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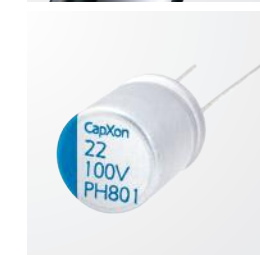
CapXon

Professional

ELECTROLYTIC CAPACITORS

2018/2019

CapXon
Catalog 2018/2019
Aluminum Electrolytic Capacitors



AEC-Q200
IATF 16949

CapXon

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* 本商品目錄所記載的內容，可能會在沒有預先通知的情況下發生更改，敬請諒解。
* Specifications subject to change without notice

Aluminum Electrolytic Capacitors Conductive Polymer Capacitors Conductive Hybrid Capacitors

**ALUMINUM
ELECTROLYTIC
CAPACITORS**

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Note:1.Specification and dimensions in this catalogue are subject to change without notice. If necessary, drawing can be provided.
2.Catalogue printed in May 2018

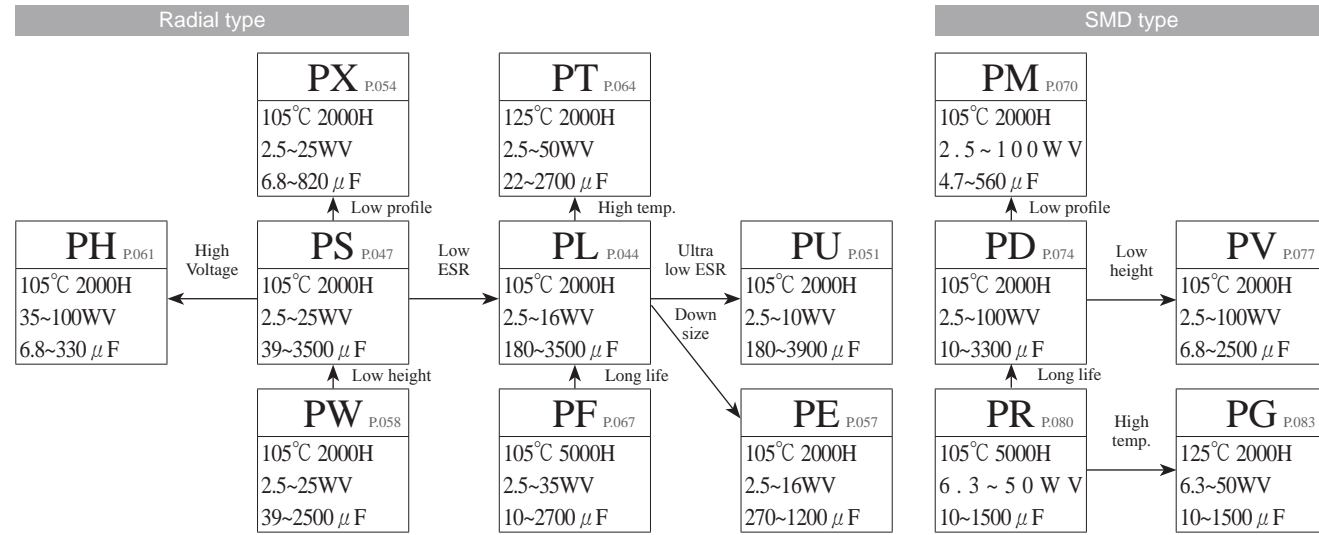
| | Series Sleeve Color | Page | Type | Features | Operating Temperature Range | Working Voltage | Capacitance | Endurance Hours |
|---------------------------|-----------------------|------|--------|---|----------------------------------|----------------------|------------------------|-----------------|
| Conductive Polymer | PL | 044 | Radial | Very low ESR | -55 to +105 °C | 2.5~16V | 180~3500μF | 2000 |
| | PS | 047 | Radial | Standard | -55 to +105 °C | 2.5~25V | 39~3500μF | 2000 |
| | PU | 051 | Radial | Ultra low ESR | -55 to +105 °C | 2.5~10V | 180~3900μF | 2000 |
| | PX | 054 | Radial | Low profile | -55 to +105 °C | 2.5~25V | 6.8~820μF | 2000 |
| | PE | 057 | Radial | Ultra low ESR, Down size to 6.3X8 (mm) | -55 to +105 °C | 2.5~16V | 270~1200μF | 2000 |
| | PW | 058 | Radial | Low height 2000Hours | -55 to +105 °C | 2.5V~25V | 39~2500μF | 2000 |
| | PH | 061 | Radial | High Voltage/High Reliability | -55 to +105 °C | 35V~100V | 6.8~330μF | 2000 |
| | PT | 064 | Radial | 125 °C Guaranteed | -55 to +125 °C | 2.5~50V | 22~2700μF | 2000 |
| | PF | 067 | Radial | Long Life to 5,000Hours | -55 to +105 °C | 2.5~35V | 10~2700μF | 5000 |
| | PM | 070 | SMD | SMD & Low profile | -55 to +105 °C | 2.5~100V | 4.7~560μF | 2000 |
| | PD | 074 | SMD | SMD & Large capacitance | -55 to +105 °C | 2.5~100V | 10~3300μF | 2000 |
| | PV | 077 | SMD | SMD & Low height | -55 to +105 °C | 2.5~100V | 6.8~2500μF | 2000 |
| | PR | 080 | SMD | SMD & Long Life to 5,000Hours | -55 to +105 °C | 6.3~50V | 10~1500μF | 5000 |
| | PG | 083 | SMD | SMD & 125 °C Guaranteed | -55 to +125 °C | 6.3~50V | 10~1500μF | 2000 |
| Hybrid Conductive Polymer | AS <small>NEW</small> | 086 | Radial | Low ESR, High Voltage, Long Life | -55 to +105 °C | 16~100V | 10~560μF | 3000~10000 |
| | AT <small>NEW</small> | 088 | Radial | 125°C, High Reliability, High Ripple Curren | -55 to +125 °C | 16~40V | 27~560μF | 3000 |
| | AA <small>NEW</small> | 090 | SMD | Low ESR, High Voltage, High Reliability, Long Life | -55 to +105 °C | 25~80V | 22~330μF | 10000 |
| | AC <small>NEW</small> | 092 | SMD | 125°C, Low ESR, High Voltage, High Reliability, Long Life | -55 to +125 °C | 25~80V | 22~330μF | 4000 |
| SMD type | EV | 094 | SMD | 105 °C, Standard | -55 to +105 °C | 6.3~50V | 0.1~1500μF | 1000 |
| | LV | 096 | SMD | 85 °C, Standard | -40 to +85 °C | 4~450V | 0.1~6800μF | 2000 |
| | HV | 099 | SMD | Wide temperature range | -55 to +105 °C -40 to +105 °C | 6.3~100V 160~450V | 0.1~6800μF 2.2~68μF | 2000 |
| | JV | 102 | SMD | 3000 hours life | -55 to +105 °C | 6.3~50V | 0.1~1000μF | 3000 |
| | MV | 104 | SMD | 5000 hours life | -40 to +105 °C | 6.3~50V | 0.1~1000μF | 5000 |
| | CV | 106 | SMD | 7000 hours life | -25 to +105 °C | 6.3~50V | 22~1500μF | 7000 |
| | NV | 108 | SMD | 5.5 ~ 10.5mm height, Non-polar | -40 to +85 °C | 6.3~50V | 0.1~560μF | 2000 |
| | KV | 110 | SMD | 85 °C, Low leakage current | -40 to +85 °C | 6.3~50V | 0.1~330μF | 1000 |
| | ZV | 112 | SMD | 105 °C, Low impedance | -55 to +105 °C | 6.3~50V | 2.2~6800μF | 2000~5000 |
| | DV | 115 | SMD | 105 °C, Low impedance | -55 to +105 °C | 6.3~100V | 1~6800μF | 2000~5000 |
| | RV | 118 | SMD | 105 °C, Low impedance, LongLife | -55 to +105 °C -40 to +105 °C | 6.3~100V 160~450V | 1~6800μF 2.2~68μF | 2000~5000 |
| | TV | 121 | SMD | For high temperature + 125 °C | -40 to +125 °C | 10~450V | 1~330μF | 1000~2000 |
| Ultra-miniature type | SS | 123 | Radial | 5mm, Standard, 85 °C | -40 to +85 °C | 4~50V | 0.1~330μF | 1000 |
| | ST | 125 | Radial | 5mm, Standard, 105 °C | -40 to +105 °C | 4~50V | 0.1~220μF | 1000 |
| | SA | 127 | Radial | 5mm, Low leakage current | -40 to +85 °C | 4~50V | 0.1~100μF | 1000 |
| | SP | 129 | Radial | 5mm, Non-polar | -40 to +85 °C | 6.3~50V | 0.1~47μF | 1000 |
| | SM | 131 | Radial | 7mm, Standard, 85 °C | -40 to +85 °C | 4~63V | 0.1~470μF | 1000 |
| | SH | 133 | Radial | 7mm, 85 °C, Long life | -40 to +85 °C | 4~63V | 0.1~470μF | 2000 |
| | SK | 135 | Radial | 7mm, Standard, 105 °C | -40 to +105 °C | 4~63V | 0.1~470μF | 1000 |
| | SJ | 137 | Radial | 7mm, 105 °C, Long life 2000 hours | -40 to +105 °C | 6.3~63V | 0.1~220μF | 2000 |
| | SG | 139 | Radial | 7mm, 105 °C, Long life 4000 hours | -40 to +105 °C | 6.3~50V | 0.1~470μF | 4000 |
| | SL | 141 | Radial | 7mm, Low leakage current, 85 °C | -40 to +85 °C | 6.3~50V | 0.1~220μF | 1000 |
| | SD | 143 | Radial | 7mm, Low leakage current, 105 °C | -40 to +105 °C | 4~63V | 0.1~100μF | 1000 |
| | SN | 145 | Radial | 7~ 9mm, Non-polar, 85 °C | -40 to +85 °C | 6.3~50V | 0.1~220μF | 1000 |

| | Series Sleeve Color | Page | Type | Features | Operating Temperature Range | Working Voltage | Capacitance | Endurance Hours |
|--------------------------|---------------------|------|--------|--|----------------------------------|----------------------|----------------------------|-----------------|
| Ultra-miniature type | SB | 147 | Radial | 7mm, Non-polar, 105 °C | -40 to +105 °C | 6.3~50V | 0.1~100μF | 1000 |
| | SZ | 149 | Radial | 7mm, Low impedance | -55 to +105 °C | 6.3~35V | 6.8~330μF | 1000 |
| | SY | 151 | Radial | 7mm, Low impedance, Long life | -55 to +105 °C | 6.3~50V | 1~330μF | 2000 |
| Standard type | GS | 153 | Radial | General purpose, 85 °C | -40 to +85 °C -25 to +85 °C | 6.3~100V 160~450V | 0.1~33000μF 0.47~560μF | 2000 |
| | GW | 158 | Radial | 9~25mm height low profile, 85 °C | -40 to +85 °C -25 to +85 °C | 6.3~100V 160~450V | 2.2~10000μF 2.2~220μF | 2000 |
| | KM | 161 | Radial | Standard, 105 °C | -40 to +105 °C -25 to +105 °C | 6.3~100V 160~500V | 0.1~22000μF 0.47~560μF | 2000 |
| | KW | 167 | Radial | 9~25mm height low profile, 105 °C | -40 to +105 °C -25 to +105 °C | 6.3~100V 160~450V | 2.2~10000μF 1.5~150μF | 2000 |
| | KC | 170 | Radial | Ultra Miniaturized | -25 to +105 °C | 400~450V | 82~220μF | 3000 |
| | LL | 172 | Radial | Low leakage current | -40 to +105 °C | 6.3~63V | 0.1~2200μF | 2000 |
| Low Impedance / ESR type | GL | 174 | Radial | Low impedance and Low ESR Miniaturized | -55 to +105 °C | 6.3~63V | 0.47~10000μF | 2000~6000 |
| | KF | 177 | Radial | Low impedance for power supply | -40 to +105 °C -25 to +105 °C | 6.3~100V 160~450V | 0.47~15000μF 0.47~330μF | 2000~5000 |
| | KZ | 182 | Radial | Low impedance | -40 to +105 °C | 6.3~50V | 0.47~6800μF | 1000~2000 |
| | GF | 185 | Radial | Low impedance | -55 to +105 °C | 6.3V~100V | 4.7~6800μF | 2000~5000 |
| | LZ | 188 | Radial | Ultra low ESR and High ripple current | -40 to +105 °C | 6.3~25V | 220~3300μF | 2000 |
| | GH | 190 | Radial | High temperature and Long life | -55 to +105 °C | 6.3~100V | 0.47~12000μF | 5000~10000 |
| | GT | 196 | Radial | Miniaturized and Long life | -40 to +105 °C | 10~100V | 1~330μF | 10000 |
| For lighting | FB | * | Radial | 105°C standard | -40 to +105 °C | 6.3~120V | 0.47~22000uF | 2000 |
| | FC | * | Radial | high ripple current and Low ESR | -40 to +105 °C | 6.3~120V | 0.47~22000uF | 3000~6000 |
| | FD | * | Radial | High Reliability | -40 to +105 °C | 6.3~120V | 0.47~22000uF | 4000~8000 |
| | FE | * | Radial | high ripple current, Low ESR and long life | -40 to +105 °C | 6.3~120V | 0.47~22000uF | 5000~10000 |
| | FF | * | Radial | Miniaturized and Long life | -40 to +105 °C | 6.3~120V | 0.47~22000uF | 6000~12000 |
| | FG | * | Radial | For hing temperature +130°C , Long life | -40 to +130°C | 6.3~100V | 0.47~22000uF | 2000~5000 |
| | FR | * | Radial | 105°C standard | -40 to +105 °C | 160~550V | 0.47~560uF | 2000 |
| | FS | * | Radial | Miniaturized , high cost performance | -40 to +105 °C | 160~500V | 0.47~560uF | 3000 |
| | FT | * | Radial | Miniaturized and Long life , Economical | -40 to +105 °C | 160~500V | 0.47~560uF | 6000 |
| | FU | * | Radial | Miniaturized and Long life | -40 to +105 °C | 160~500V | 0.47~560uF | 10000 |
| | FW | * | Radial | Miniaturized and Utlar Long life | -40 to +105 °C | 160~450V | 1~560uF | 12000~20000 |
| | FX | * | Radial | For hing temperature +130°C , Miniaturized and Long life | -40 to +130°C | 160~450V | 1~560uF | 2000~5000 |
| High reliability type | FH | 198 | Radial | Low ESR and Long Life | -40 to +105 °C | 6.3V~100V | 6.8~18000μF | 4000~10000 |
| | ZH | 202 | Radial | Ultra low ESR and Long Life | -40 to +105 °C | 6.3V~100V | 8.2~8200μF | 6000~10000 |
| | KL | 205 | Radial | Long life 5,000 hours | -40 to +105 °C -25 to +105 °C | 160~400V 450~500V | 3.3~330μF 2.2~180μF | 5000 |
| | KH | 208 | Radial | Long life 5,000~10,000 hours | -40 to +105 °C -25 to +105 °C | 10~400V 450V | 6.8~3300μF 6.8~100μF | 5000~10000 |
| | TH | 211 | Radial | For high temperature +125 °C | -40 to +125 °C -25 to +125 °C | 10~400V 450V | 0.47~8200μF 1~47μF | 1000~3000 |
| | TE | 215 | Radial | For high temperature +130 °C | -40 to +130 °C -25 to +130 °C | 10~400V 450V | 2.2~4700μF 1~100μF | 1000~3000 |
| | KS | 218 | Radial | Over voltage vent operating facility | -25 to +105 °C | 200,400W | 4.7~470μF | 2000 |
| | FK | 220 | Radial | Long life for LED and ballast | -40 to +105 °C -25 to +105 °C | 160~450V 500V | 1~330μF 4.7~120μF | 6000~8000 |
| | FL | 223 | Radial | Long life for LED and ballast | -40 to +105 °C -25 to +105 °C | 160~450V 500V | 1~680μF 10~68μF | 8000~12000 |
| | LE | 227 | Radial | Long life for LED lighting | -40 to +105 °C | 160~450W | 1~68μF | 12000~20000 |
| | KY | 229 | Radial | Slim type | -25 to +105 °C | 250~450W | 12~150μF | 2000 |
| | LY | 231 | Radial | Slim type, longlife 5000hours | -25 to +105 °C | 250~450W | 12~150μF | 5000 |
| | HY | 233 | Radial | Slim type, longlife 10000hours | -25 to +105 °C | 250~450W | 12~120μF | 10000 |

| | Series Sleeve Color | Page | Type | Features | Operating Temperature Range | Working Voltage | Capacitance | Endurance Hours |
|----------------------|-----------------------|-------|---|--|----------------------------------|----------------------|-------------------------------|-----------------|
| Non-polarized type | NP | 235 | Radial | Non-polarized,85°C | -40 to +85 °C -25 to +85 °C | 6.3~100V 160~250V | 0.47~3300μF 0.47~47μF | 2000 |
| | NK | 237 | Radial | Non-polarized,105°C | -40 to +105 °C -25 to +105°C | 6.3~100V 160~250V | 0.47~3300μF 0.47~47μF | 2000 |
| For Audio Equipment | SW | 239 | Radial | 5mm height,for audio equipment | -40 to +85°C | 4~50V | 0.1~470μF | 1000 |
| | SR | 241 | Radial | 7mm height,for audio equipment | -40 to +85°C | 6.3~50V | 0.1~220μF | 1000 |
| | RW | 243 | Radial | standard,for audio equipment | -40 to +85°C | 6.3~100V | 0.1~33000μF | 2000 |
| | NR | 245 | Radial | Non-polar,for audio equipment | -40 to +85°C | 6.3~100V | 0.15~1000μF | 2000 |
| Photo flash type | SF | 247 | Snap-in | Photo flash equipment | -20 to +55°C | 330/350V | 150~1500μF | 5000 times |
| | RF | 248 | Radial | Photo flash equipment | -20 to +55°C | 330/350V | 100~450μF | 5000 times |
| Large can type | LR | 249 | Snap-in | 85°C , for audio equipment | -40 to +85°C | 16~100V | 680~33000μF | 2000 |
| | LP | 254 | Snap-in | 85 °C, Standard | -40 to +85 °C -25 to +85 °C | 6.3~450V 500~600V | 22~100000μF 47~1500μF | 2000 |
| | LU | 263 | Snap-in | 85 °C, Longlife 3000hours | -40 to +85 °C -25 to +85 °C | 10~450V 500~600V | 47~82000μF 47~1500μF | 3000 |
| | LD <small>NEW</small> | 272 | Snap-in | 85 °C, Longlife 5000hours | -40 to +85 °C -25 to +85 °C | 10~450V 500V | 47~100000μF 47~1500μF | 5000 |
| | HP | 280 | Snap-in | 105 °C, Standard | -40 to +105 °C -25 to +105 °C | 6.3~450V 500~550V | 56~100000μF 47~1000μF | 2000 |
| | HW | 290 | Snap-in | 105 °C, Low Profile 15mm height | -40 to +105 °C | 160~400V | 39~390μF | 2000 |
| | HU | 293 | Snap-in | 105 °C, Longlife 3000hours | -40 to +105 °C -25 to +105 °C | 10~450V 500V | 33~82000μF 39~470μF | 3000 |
| | HL | 302 | Snap-in | Long life with low ESR | -40 to +105 °C -25 to +105 °C | 10~450V 500V | 39~56000μF 47~470μF | 5000 |
| | LT | 310 | Snap-in | 4 Snap-in terminals type | -40 to +85 °C -25 to +85 °C | 16~450V 500V | 330~82000μF 220~1500μF | 2000 |
| | HT | 314 | Snap-in | 4 Snap-in terminals type | -40 to +105°C | 160~450V | 82~2700μF | 2000 |
| For inverter | UB | 318 | Snap-in | Useful life 5000hours | -40 to +105 °C -25 to +105 °C | 200~450V 500V | 68~3300μF 100~1500μF | 2000 |
| | UC | 323 | Snap-in | Useful life 7000hours | -40 to +105 °C -25 to +105 °C | 200~450V 500~630V | 68~6800μF 56~1500μF | 3000 |
| | UD | 329 | Snap-in | Useful life 10000hours | -40 to +105 °C -25 to +105 °C | 200~450V 500~600V | 68~2700μF 47~680μF | 5000 |
| | UJ | 334 | Snap-in | Useful life 5000hours | -40 to +105 °C -25 to +105 °C | 200~450V 500~550V | 82~3300μF 47~1000μF | 2000 |
| | UK | 339 | Snap-in | Useful life 8000hours | -40 to +105 °C -25 to +105 °C | 200~450V 500~550V | 68~2200μF 47~680μF | 3000 |
| | UL | 344 | Snap-in | Useful life 10000hours | -40 to +105 °C -25 to +105 °C | 200~450V 500~550V | 82~2700μF 47~680μF | 5000 |
| Screw large can type | RS | 350 | Screw | General,useful life 12000hours | -40 to +85 °C | 10~100V | 1800~1000000μF | 2000 |
| | RG | 355 | Screw | Useful life 6000hours | -40 to +85 °C -25 to +85 °C | 160~450V 500~630V | 390~39000μF 1000~10000μF | 2000 |
| | RP | 359 | Screw | Useful life 10000hours | -40 to +85 °C -25 to +85 °C | 160~450V 500~630V | 270~68000μF 100~10000μF | 2000 |
| | RX | 365 | Screw | useful life 20000hours | -40 to +85 °C -25 to +85 °C | 160~450V 500~650V | 220~100000μF 10000~15000μF | 5000 |
| | RU | 371 | Screw | useful life 12000hours high ripple current | -40 to +85 °C -25 to +85 °C | 160~450V 500V | 1000~33000μF 820~10000μF | 2000 |
| | RJ | 375 | Screw | useful life 10000hours with stud | -40 to +85 °C | 350~450V | 1500~22000μF | 2000 |
| | RY | 378 | Screw | useful life 12000hours high ripple current with stud | -40 to +85 °C | 350~450V | 1500~22000μF | 2000 |
| | RK | 381 | Screw | General | -40 to +105 °C | 10~100V | 1000~1000000μF | 2000 |
| | RL | 386 | Screw | Long life | -40 to +105 °C -25 to +105 °C | 160~450V 500V | 220~22000μF 680~8200μF | 5000 |
| | RM | 391 | Screw | useful life 6000hours | -40 to +105 °C -25 to +105 °C | 160~450V 500V | 180~68000μF 330~10000μF | 2000 |
| | RH | 396 | Screw | useful life 8000hours high ripple current | -40 to +105 °C | 160~450V | 220~47000μF | 2000 |
| | RQ | 400 | Screw | useful life 6000hours with stud | -40 to +105 °C | 160~450V | 2200~47000μF | 2000 |
| RT | 403 | Screw | useful life 8000hours high ripple current with stud | -40 to +105 °C | 160~450V | 2200~47000μF | 2000 | |

※About the Aluminum Electrolytic Capacitor related to Automotive Electronics applications, please contact us.

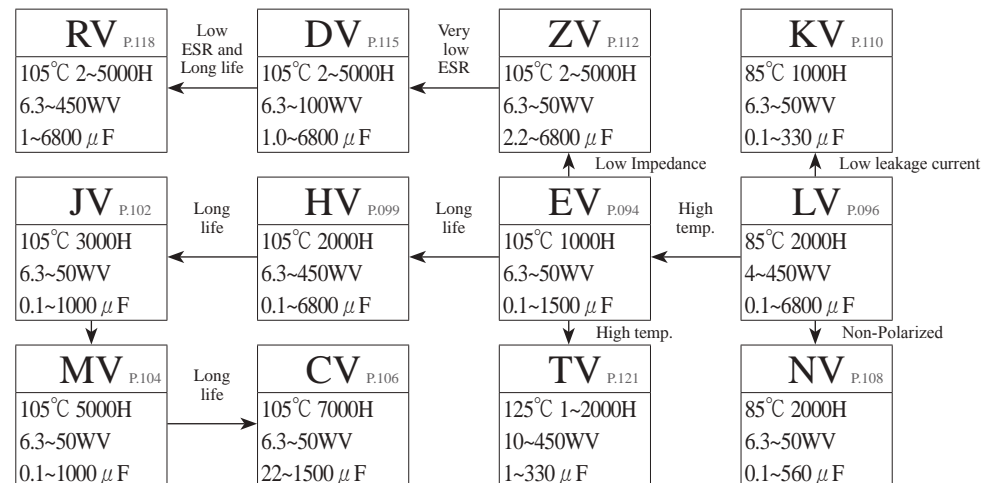
Radial type of Aluminum Electrolytic Capacitors



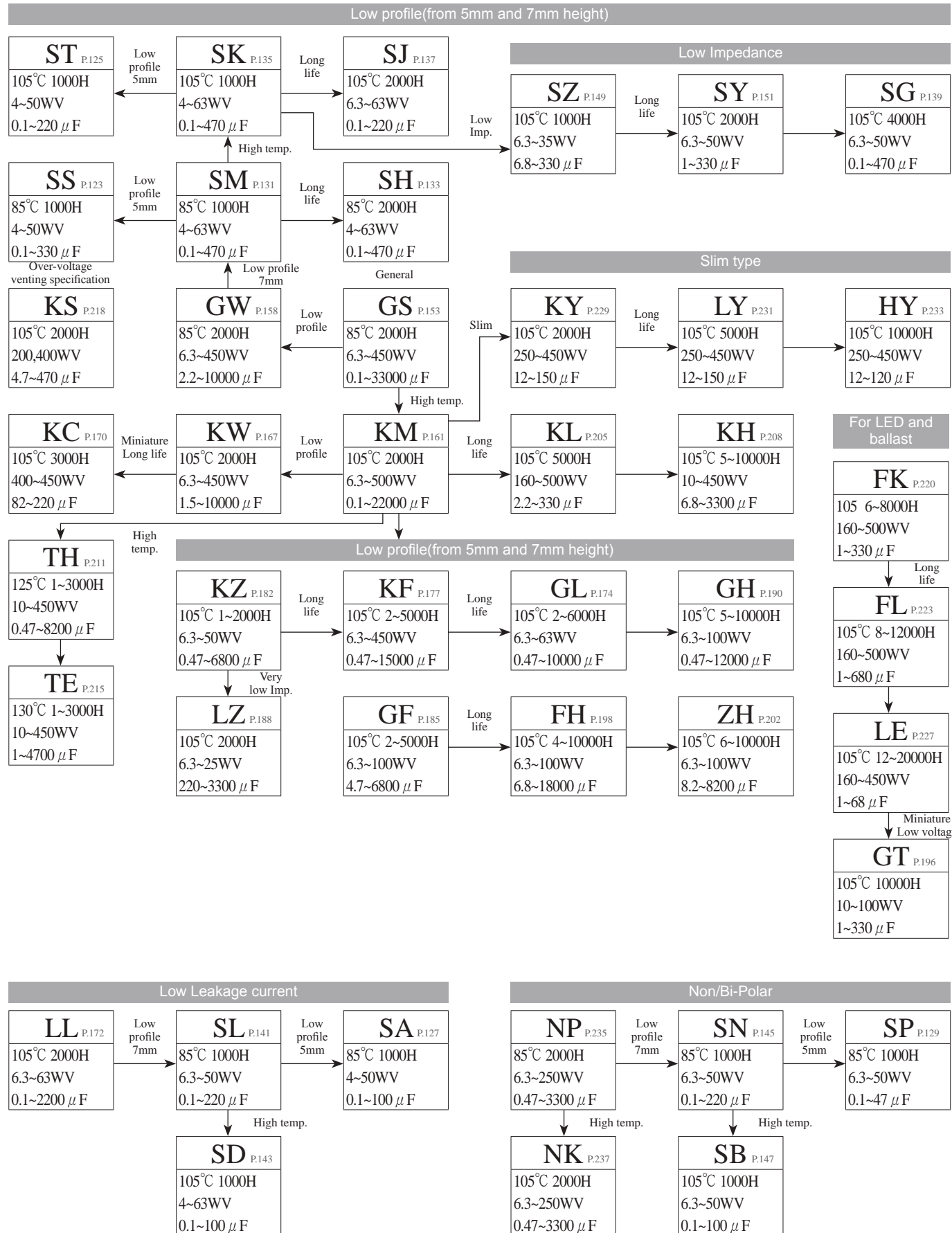
Hybrid Conductive Polymer Aluminum Electrolytic Capacitors



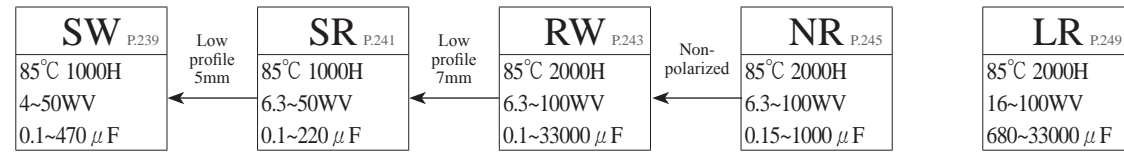
SMD type of Aluminum Electrolytic Capacitors



Radial type of Aluminum Electrolytic Capacitors



Aluminum Electrolytic Capacitors for audio equipment



Snap-in type of Aluminum Electrolytic Capacitors

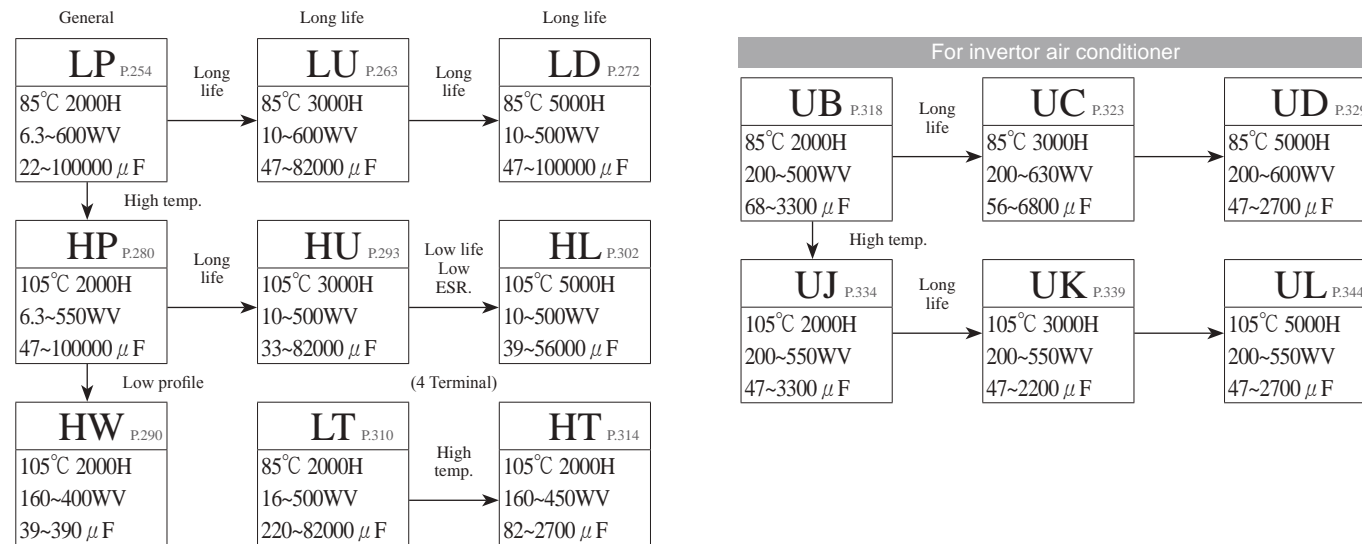
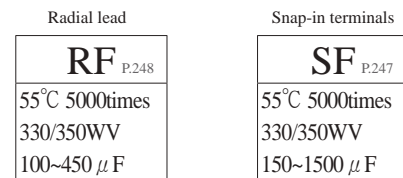
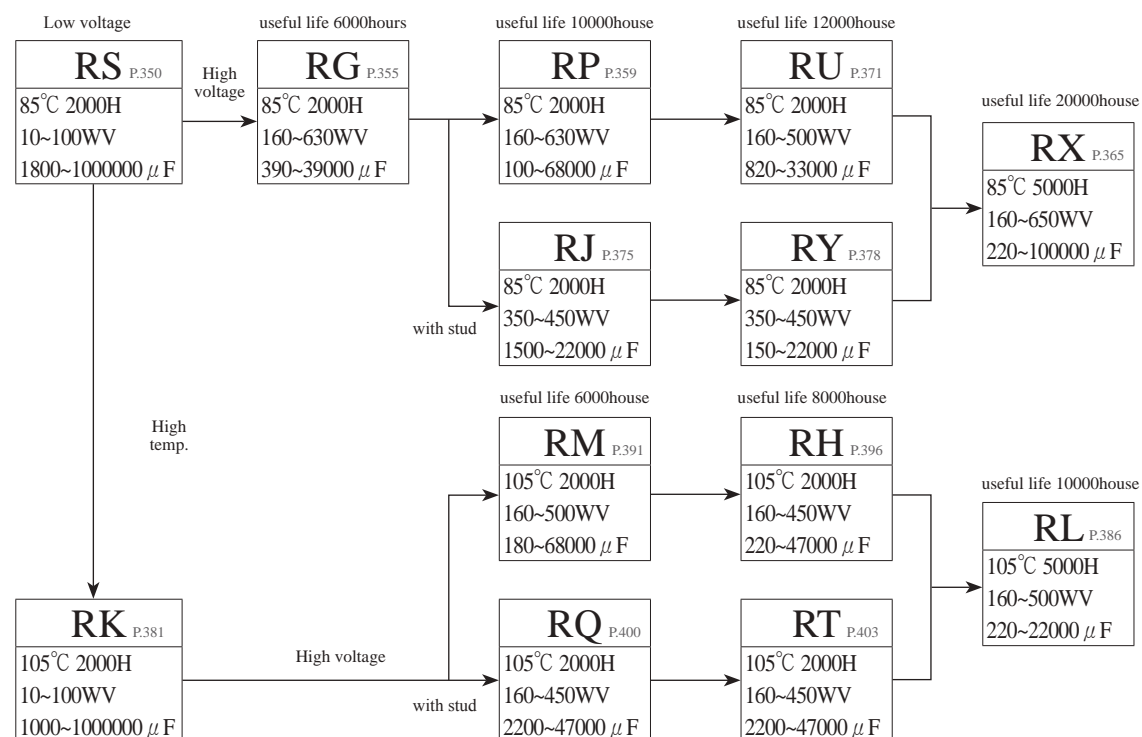
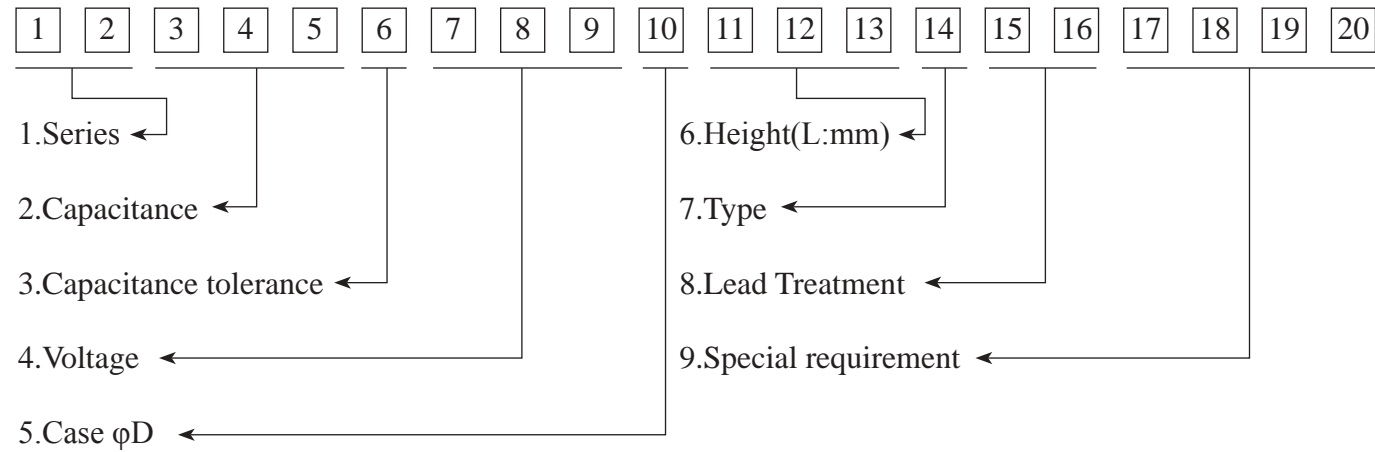


Photo flash type of Aluminum Electrolytic Capacitors



Screw type of Aluminum Electrolytic Capacitors





(1) Series
 For the details, please refer to "List of the Products" on page3.

(2) Capacitance
 Capacitance is shown in microfarads(uF)

| μF | 0.1 | 0.47 | 1 | 4.7 | 10 | 100 | 1000 | 10000 |
|------|-----|------|-----|-----|-----|-----|------|-------|
| Code | 0R1 | R47 | 010 | 4R7 | 100 | 101 | 102 | 103 |

(3) Capacitance tolerance

| Tolerance% | ±5 | ±10 | ±20 | ±30 | -10to+30 | -10to+50 | -10to+20 | -10to100 | 0to+20 | -30to+0 | ±15 |
|------------|--------|--------|--------|---------|----------|----------|----------|----------|----------|---------|---------|
| Code | H | K | M | N | Q | T | V | W | Z | U | S |
| Tolerance% | 0to+30 | 0to+40 | 0to+50 | -5to+20 | -8to+5 | +5to+20 | 0to-20 | -15to+20 | -25to+20 | -50to+0 | -5to+30 |
| Code | Y | X | A | J | E | I | B | P | L | O | C |

(4) Voltage(W.V)

| Voltage(W.V) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160 | 200 | 220 | 250 | 350 | 400 | 420 | 450 | 500 |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 6R3 | 010 | 016 | 025 | 035 | 050 | 063 | 080 | 100 | 160 | 200 | 220 | 250 | 350 | 400 | 420 | 450 | 500 |

(5) Case(φD)

| Diameter | 3 | 4 | 5 | 6.3 | 8 | 10 | 12 | 12.5 | 13 | 14.5 | 16 | 18 | 20 | 22 | 25 | 30 | 35 | 40 | 42 | 45 | 51 | 63.5 | 76.2 | 89 | 100 |
|----------|---|---|---|-----|---|----|----|------|----|------|----|----|----|----|----|----|----|----|----|----|----|------|------|----|-----|
| Code | A | B | C | E | F | G | H | Z | I | Y | J | K | L | M | N | O | P | Q | U | V | R | S | T | X | D |

(6) Height(L:mm)

| Description | 5 | 5.5 | 5.8 | 6.5 | 7 | 7.7 | 8 | 8.7 | 9 | 10 | 10.5 | 11 | 12.5 | 14 | 16 | 17 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|
| Code | 050 | 055 | 058 | 065 | 070 | 077 | 080 | 087 | 090 | 100 | 105 | 110 | 125 | 140 | 160 | 170 |

| Description | 20 | 25 | 25.5 | 31.5 | 35 | 35.5 | 41 | 47 | 52 | 83 | 98 | 118 | 141 | 151 |
|-------------|-----|-----|------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | 200 | 250 | 255 | 315 | 350 | 355 | 410 | 470 | 520 | 830 | 980 | A18 | A41 | A51 |

(7) Type

| Type | Without Lead Treatment | With Lead Treatment | Polymer |
|------|------------------------|---------------------|---------|
| Code | A | E | P |

(8) Lead Treatment
 For the details, please refer to page10-15.

(9) Special & appearance requirement (The 17th, 18th, 19th, 20th code)

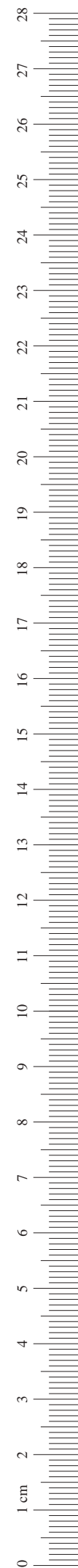
| Code | Special |
|------|--------------------|
| A | Terminal |
| B | Rubber |
| C | Lead wire |
| D | DF |
| E | Electrolyte |
| F | Pitch |
| G | Fill glue |
| H | Height requirement |

| Code | Special |
|------|---------------------------------|
| I | LC |
| K | Vent line |
| L | Life |
| N | Nude |
| P | Sleeve, tray, print, PVC sleeve |
| Q | Capacitance, Cv, Break |
| R | Ripple current |
| S | Countermeasure |

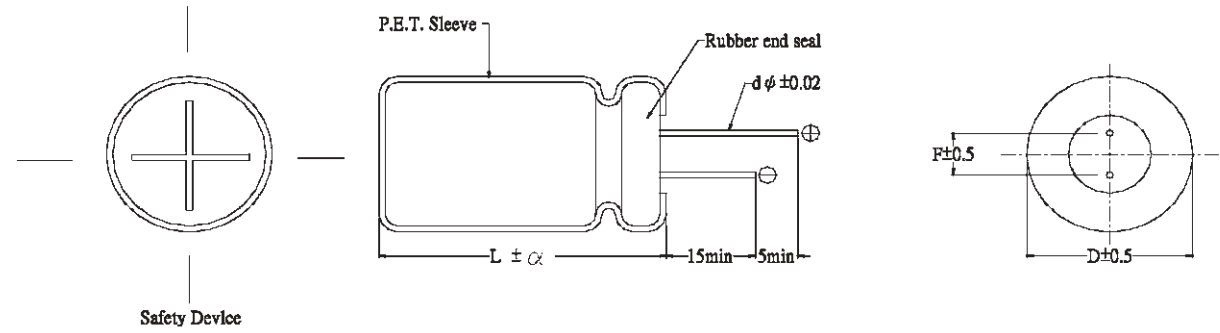
| Code | Special |
|------|---|
| T | Temperature characteristic |
| V | Vt, Electrolyte paper |
| M | solder, technics, form. Case with stud |
| Y | clip loop |
| Z | Impedance |
| U | Package& Label |

Remark:

1. If it's without lead treatment & special requirement, after the 14th code is blank
2. If it's with lead treatment & without require special requirement, the 17th 18th 19th 20th code is blank
3. If it's without lead treatment, but, with special requirement, the 15th 16th code filled with 0.
4. If it's without lead treatment, but with special requirement, also exceed 4 kinds, keystone characteristic is 4code.
5. If it's with lead treatment, but with 1 special requirement, only remark 17 code, latter three code is blank.
6. If it's with led treatment, but with 1 special requirement, and it is different from former data, the 17th is 0, the 18th code is characteristic.



Standard



| α | D < 16 | D=16 | | D=18 | | D > 18 |
|---|--------|-----------|-------------------|-----------|---------------------|--------|
| | | L:25~35.5 | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 |

| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 |
|----|------|-----|-----|---------------|---------------|-----|-----|-----|----|------|
| F | 1.5 | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10 | 12.5 |
| dφ | 0.45 | 0.5 | | L < 20 0.5 | L ≥ 20 0.6 | 0.6 | | 0.8 | | 1.0 |

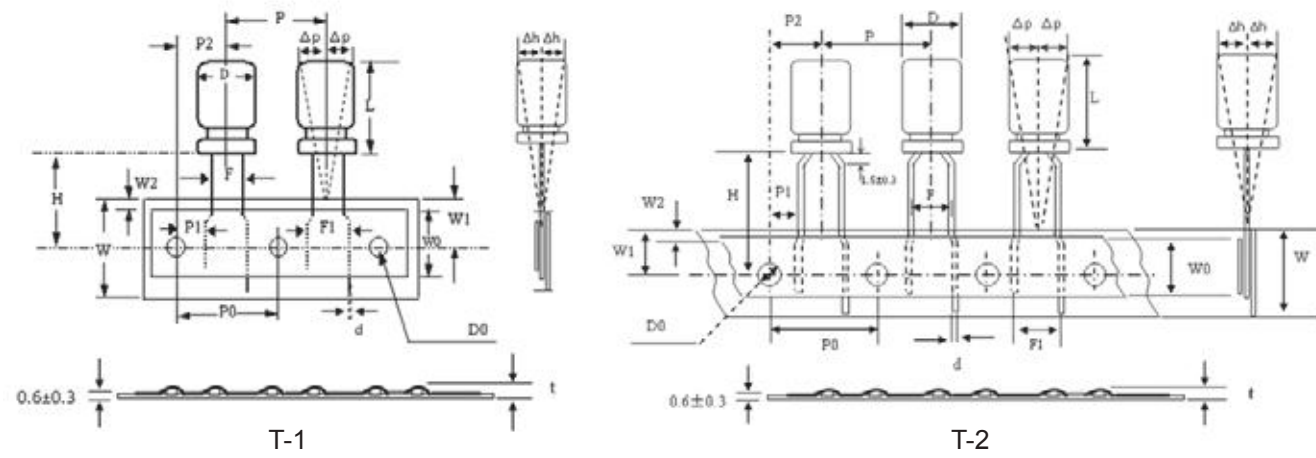
Cutting & Forming

| Part No.Code (15th, 16th) | Cutting & Forming | Size (mm) | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|-------------------|--|------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|
| CF | <p>Fig1</p> | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> </tr> <tr> <td>F</td> <td>2</td> <td>2.5</td> </tr> </table> <p>*Length "H" customized</p> | Dφ | 4 | 5 | F | 2 | 2.5 | | | | | | | | | | | | | | | | |
| | Dφ | 4 | 5 | | | | | | | | | | | | | | | | | | | | | |
| F | 2 | 2.5 | | | | | | | | | | | | | | | | | | | | | | |
| CF | <p>Fig2</p> | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>4</td> <td>4</td> <td>5</td> <td>5</td> <td>6.3</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> </tr> <tr> <td>F</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>3.5</td> <td>5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> </tr> </table> <p>*Length "H" customized</p> | Dφ | 4 | 4 | 4 | 5 | 5 | 6.3 | 6.3 | 8 | 10 | 13 | F | 2.5 | 3.5 | 5 | 3.5 | 5 | 3.5 | 5 | 5 | 7.5 | 7.5 |
| | Dφ | 4 | 4 | 4 | 5 | 5 | 6.3 | 6.3 | 8 | 10 | 13 | | | | | | | | | | | | | |
| F | 2.5 | 3.5 | 5 | 3.5 | 5 | 3.5 | 5 | 5 | 7.5 | 7.5 | | | | | | | | | | | | | | |
| KF | <p>Fig1</p> | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> </tr> <tr> <td>F</td> <td>2</td> <td>2.5</td> </tr> <tr> <td>E</td> <td>1.12</td> <td>1.12</td> </tr> <tr> <td>H1</td> <td>4</td> <td>4</td> </tr> <tr> <td>H2</td> <td>1.8</td> <td>1.8</td> </tr> </table> | Dφ | 4 | 5 | F | 2 | 2.5 | E | 1.12 | 1.12 | H1 | 4 | 4 | H2 | 1.8 | 1.8 | | | | | | | |
| | Dφ | 4 | 5 | | | | | | | | | | | | | | | | | | | | | |
| F | 2 | 2.5 | | | | | | | | | | | | | | | | | | | | | | |
| E | 1.12 | 1.12 | | | | | | | | | | | | | | | | | | | | | | |
| H1 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| H2 | 1.8 | 1.8 | | | | | | | | | | | | | | | | | | | | | | |
| KF | <p>Fig2</p> | <table border="1"> <tr> <td>Dφ</td> <td>5</td> <td>6.3</td> <td>8</td> </tr> <tr> <td>F</td> <td>5</td> <td>5</td> <td>5</td> </tr> <tr> <td>E</td> <td>1.12</td> <td>1.12</td> <td>1.32</td> </tr> <tr> <td>H1</td> <td>4</td> <td>4</td> <td>4</td> </tr> <tr> <td>H2</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> </tr> </table> | Dφ | 5 | 6.3 | 8 | F | 5 | 5 | 5 | E | 1.12 | 1.12 | 1.32 | H1 | 4 | 4 | 4 | H2 | 1.8 | 1.8 | 1.8 | | |
| | Dφ | 5 | 6.3 | 8 | | | | | | | | | | | | | | | | | | | | |
| F | 5 | 5 | 5 | | | | | | | | | | | | | | | | | | | | | |
| E | 1.12 | 1.12 | 1.32 | | | | | | | | | | | | | | | | | | | | | |
| H1 | 4 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | |
| H2 | 1.8 | 1.8 | 1.8 | | | | | | | | | | | | | | | | | | | | | |

| Part No.Code (15th, 16th) | Cutting & Forming | Size (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|-------------------|--|------|------|------|------|------|------|-----|------|------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|----|----|----|----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| CA | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> <td>22</td> <td>25</td> </tr> <tr> <td>F</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> <td>10</td> <td>12.5</td> </tr> </table> <p>*Length "H1" customized</p> | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FA FB FC FD FE | | <p>Fig1</p> <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> </tr> <tr> <td>F</td> <td>2</td> <td>2.5</td> <td>3.5</td> </tr> <tr> <td>code</td> <td>FB</td> <td>FC</td> <td>FD</td> </tr> </table> <p>Fig2</p> <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> </tr> <tr> <td>F</td> <td>5</td> <td>5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> </tr> <tr> <td>code</td> <td>FA</td> <td>FA</td> <td>FA</td> <td>FA</td> <td>FE</td> <td>FE</td> </tr> </table> | Dφ | 4 | 5 | 6.3 | F | 2 | 2.5 | 3.5 | code | FB | FC | FD | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | F | 5 | 5 | 5 | 5 | 7.5 | 7.5 | code | FA | FA | FA | FA | FE | FE | | | | | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 2 | 2.5 | 3.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| code | FB | FC | FD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 5 | 5 | 5 | 5 | 7.5 | 7.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| code | FA | FA | FA | FA | FE | FE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CK | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> </tr> <tr> <td>F</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> </tr> <tr> <td>C</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> </tr> <tr> <td>K</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> </tr> </table> | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | C | 4 | 4 | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | K | 4 | 4 | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | 4 | 4 | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K | 4 | 4 | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KA | | <table border="1"> <tr> <td>Dφ</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> <td>22</td> </tr> <tr> <td>F</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> <td>10</td> </tr> <tr> <td>E</td> <td>1.12</td> <td>1.12</td> <td>1.32</td> <td>1.32</td> <td>1.32</td> <td>1.32</td> <td>1.32</td> <td>1.82</td> </tr> <tr> <td>H1</td> <td>4</td> <td>4</td> <td>4</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> <td>4.5</td> </tr> <tr> <td>H2</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> </tr> </table> | Dφ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | F | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | E | 1.12 | 1.12 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.82 | H1 | 4 | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | H2 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| Dφ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | 1.12 | 1.12 | 1.32 | 1.32 | 1.32 | 1.32 | 1.32 | 1.82 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | 4 | 4 | 4 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H2 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Part No.Code (15th, 16th) | Cutting & Forming | Size (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|-------------------|--|-----|-----|-----|-----|-----|-----|-----|------|----|----|----|-----|-----|-----|-----|-----|---|---|-----|-----|----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| EF | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> </tr> <tr> <td>F</td> <td>5</td> <td>5</td> <td>5</td> <td>5</td> </tr> <tr> <td>F1</td> <td>1.2</td> <td>1.2</td> <td>1.2</td> <td>1.2</td> </tr> <tr> <td>H1</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> </tr> <tr> <td>H2</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> <td>1.8</td> </tr> </table> | Dφ | 4 | 5 | 6.3 | 8 | F | 5 | 5 | 5 | 5 | F1 | 1.2 | 1.2 | 1.2 | 1.2 | H1 | 4 | 4 | 4 | 4 | H2 | 1.8 | 1.8 | 1.8 | 1.8 | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 5 | 5 | 5 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F1 | 1.2 | 1.2 | 1.2 | 1.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H2 | 1.8 | 1.8 | 1.8 | 1.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CR | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> <td>22</td> <td>25</td> </tr> <tr> <td>F</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> <td>10</td> <td>12.5</td> </tr> <tr> <td>H1</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> </tr> </table> <p>*Length "H2" customized</p> | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | H1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CL | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> <td>22</td> <td>25</td> </tr> <tr> <td>F</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> <td>10</td> <td>12.5</td> </tr> <tr> <td>H1</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> <td>2.5</td> </tr> </table> <p>*Length "H2" customized</p> | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | H1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| H1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CS | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> <td>22</td> <td>25</td> </tr> <tr> <td>F</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> <td>10</td> <td>12.5</td> </tr> </table> <p>*Length "H" "H1" "H2" customized</p> | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CZ | | <table border="1"> <tr> <td>Dφ</td> <td>4</td> <td>5</td> <td>6.3</td> <td>8</td> <td>10</td> <td>13</td> <td>16</td> <td>18</td> <td>22</td> <td>25</td> </tr> <tr> <td>F</td> <td>1.5</td> <td>2</td> <td>2.5</td> <td>3.5</td> <td>5</td> <td>5</td> <td>7.5</td> <td>7.5</td> <td>10</td> <td>12.5</td> </tr> </table> <p>*Length "H" "H1" "H2" customized</p> | Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | |
| Dφ | 4 | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | 1.5 | 2 | 2.5 | 3.5 | 5 | 5 | 7.5 | 7.5 | 10 | 12.5 | | | | | | | | | | | | | | | | | | | | | | | | | |

Taping



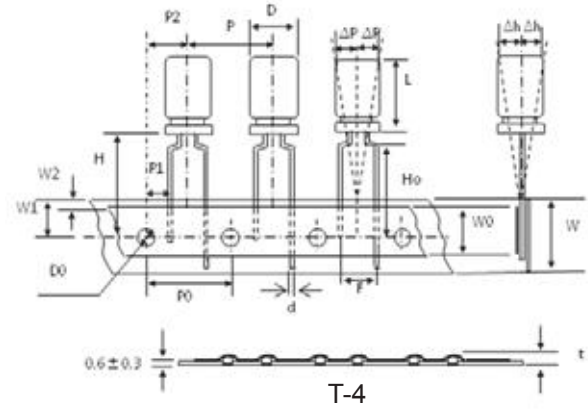
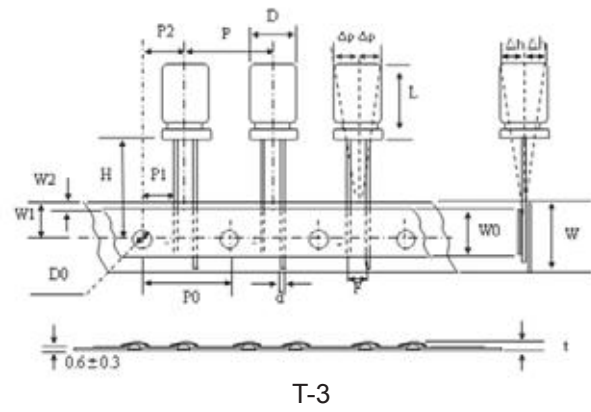
Specification Information

| Code | D | L | d | P | P0 | P1 | P2 | F | F1 | W | W0 | W1 | W2 | H | D0 | Δh | ΔP | t | code | Fig |
|------|------|-------------|-------|------|------|------|------|--------------|------|------|------|------|-----|---------------|------|-----|-----|-----|------|-----|
| Tol. | ±0.5 | / | ±0.02 | ±1.0 | ±0.2 | ±0.7 | ±1.3 | +0.4 -0.2 | ±0.5 | ±0.5 | ±0.5 | ±0.5 | Max | +0.75 -0.5 | ±0.2 | Max | Max | Max | | |
| Item | 5 | 5-7(+1) | 0.45 | 12.7 | 12.7 | 4.6 | 6.35 | 2 | 3.5 | 18 | 11 | 9 | 2 | 18.5 | 4 | 1 | 1 | 1.5 | TB | T-1 |
| | | 9(±2) | 0.5 | | | | | | | | | | | | | | | | | |
| | | 11-15(±1.5) | 0.5 | | | | | | | | | | | | | | | | | |

| Code | D | L | d | P | P0 | P1 | P2 | F | F1 | W | W0 | W1 | W2 | H | D0 | Δh | ΔP | t | code | Fig |
|------|-------------|---------|-------|------|------|------|------|--------------|------|------|------|------|------|---------------|------|-----|-----|-----|------|-----|
| Tol. | ±0.5 | / | ±0.02 | ±1.0 | ±0.2 | ±0.7 | ±1.3 | +0.4 -0.2 | ±0.5 | ±0.5 | ±0.5 | ±0.5 | Max | +0.75 -0.5 | ±0.2 | Max | Max | Max | | |
| Item | 4 | 5-7(+1) | 0.45 | 12.7 | 12.7 | 4.6 | 6.35 | 2 | 3.5 | 18 | 11 | 9 | 2 | 18.5 | 4 | 1 | 1 | 1.5 | TB | T-2 |
| | | 2.5 | TC | | | | | | | | | | | | | | | | | |
| | | 5-7(+1) | 0.45 | | | | | | | | | | | | | | | | | |
| 5 | 9(±2) | 0.5 | 12.7 | 12.7 | 4.6 | 6.35 | 2.5 | 3.5 | 18 | 11 | 9 | 2 | 18.5 | 4 | 1 | 1 | 1.5 | TC | | |
| | 11-15(±1.5) | 0.5 | | | | | | | | | | | | | | | | | | |

*: In this case, that is suitable for polymer.

Taping

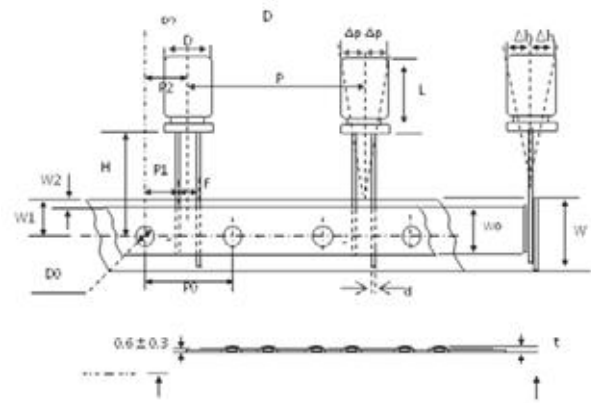


Specification Information

| Code | D | L | d | P | P0 | P1 | P2 | F | W | W0 | W1 | W2 | H | D0 | Δh | ΔP | t | code | Fig |
|-------------|---------------|---------------|-------|------|------|------|------|--|------|------|------|-----|---|------|-----|-----|-----|------|-----|
| Tol. | ±0.5 | / | ±0.02 | ±1.0 | ±0.2 | ±0.7 | ±1.3 | $\begin{matrix} +0.4 \\ -0.2 \end{matrix}$ | ±0.5 | ±0.5 | ±0.5 | Max | $\begin{matrix} +0.75 \\ -0.5 \end{matrix}$ | ±0.2 | Max | Max | Max | | |
| Item | 6.3 | 5(+1) | 0.45 | 12.7 | 12.7 | 5.1 | 6.35 | 2.5 | 18 | 11 | 9 | 2 | 18.5 | 4 | 1 | 1 | 1.5 | TC | T-3 |
| | | 7(+1) | 0.5 | | | | | | | | | | | | | | | | |
| | | 10(+1)* | 0.6 | | | | | | | | | | | | | | | | |
| | | 9(±2) | 0.5 | | | | | | | | | | | | | | | | |
| | | 11-15(±1.5) | 0.5 | | | | | | | | | | | | | | | | |
| | 8 | 5(+1) | 0.45 | 12.7 | 12.7 | 4.6 | 6.35 | 3.5 | 18 | 11 | 9 | 2 | 18.5 | 4 | 1 | 1 | 1.5 | TD | |
| | | 7(+1) | 0.5 | | | | | | | | | | | | | | | | |
| | | 8(+1)* | 0.6 | | | | | | | | | | | | | | | | |
| | | 11.5(+1.5)* | 0.6 | | | | | | | | | | | | | | | | |
| | | 9(±2) | 0.5 | | | | | | | | | | | | | | | | |
| | 11.5-16(±1.5) | 0.5 | | | | | | | | | | | | | | | | | |
| | 10 | 7~9(±2) | 0.6 | 12.7 | 12.7 | 3.85 | 6.35 | 5 | 18 | 11 | 9 | 2 | 18.5 | 4 | 1 | 1 | 1.5 | TA | |
| | | 12.5-35(±1.5) | 0.6 | | | | | | | | | | | | | | | | |
| | 13 | 13~16(+2) | 0.6 | 15 | 15 | 5 | 7.5 | 5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TA | |
| 20-35(±1.5) | | 0.6 | | | | | | | | | | | | | | | | | |

| Code | D | L | d | P | P0 | P1 | P2 | F | W | W0 | W1 | W2 | H | H0 | D0 | Δh | ΔP | t | code | Fig |
|---------------|------|-------------|-------|------|------|------|------|--|------|------|------|-----|---|------|------|-----|-----|-----|------|-----|
| Tol. | ±0.5 | / | ±0.02 | ±1.0 | ±0.2 | ±0.7 | ±1.3 | $\begin{matrix} +0.4 \\ -0.2 \end{matrix}$ | ±0.5 | ±0.5 | ±0.5 | Max | $\begin{matrix} +0.75 \\ -0.5 \end{matrix}$ | ±0.5 | ±0.2 | Max | Max | Max | | |
| Item | 4 | 5-7(+1) | 0.45 | 12.7 | 12.7 | 3.85 | 6.35 | 5 | 18 | 11 | 9 | 2 | 18.5 | 16 | 4 | 1 | 1 | 1.5 | TA | T-4 |
| | | 5-7(+1) | 0.45 | | | | | | | | | | | | | | | | | |
| | | 9(±2) | 0.5 | | | | | | | | | | | | | | | | | |
| | 5 | 11-15(±1.5) | 0.5 | 12.7 | 12.7 | 3.85 | 6.35 | 5 | 18 | 11 | 9 | 2 | 18.5 | 16 | 4 | 1 | 1 | 1.5 | | |
| | | 5(+1) | 0.45 | | | | | | | | | | | | | | | | | |
| | | 7(+1) | 0.5 | | | | | | | | | | | | | | | | | |
| | 6.3 | 10(+1)* | 0.6 | 12.7 | 12.7 | 3.85 | 6.35 | 5 | 18 | 11 | 9 | 2 | 18.5 | 16 | 4 | 1 | 1 | 1.5 | | |
| | | 9(±2) | 0.5 | | | | | | | | | | | | | | | | | |
| | | 11-15(±1.5) | 0.5 | | | | | | | | | | | | | | | | | |
| | | 5(+1) | 0.45 | | | | | | | | | | | | | | | | | |
| | 8 | 7(+1) | 0.5 | 12.7 | 12.7 | 3.85 | 6.35 | 5 | 18 | 11 | 9 | 2 | 18.5 | 16 | 4 | 1 | 1 | 1.5 | | |
| | | 8(+1)* | 0.6 | | | | | | | | | | | | | | | | | |
| | | 11.5(+1.5)* | 0.6 | | | | | | | | | | | | | | | | | |
| | | 9(±2) | 0.5 | | | | | | | | | | | | | | | | | |
| 11.5-16(±1.5) | | 0.5 | | | | | | | | | | | | | | | | | | |
| 20-25(±1.5) | | 0.6 | | | | | | | | | | | | | | | | | | |

*: In this case, that is suitable for polymer.



T-5

| Code | D | L | d | P | P0 | P1 | P2 | F | W | W0 | W1 | W2 | H | D0 | Δh | ΔP | t | code | Fig |
|------|------|---------------|-------|------|------|------|------|--------------|------|------|------|-----|---------------|------|-----|-----|-----|------|-----|
| | ±0.5 | / | ±0.02 | ±1.0 | ±0.2 | ±0.7 | ±1.3 | +0.4 -0.2 | ±0.5 | ±0.5 | ±0.5 | Max | +0.75 -0.5 | ±0.2 | Max | Min | Max | | |
| Item | 13 | 13~16(±2) | 0.6 | 25.4 | 12.7 | 3.85 | 6.35 | 5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TA | T-5 |
| | | 20~35(±1.5) | 0.6 | | 12.7 | 3.85 | 6.35 | 5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TA | |
| | 16 | 16~21(±2) | 0.8 | 30 | 15 | 3.75 | 7.5 | 7.5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TE | |
| | | 25~35.5(±1.5) | 0.8 | | 15 | 3.75 | 7.5 | 7.5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TE | |
| | 18 | 16~21(±2) | 0.8 | 30 | 15 | 3.75 | 7.5 | 7.5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TE | |
| | | 25~31.5(±1.5) | 0.8 | | 15 | 3.75 | 7.5 | 7.5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TE | |
| | | 35.5(±2) | 0.8 | | 15 | 3.75 | 7.5 | 7.5 | 18 | 15 | 9 | 2 | 18.5 | 4 | 2 | 2 | 1.5 | TE | |

Part Number Ammo Package

| F | 5 | 2 | 2.5 | 3.5 | 7.5 |
|-------------------|----|----|-----|-----|-----|
| Code (15th, 16th) | TA | TB | TC | TD | TE |

Part Number Reel Package

| F | SMD |
|-------------------|-----|
| Code (15th, 16th) | TR |

| F | Radial | | | | |
|-------------------|--------|----|-----|-----|-----|
| | 5 | 2 | 2.5 | 3.5 | 7.5 |
| Code (15th, 16th) | RA | RB | RC | RD | RE |

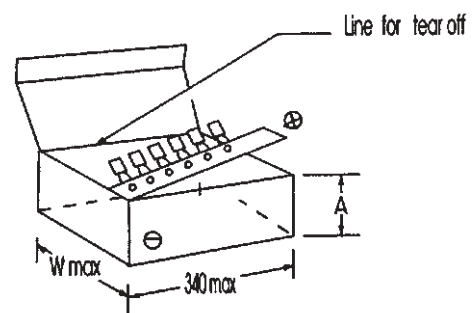
Package Information

| Size φ DxL(mm) | Ammo Package | | |
|-------------------|--------------|----|----------------|
| | W | A | Quantity (pcs) |
| 4xall | 227 | 51 | 2500 |
| 5xall | 227 | 51 | 2000 |
| 6.3xall | 227 | 51 | 1500 |
| 8x5~16 | 227 | 51 | 800 |
| 8x17~25 | 191 | 57 | 800 |
| 10x7~15 | 227 | 51 | 600 |
| 10x16~20 | 191 | 57 | 500 |
| 10x21~25 | 190 | 60 | 500 |
| 13x13~15 | 227 | 51 | 300 |

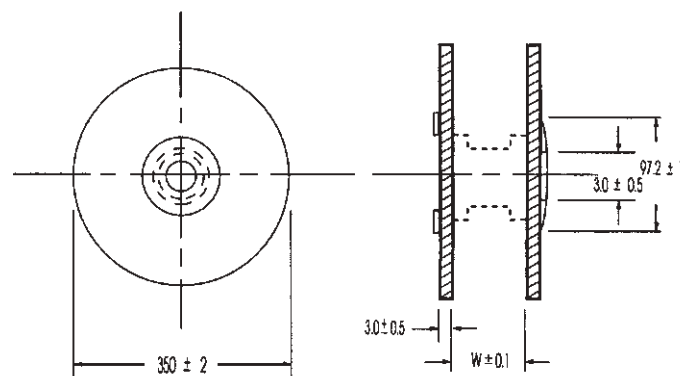
| Size φ DxL(mm) | Ammo Package | | |
|-------------------|--------------|----|----------------|
| | W | A | Quantity (pcs) |
| 13x16~20 | 191 | 57 | 300 |
| 13x21~25 | 190 | 60 | 300 |
| 13x26~30 | 216 | 64 | 300 |
| 16x16~20 | 191 | 57 | 200 |
| 16x21~25 | 216 | 64 | 200 |
| 16x26~30 | 254 | 67 | 250 |
| 16x31~35.5 | 230 | 71 | 250 |
| 18x16~25 | 260 | 61 | 200 |
| 18x26~35.5 | 260 | 71 | 200 |

| Size φ DxL(mm) | Reel Package | |
|-------------------|--------------|----------------|
| | AW | Quantity (pcs) |
| 4xall | 45 | 1800 |
| 5xall | 45 | 1300 |
| 6.3xall | 45 | 1000 |
| 8x5~17 | 45 | 800 |
| 8x18~28 | 55 | 800 |
| 10x7~17 | 45 | 600 |
| 10x18~28 | 55 | 600 |
| 13x13~17 | 45 | 300 |
| 13x18~28 | 55 | 300 |
| 16x13~17 | 45 | 200 |
| 16x18~28 | 55 | 200 |

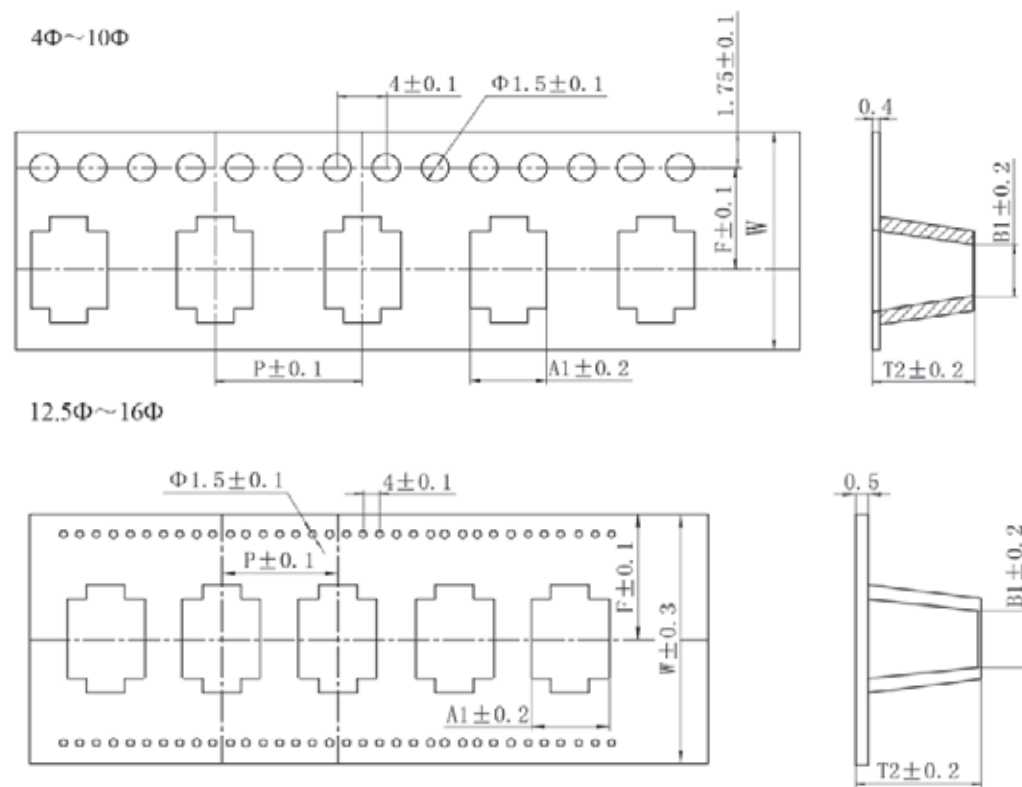
Ammo Package



Reel Package



Carrier tape

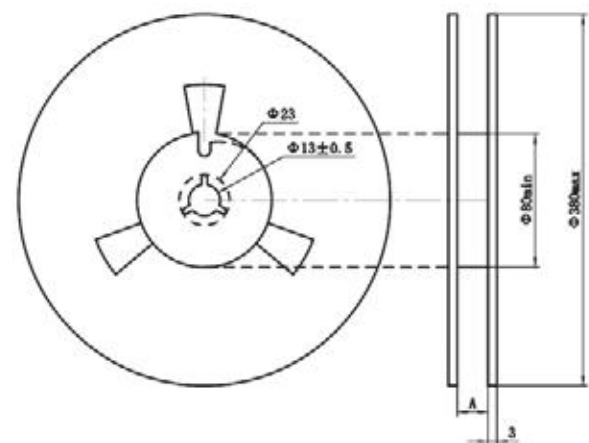


Unit: mm

| φ D | 4x5.5 | 5x5.5 | 5x5.8 | 6.3x6.1 | 6.3x5.5 | 6.3x5.8 | 6.3x7.7 | 8x6.5 | 8x7.7 | 8x8.7 |
|-----|-------|-------|-------|---------|---------|---------|---------|-------|-------|-------|
| W | 12.0 | 12.0 | 12.0 | 16 | 16.0 | 16.0 | 16.0 | 16 | 16 | 24.0 |
| P | 8.0 | 12.0 | 12.0 | 12 | 12.0 | 12.0 | 12.0 | 12 | 12 | 16.0 |
| F | 5.5 | 5.5 | 5.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 11.5 |
| A1 | 4.7 | 5.7 | 5.7 | 7 | 7.0 | 7.0 | 7.0 | 8.7 | 8.7 | 8.7 |
| B1 | 4.7 | 5.7 | 5.7 | 7 | 7.0 | 7.0 | 7.0 | 8.7 | 8.7 | 8.7 |
| T2 | 5.7 | 5.7 | 6.1 | 6.2 | 5.7 | 5.7 | 8.0 | 7.0 | 8.2 | 11.0 |

| φ D | 8x10.5 | 8x11.7 | 10x8.7 | 10x10.5 | 10x12.4 | 12.5x14 | 16x17 | 16x21.5 | 18x16.5 | 18x21.5 |
|-----|--------|--------|--------|---------|---------|---------|-------|---------|---------|---------|
| W | 24.0 | 24.0 | 24 | 24.0 | 24.0 | 32 | 44 | 44 | 44 | 44 |
| P | 16.0 | 16.0 | 16 | 16.0 | 16.0 | 24 | 28 | 32 | 32 | 32 |
| F | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 16 | 21.95 | 22 | 22 | 22 |
| A1 | 8.7 | 8.7 | 10.7 | 10.7 | 10.7 | 13.9 | 17.5 | 17.5 | 19.9 | 19.9 |
| B1 | 8.7 | 8.7 | 10.7 | 10.7 | 10.7 | 13.9 | 17.5 | 17.5 | 19.9 | 19.9 |
| T2 | 11.0 | 13.0 | 11.0 | 11.0 | 12.9 | 14.5 | 17.3 | 23 | 17.5 | 23 |

Reel



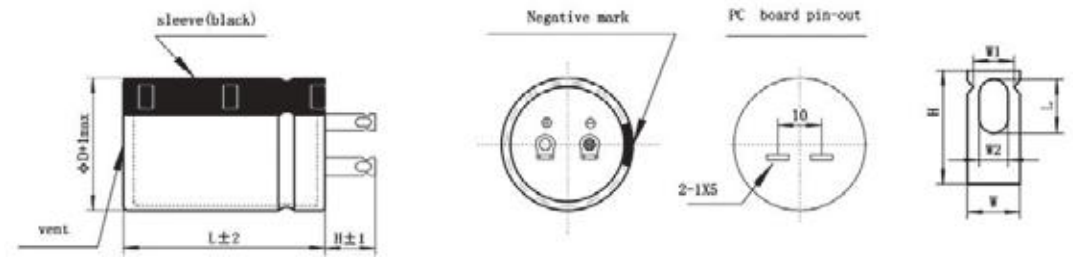
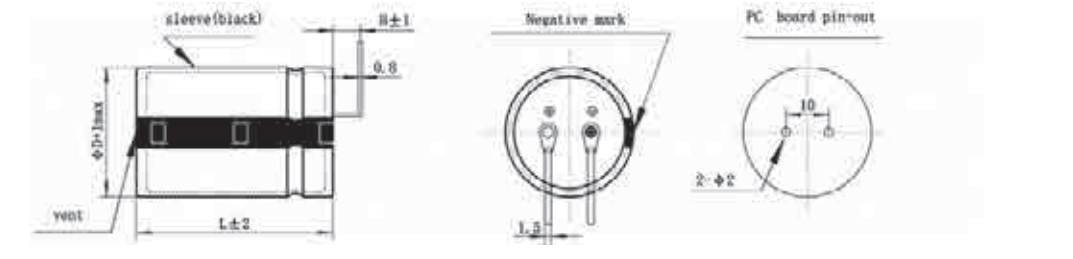
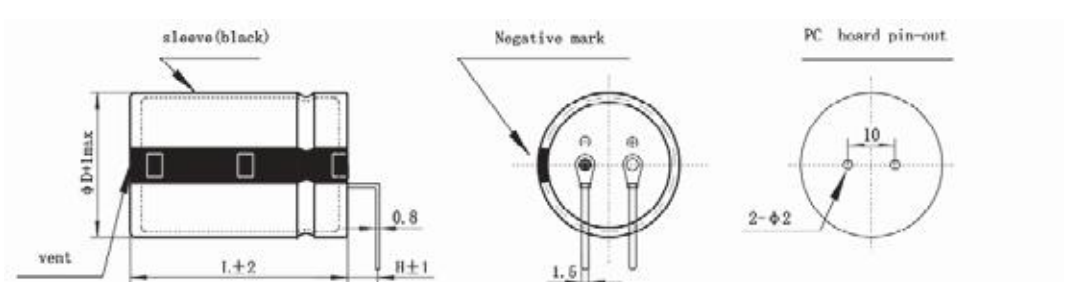
| D φ | 4 | 5 | 6.3, 8 | 8, 10 | 12.5 | 16 | 18 |
|-----|----|----|--------|-------|------|----|----|
| A | 14 | 14 | 18 | 26 | 34 | 46 | 46 |

| φ D | Quantity |
|---------|----------|
| 4x5.5 | 2000pcs |
| 5x5.5 | 1000pcs |
| 5x5.8 | 1000pcs |
| 6.3x6.1 | 1000pcs |
| 6.3x5.5 | 1000pcs |
| 6.3x5.8 | 1000pcs |
| 6.3x7.7 | 900 pcs |
| 8x6.5 | 1000pcs |
| 8x7.7 | 700pcs |
| 8x8.7 | 500pcs |

| φ D | Quantity |
|---------|----------|
| 8x10.5 | 500pcs |
| 8x11.7 | 400pcs |
| 10x8.7 | 500pcs |
| 10x10.5 | 500pcs |
| 10x12.4 | 400pcs |
| 12.5x14 | 200pcs |
| 16x17 | 125pcs |
| 16x21.5 | 100pcs |
| 18x16.5 | 125pcs |
| 18x21.5 | 100pcs |

Snap-in terminal Type

| Terminal Type | Terminal code | Unit: mm | | | | | | |
|--------------------------|---------------|--|---|---|---|---|-----|-----|
| Standard | PP | <p>D=Φ22 to Φ45</p> <table border="1"> <tr> <td>H</td> <td>6</td> <td>4</td> </tr> <tr> <td>h</td> <td>2.5</td> <td>1.5</td> </tr> </table> <p>Standard H:6.0±1mm. Also available H:4.0±1mm.</p> | H | 6 | 4 | h | 2.5 | 1.5 |
| H | 6 | 4 | | | | | | |
| h | 2.5 | 1.5 | | | | | | |
| Vibration proof (T type) | CP | <p>D=Φ30 to Φ45</p> <p>Standard H:4.5±1mm. Also available H:5.5±1mm.</p> | | | | | | |
| Vibration proof (U type) | HP | <p>D=Φ30 to Φ45</p> <p>Standard H:6±1mm.</p> | | | | | | |

| Terminal Type | Terminal code | Unit: mm |
|--------------------------------------|---------------|--|
| Lug Type | VP | <p>D=Φ 30 to Φ 45</p>  <p>Standard H:6±1mm. Also available H:5.0±1mm & H:12.0±1mm.</p> |
| Long terminal for Left bending (CL) | TP | <p>D=Φ 22 to Φ 45</p>  <p>Standard H:2.5±1mm.</p> |
| Long terminal for right bending (CR) | TP | <p>D=Φ 22 to Φ 45</p>  <p>Standard H:2.5±1mm.</p> |

| Terminal Type | Terminal code | Unit: mm | | | | | | |
|-----------------|---------------|---|---|---|---|-----|-----|-----|
| Slim terminal | LP | <p>D=Φ22 to Φ45</p> <p>Standard H:9.5±1mm. Also available H:4.0±1mm.</p> | | | | | | |
| 3 pins terminal | ZP | <p>D=Φ22 to Φ45</p> <table border="1" data-bbox="1064 1272 1324 1328"> <tr> <td>H</td> <td>4</td> </tr> <tr> <td>h</td> <td>1.5</td> </tr> </table> <p>Standard H:4.0±1mm.</p> | H | 4 | h | 1.5 | | |
| H | 4 | | | | | | | |
| h | 1.5 | | | | | | | |
| 4 pins terminal | YP | <p>D=Φ30 to Φ45</p> <table border="1" data-bbox="940 1790 1324 1846"> <tr> <td>H</td> <td>6</td> <td>4</td> </tr> <tr> <td>h</td> <td>2.5</td> <td>1.5</td> </tr> </table> <p>Standard H:6.0±1mm. Also available H:4.0±1mm.</p> | H | 6 | 4 | h | 2.5 | 1.5 |
| H | 6 | 4 | | | | | | |
| h | 2.5 | 1.5 | | | | | | |

Package for Snap-in type

Packing of Snap-in



Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|--------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | 35 ≤ L ≤ 65 | ≥ 6(L=35、36) | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | 25 < L < 45 | / | 300 | 6 | 50 |
| 35 | 45 ≤ L ≤ 85 | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | 40 ≤ L ≤ 45 | / | 160 | 4 | 40 |
| 40 | 45 < L ≤ 75 | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | 40 ≤ L ≤ 65 | / | 140 | 4 | 35 |
| 45 | 65 < L ≤ 105 | / | 70 | 2 | 35 |

Series Discontinued

The following series are discontinued. Please use the replacement in the table.

▼ RADIAL TYPE REPLACEMENTS

| Discontinued series | Characteristics | Replacements | Page |
|---------------------|-----------------|--------------|------|
| GR | 85°C standard | GS | 153 |
| BP | Bi-polarized | Cancel | |

▼ SNAP-IN TYPE REPLACEMENTS

| Discontinued series | Characteristics | Replacements | Page |
|---------------------|-----------------|--------------|------|
| LS | 85°C standard | LP | 254 |
| HS | 105°C standard | HP | 280 |

*Please contact us.

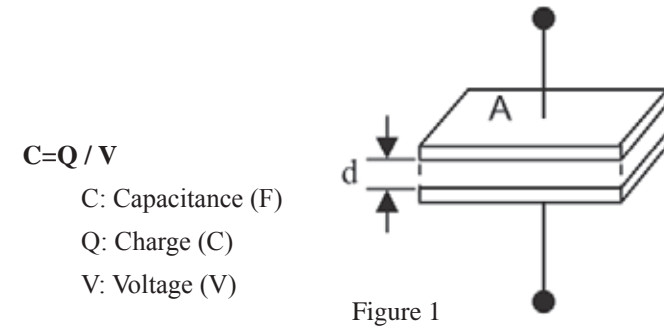
Already been discontinued products are not listed in this catalog.

Screw

1 Guide of Aluminum Electrolytic Capacitors.

1.1 Construction of Capacitors.

When voltage V is applied between both conducting electrodes place, a certain amount charge Q will be stored in dielectric surface by a proportional relative voltage. The proportional constant C is designating the ability of the capacitor store energy in electric field. The basic construction is as Figure 1:



Formula of Capacitance of Capacitor

- $C = \epsilon_0 * \epsilon * A/d$
- C : Capacitance (F)
- ϵ_0 : Absolutely Permittivity (=8.85*10⁻¹² F/m)
- ϵ : Relative Permittivity
- A : Surface of Capacitor Electrode (m²)
- d : Space of Electrode (m)

The relative dielectric constant of the aluminum oxide membrane is 7 to 8, in order to obtain a larger capacitance, A surface area A can be increased or decreased thickness B.

Electrolytic capacitor comprising of two conductive electrodes, an anode (positive foil) and cathode (negative foil) electrodes. An insulating layer is requested to separate both electrodes. Anode if formed by an enlarged surface area of aluminum foil, Oxide membrane (Al₂O₃) will become an insulating layer on the foil Surface. Compared with other material of capacitors, cathode electrode is in charge of conductive liquid, so called electrolyte. Cathode foil is in charge of passing current to the electrolyte.

Figure 2 Cutting Construction of Aluminum Electrolytic Capacitor.

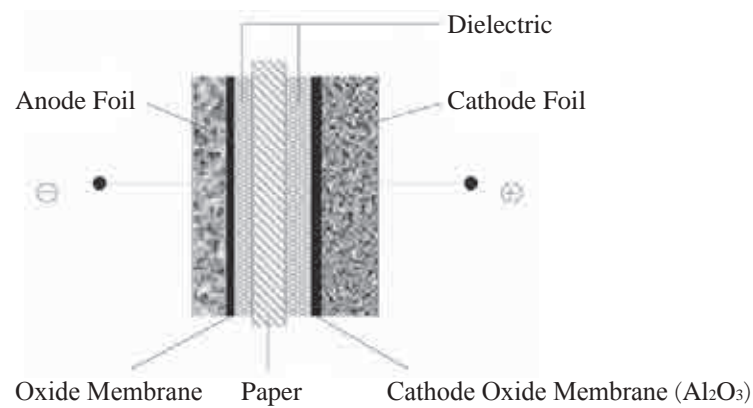
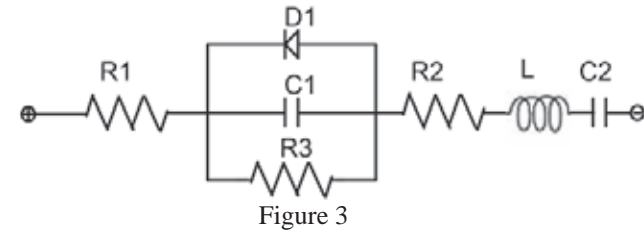


Figure 2

1.2 Equivalent Circuit of Capacitor

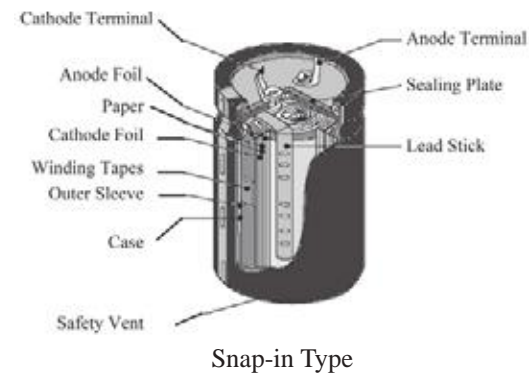
Figure 3: Electrical Equivalent Circuit of Aluminum Electrolytic Capacitor



- R1: Resistance of Terminal and Electrode
- R2: Resistance of Anode Oxide Layer and Electrolyte
- R3: Insulation Resistance of Defective Cathode Oxide Membrane
- D1: Oxide Semiconductor of Cathode Oxide Membrane
- C1: Anode Foil Capacitance
- C2: Cathode Foil Capacitance
- L: Inductance by Terminals and Electrodes.

1.3 Structure of Aluminum Electrolytic capacitor

Winding of Element



2 Definitions of Electrical Parameters

2.1 Voltage

2.1.1 Rated Voltage

Rated voltage means DC voltage and covering the peak voltage value (including pulse voltage) which may be applied continuously to a capacitor in the specified temperature range.

2.1.2 Operating Voltage

Operating voltage is covering applied continuously rated voltage to a capacitor (including superimposed AC voltage) within specified temperature range.

2.1.3 Surge Voltage

Surge voltage is the maximum voltage which applied to the capacitor value in a short period. Surge voltage is defined by JIS C 5101 as below:

$$V_R \leq 315 \text{ V} : V_S = 1.15 \text{ multiple } V_R$$

$$V_R > 315 \text{ V} : V_S = 1.10 \text{ multiple } V_R$$

2.1.4 Ripple Voltage

Voltage applied is a combination of DC and AC voltage in many product applications. Please note the following:

DC and AC voltage superimposed voltage value must less than rated voltage

Reverse voltage is not allowed. Applied ripple current must less than rated ripple current

2.1.5 Recovery Voltage

Recovery voltage is after the capacitor be discharging, a voltage between 2 terminals will be appear after some times.

Once recovery voltage is present, sparking may scare the operators during assembly, and low voltage components may also be affected. To prevent this kind of affection, use a 100Ω~1KΩ resistor to discharge the voltage and covered with a tin foil with short-circuit on 2 terminals.

2.2 Capacitance**2.2.1 AC/DC Capacitance**

In most product applications (e.g. filtering or coupling), is typically measuring AC impedance (considering the amplitude and phase) to get the AC capacitance value.

AC capacitor is considering with frequency and temperature, JIS C 5101 defined the test frequency of 100 Hz or 120 Hz, test temperature at 20 °C.

2.2.2 Calculation of Capacitance

The capacitance of anode foil dielectric portion can be calculated by the following formula:

$$C_a = 8.854 \times 10^{-12} \frac{\epsilon A}{d} \quad (\text{F})$$

ϵ : Relative Permittivity

A: Anode Surface of Capacitor (m²)

d: Space of Electrode(m)

C_c of the cathode foil is determined by the characteristics of oxide membrane. And it can be generated from a forming voltage or generated by natural growth during storage. (Typically the cathode foil oxide membrane acceptance voltage is less than 1V). The structure of aluminum electrolytic capacitors, C_a and C_c are connected together by series, so the total capacitance of the capacitor can be calculated by the following formula:

$$C = \frac{C_a \times C_c}{C_a + C_c}$$

2.2.3 Rated Capacitance

Rated capacitance is a value by designed and marked on the capacitor.

2.2.4 Tolerance of Capacitance

Capacitance tolerance is the deviation from the scope of the actual rated capacitance distribution of the capacitor.

Usually the tolerance of the standard is +20% (M), however, a tolerances +10% (K), and other special requirements of the capacitor tolerance can be also manufactured.

2.2.5 Temperature Characteristics of Capacitance

The capacitance of aluminum electrolytic capacitor will be affect with different temperature, the viscosity of electrolyte increased thus reducing the conductivity and capacitance when the temperature is decrease. The typical characteristic is as Figure 4:

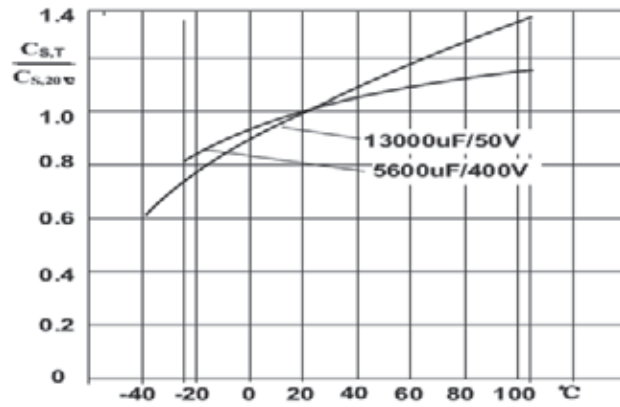


Figure 4

Cs Reference value by temperature characteristic at 20°C and 120 Hz

2.2.6 Frequency Characteristics of Capacitance

Capacitance is about to the temperature and the test frequency. As the test frequency increases, the capacity decreases. Typically frequency characteristic curve is as Figure 5.

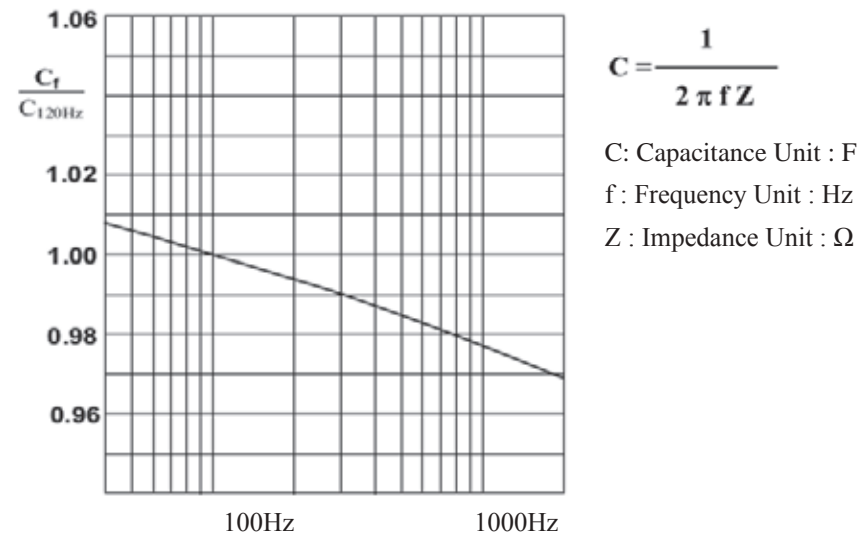


Figure 5

Capacitance C: Versus Frequency f: Typical Behavior

2.3 Dissipation Factor (Tan δ), DF Value

Dissipation factor is the ratio of equivalent series resistance (ESR) to the capacitive reactance (1/ωC) in the equivalent series circuit. Aluminum electrolytic capacitors simplified equivalent circuit is as Figure 6.

Tan δ and 1/ωC, ESR series connection is as Figure 7 and by the following formula:

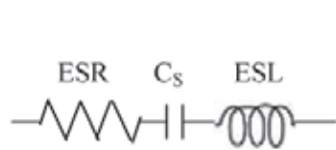


Figure 6

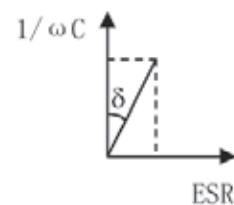


Figure 7

$$\text{Tan}\delta = \text{ESR} / (1/\omega C) = \omega * C * \text{ESR}$$

Where: ESR at 120Hz

$$\omega = 2\pi f$$

$$f = 120\text{HZ}$$

C: Series Capacitance (F)

DF (Tanδ) measured at 120Hz and 20 °C.

Tanδ becomes larger by measuring frequency increase (Figure 8), and test temperature decrease (Figure 9).

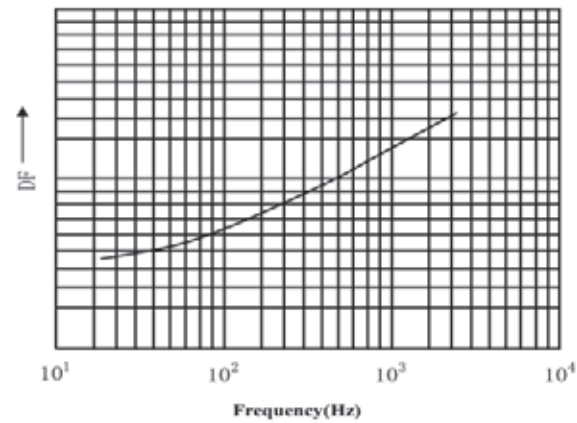


Figure 8

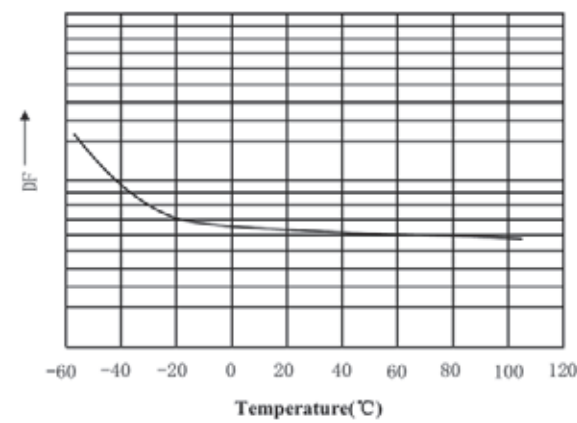


Figure 9

2.4 Equivalent Series Inductance - ESL

Equivalent series inductance represents the inductive part of the capacitors (lead terminal and internal foil). ESL is mainly affected by the frequency. The equivalent series circuit is as Figure 6.

2.5 Equivalent Series Resistance - ESR

ESR represents the losses of the capacitors. The equivalent series circuit is as figure 6. ESR is connected in series with the capacitance in the equivalent circuit. The ohm resistance of ESR is come from of electrode foil, electrolyte, the lead resistance and each internal resistance connection.

ESR decreases with increasing temperature, and also decreases with increasing frequency at low frequency.

2.6 Impedance Z

The impedance Z is the resistance which opposes the flow of alternating current in the particular frequency. It is related to capacitance and inductance which corresponds to the capacitive and inductive reactance, and also relevant with equivalent series resistance (ESR). Specific expression is as following.

$$Z = \sqrt{ESR^2 + (X_L - X_C)^2}$$

Xc: Capacitance CS Capacitive Reactance of $1/\omega CS$: $1/2\pi f * C$

Xl: Inductive Reactance ωESL of Capacitor Winding and Terminals: $2\pi f * ESL$

A typical impedance versus frequency curve is as following. The minimum impedance appears at resonant frequency and it will be equal to the ESR at same frequency.

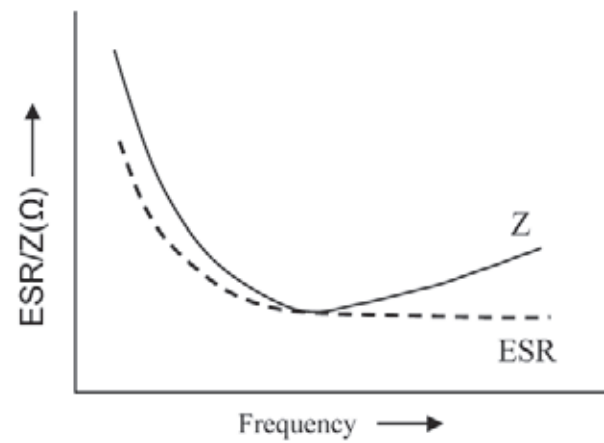


Figure 10 Impedance vs ESR vs Frequency

2.7 Leakage Current

When a DC voltage is applied through 2 terminals of the electrolytic capacitor, a small amount of current is allowed to flow into dielectric of oxide membrane. This small amount of current is called leakage current (LC).

2.7.1 Time and Temperature Characteristics of Leakage Current

As figure 11, there is a big leakage current (inrush current) flow through when capacitor is applied with voltage. With time extend, the leakage current will decrease into a stable leakage current. Thus, the leakage current (LC) is presented after a few minutes when a rated voltage is applied at temperature 20°C.

Leakage current temperature characteristics is as figure 12, larger LC at high temperature; smaller LC at low temperature.

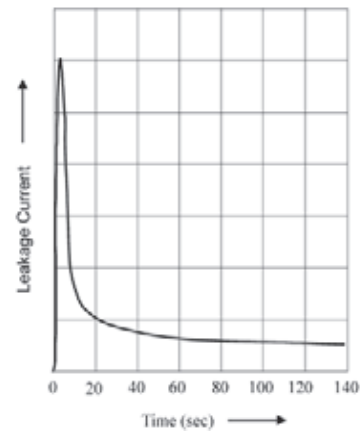


Figure 11 Time vs Leakage Current

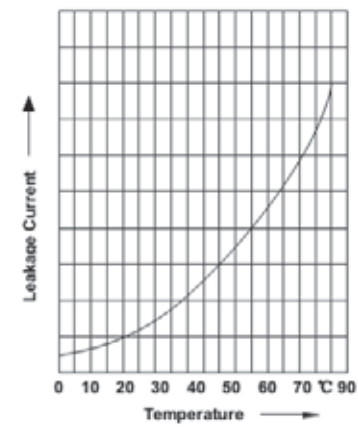


Figure 12 Temperature vs Leakage Current

2.7.2 Voltage Characteristics of Leakage Current

The effective value between leakage current and voltage of ambient temperature as figure 13.

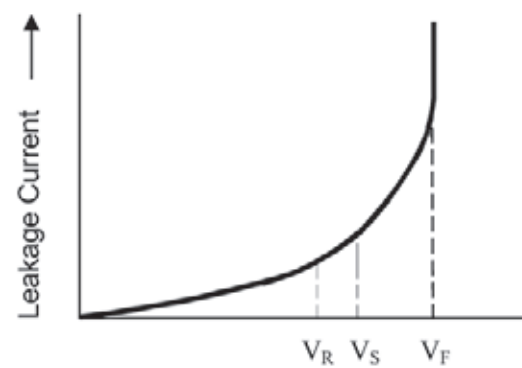


Figure 13 Leakage Current vs Voltage

2.7.3 Acceptance Test of Leakage Current

According to JIS-C-5101, following is the formula of leakage current test value after 5 minutes rated voltage applied at temperature 20 °C.

$$I_{leak} \leq 0.3\mu A * (C * V)^{0.7} + 4\mu A$$

2.7.4 The behavior of leakage current without voltage applied (non voltage storage)

Oxide membrane will be not recover thus performance reduce in a high temperature when voltage is not applied to the 2 terminals of aluminum electrolytic capacitors due to no leakage flow oxygen ions into anode foil.

The leakage current will be rise back when a long time store with non voltage applied.

Please operate of capacitors over than 1 hour after an expired storage (6 months) before using in the circuit.

This action will help oxide membrane recover and can be stored again.

3 Ripple Current

3.1 General

Ripple current is alternating current which flowing through the capacitors. Each capacitor is designed by a rated ripple current which operated under a rated operating temperature to control internal temperature of capacitors. The maximum allowable ripple current depends on the ambient temperature, capacitor surface area (thermal area), dissipation factor tanδ (or ESR) and alternating current frequency.

3.2 Frequency Dependence of Ripple Current

ESR of aluminum electrolytic capacitor will effect with frequency in a fixed voltage. Thus, ripple current is also effective with frequency.

In the most product applications, more than one frequency of ripple current could be found. In this case, we have to consider RMS of ripple current because of self-heating of capacitors is come from the combination of all ripple current of frequency as formula below:

$$I_r = \sqrt{\left(\frac{I_{r1}}{F_{r1}}\right)^2 + \left(\frac{I_{r2}}{F_{r2}}\right)^2 + \dots + \left(\frac{I_{rn}}{F_{rn}}\right)^2}$$

I_r : RMS Value of Ripple Current

$I_{r1} \dots I_{rn}$: RMS Value of Ripple Current at Frequency $f_1 \dots f_n$

$F_{r1} \dots F_{rn}$: Correction Factor of Ripple Current at Frequency $f_1 \dots f_n$

$$F_{ri} = \sqrt{\frac{ESR(f_0)}{ESR(f_i)}} \quad \text{Where } f_0 = \text{Reference Frequency of Nominal Ripple Current}$$

3.3 Temperature Dependence of Ripple Current

Capacitance of each series is given the maximum allowable ripple current under the rated temperature in category.

4 Useful Life

Useful Life (also referred to service life and operating life) is defined as the life achieved by the capacitor without exceeding the specified failure rate. The total failure or failure due parametric variation is considered to constitute the end of the useful life. Depending on the circuit design, as a failure result does not mean device failure due to parameters variation. Instead, it may consider the actual useful life will longer than the specified useful life.

Useful life is given by operating experience and accelerated aging test result. If the load is less than the rated value, useful life can be extended (E.g., lower operating voltage, current, and ambient temperature). In addition to the specified life range in category, CapXon is able to offer special useful life according to customer requested.

Screw

4.1 Load Conditions

Conditions of load useful life

Rated Voltage (the peak value of AC voltage superimposed on DC voltage should not be higher than rated voltage)

Rated Ripple Current

Rated Temperature

4.2 Operating Useful Life

Capacitor's operating useful life is calculated from each series expectation useful life.

To learn more about useful life information as below:

To calculate the ratio.

To find the intersection of calculated ratio and operating temperature.

To see the useful life value from the intersection of graph curve.

Above process does not consider the frequency characteristic of ripple current. Equivalent ripple current is calculated from the frequency corresponding to the conversion factor.

The following example illustrates the calculation procedure to use the data of a capacitor of RH series

| VR | CR | Case | I_R max 120Hz 105°C (A) |
|-----|------|----------|---------------------------|
| 450 | 2200 | 63.5X120 | 9.2 |

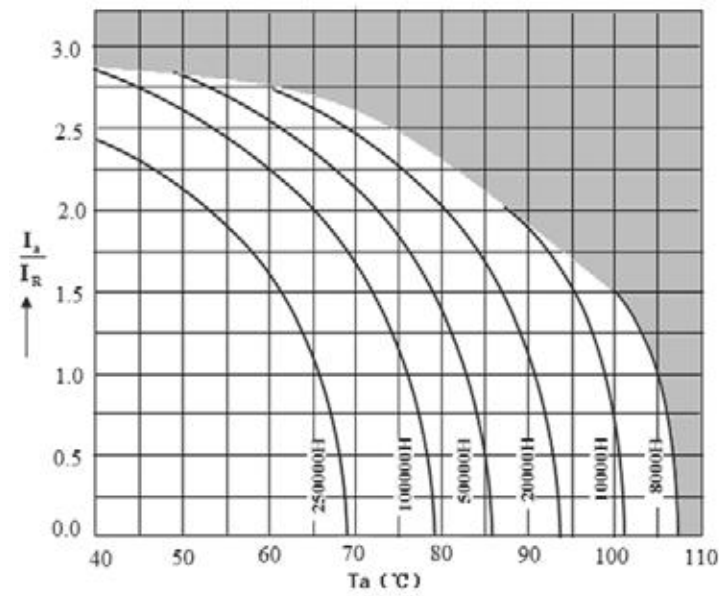


Figure 14

E.g. 1- Calculation of Useful Life

The following values are used to determine the frequency conversion. The corresponding useful life can be calculated.

Ripple Current: 25 A

Frequency: 400 Hz

Ambient: 60°C

Equivalent ripple current at 120Hz frequency converts calculations (see RH series allowable ripple current IRC frequency)

$$\frac{25A}{1.25} = 20A$$

To calculate the ratio of the actual value of the ripple current and specification values.

$$\frac{I_a}{I_R} = \frac{20A}{9.2A} = 2.2$$

Ripple current ratio and ambient temperature (60°C) on the intersection of the graph says the useful life is 100,000 hours (Figure14).

E.g. 2- Calculation of Ripple Current on Aluminum Electrolytic Capacitor

In many applications, Aluminum Electrolytic Capacitors are subjected to the ripple currents of varying frequency.

Current 1: I_{a1}, at 400Hz RMS=20A

Current 2: I_{a2}, at 4 kHz RMS=16A

Ambient: 60°C

Requested Useful Life 100000 Hours

The first step is calculating equivalent 120Hz values for the 2 current values (Frequency factors given on series RH-Frequency factor of permissible ripple current IRC) and the RMS value)

$$\text{Current I1: } \frac{20A}{1.25} = 16A$$

$$\text{Current I2: } \frac{16A}{1.32} \approx 12.12A$$

$$I_{total.RMS} = \sqrt{I_1^2 + I_2^2} = \sqrt{(16)^2 + (12.12)^2} \approx 20.07A$$

Calculation of Ripple Current Factor:

$$\frac{I_{total.RMS}}{I_{RC.R}} = \frac{20.07A}{9.5A} \approx 2.11$$

Ripple current ratio and ambient temperature (60°C) on the intersection of the graph says the useful life is 100,000 hours (Figure14).

Screw

5 Connection of Aluminum Electrolytic Capacitor

In some applications of Aluminum Electrolytic Capacitor, parallel connection and series connections and combination of parallel and series connections will be used.

5.1 Parallel Connection

Parallel connection: Current flows in equally through each unit are a necessary when parallel connection.

5.2 Series Connection

Series connection: Using balancing resistors to equally control the voltage distribution across each unit.

Operating voltage may exceed the specification value because of each single capacitors insulation is quite different and

voltage distribution may quite irregularly. Therefore, forced balancing of voltage distribution is recommended. The balancing resistance must be equal to each other, and the resistance is requested much less than insulation resistance of capacitors. As Figure15:

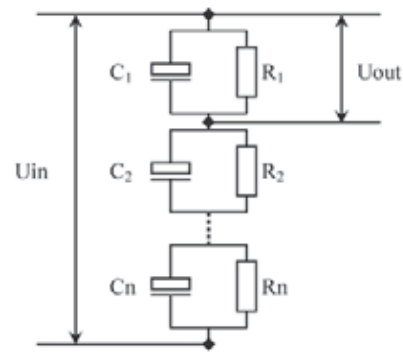


Figure 15

Formula of Equation Resistance Value:

$$R \text{ balancing resistance} = 50(\text{m}\Omega) * \mu\text{F} * (1/\text{CR})$$

5.3 Combination of Parallel and Series Connection

Above recommended combination gives apply both in Parallel and Series circuit. It is recommended to allocate balancing resistors to each capacitor if use balancing resistors is a must. (as Figure 16)

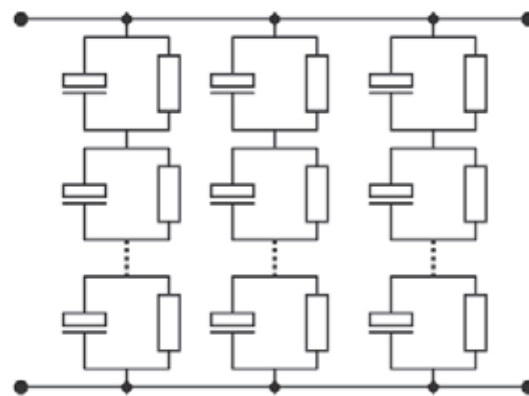


Figure 16

6 Climatic Conditions

6.1 Minimum Permissible Operation Temperature (Lower Temperature)

Aluminum Electrolytic Capacitors will increase DF values (or ESR values) when the operation temperature is decrease. Aluminum Electrolytic Capacitors will define the minimum operating temperature due to both of DF and ESR values are limited in a range for most product applications.

6.2 Maximum Permissible Operation Temperature (Upper Temperature)

Maximum permissible operation temperature is meaning the capacitors maximum operation environment temperature. Capacitors will be un-useful if operation environment is higher than category defined.

Useful life and reliability will both increase if capacitors can be used in lower operation temperature environment.

6.3 Storage Temperature

Aluminum Electrolytic Capacitors can be stored in voltage-free under category said temperature. However, it must reduce useful life and reliability easier and accelerate leakage current value if Capacitors stored in higher temperature. The oxide membrane getting worst is the mainly reason to cause abnormal circuit when Oxide membrane repaired by a larger current suddenly. Therefore, the storage temperature should not exceed 40 °C, and suggested stored at temperature 5 °C ~ 35 °C. The effective valid date of capacitors is for 1 year, please use a series resistor in 1000Ω and rated voltage to charge for 30 minutes continuously to let inside oxide membrane regeneration if storage in a long time (over 12 months) is a necessary..

7 Maintenance

A regular inspection is recommended when screw capacitors use in industrial applications. Before inspection, make sure to turn off the power and discharge screw capacitors carefully, and do not force pressure to the terminal to avoid damage.

Inspection items as below:

7.1 Outer damage, deformation and electrolyte leakage checking.

7.2 Electrical Performance: leakage current, capacitance, DF values and other product specifications subject times.

If there is an abnormal detected, make sure the capacitor specifications to replacement and handled properly.

8 Mounting

8.1 Installation

Make sure capacitor's rated capacitance, rated voltage and polarity before installation.

Please confirmed capacitors and circuit board terminal pitch is consistent before installation. It may cause stress to internal capacitor through the terminal to cause short if the pitch is different.

Robotic force pressure and lead bending strength has to be controlled properly when automatically mounting.

Mounting Position of Screw Capacitors

To avoid screw capacitor explosion when capacitance safety vent is opened while capacitance reached a certain exhaust gas pressure, the screw capacitors should not be mounted with the safety vent upside down. Recommended mounting method is shown as Figure17 to avoid safety vent down installation.

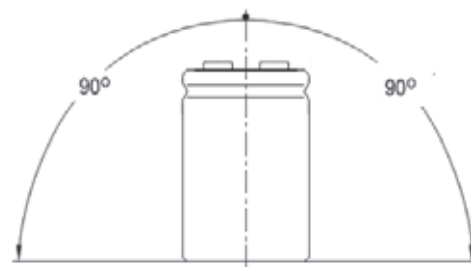


Figure 17

Recommended range of mounting positions

Horizontal Mounting Request

Anode terminal in upper side with safety vent in horizontal as Figure18.

Safety vent in upper side with Anode and Cathode terminal in horizontal as Figure19.

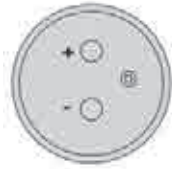


Figure 18

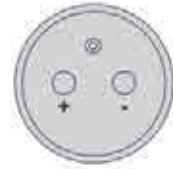


Figure 19

It may not damage capacitors directly but an electrolyte leakage may happen if install by other mounting methods.

8.2 Soldering**8.2.1 Before Soldering**

Soldering conditions (preheat, solder temperature and immersion time, frequency) must be completed in the limited range to prevent the performance of capacitors.

When circuit board terminal pitch does not match with capacitors terminal pitch, please do not force extra pressure to capacitor when an extra treatment is necessary.

To avoid treating capacitor body with a soldering iron to prevent sleeve holes and other damage;

To avoid capacitor body dipped in soldering, solder heat will cause the capacitor damage due to internal pressure arise.

8.2.2 After Soldering

After soldering into PCB, do not external forces or pull capacitor body, to prevent the extra pressure to damage the part through the terminal into internal body to cause part short.

8.3 Cleaning Agents

Please use available cleaning agents to clean circuit boards under temperature 50°C within 5 minutes after soldering

Cleaning agent must be strictly managed, such as pollution, chlorine concentration may be increased, result to an internal capacitor corrosion.

After cleaning, must be dry immediately, to avoid cleaning agent remains between sealing portion and circuit board.

Do not use below solvents to clean the capacitance:

Halogen-containing solvents: halogen solvents penetrate (diffuse) into the internal capacitance, will cause cleaning agent decomposition reaction of free chlorine ions, react with the aluminum to cause capacitor corrosion.

Alkaline solvent: corrosion aluminum case

Xylene: sealing rubber oxidation

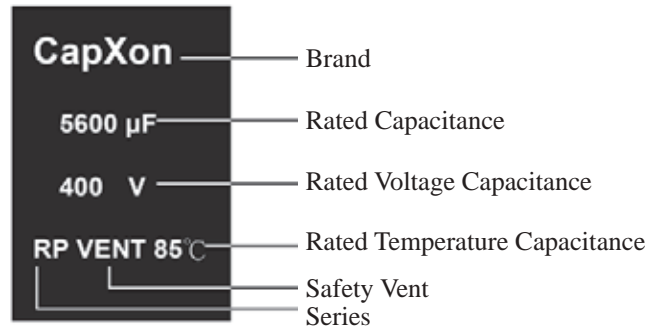
Acetone: description words blur or disappear

9 Outer Sleeve of Capacitors

Outer sleeve and outer plate does not guarantee electrical insulation function, description only.

10. Marking of Capacitors

Marking Content of Screw Type:solvent.



Screw

Corporate goals

We adhere to the tenet of "QUALITY FIRST", and offer satisfying products and service to the customer. This aim is shared by the CapXon quality and environment management system:

1 CapXon quality system

1.1 CapXon quality policy and environment policy

We adhere to the tenet of "QUALITY FIRST", and offer satisfying products and service to the customer.

1.2 Quality management system

The quality management system to IATF 16949:2016 is applied throughout the company and is used to implement the CapXon quality policy.

The implications include:

As a rule, product and process developments follow the rules of APQP),

Quality tools such as FMEA), MSA) and SPC) minimize risks and ensure continuous improvements in conjunction with regular internal audits and QM reviews.

1.3 Certification

The CapXon quality management system forms the basis for the company certification to ISO 9001:2015 and IATF 16949:2016 that comprises the CapXon plants and sales organizations.

1.4 Delivery quality

“Delivery quality” means compliance with the agreed data at the time of delivery.

1.5 Failure criteria

A component is defective if one of its features does not correspond to the specification of the data sheet or an agreed delivery specification. Failure criteria please refer to Defective degree evaluation and handling method of reliability experiment.

1.6 Incoming goods inspection at the customer

We recommend the use of a random sampling plan according to MIL-STD-1916 (contents compliant with MIL STD 105 D and IEC 60410) for incoming goods inspection. The test methods to be used are laid down in the relevant standards. Deviations must be agreed by the customer and the supplier.

1.7 Duration of use

The service life in terms of reliability is the time period during which random failures occur, i.e. the range in the product operating life in which the failure rate remains largely constant (early failures and end of operating life excepted). The value depends strongly on conditions of use.

1.7.1 Failure rate (long-term failure rate)

The failure rate is defined as the failure percentage divided by a specified operating period. The failure rate is expressed in fit (failures in 10⁹ component hours) or as percentage of failures in 1000 hours.

1 fit = 1 x 10⁻⁹/h (fit = failure in time)

Example of a failure rate test determined by a useful life test:

1. Number of components tested N = 10000

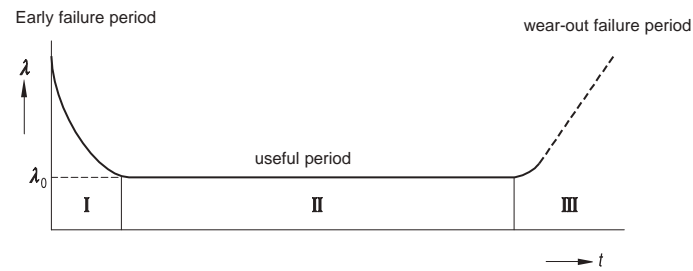
2. Operating hours t_b = 20000 h

3. Number of failures n = 2

$$\lambda_{\text{test}} = \frac{n}{N} * \frac{1}{t_b} = \frac{2}{10000} * \frac{1}{20000\text{H}} = 10\text{FIT} = 0.001\%/1000\text{H}$$

Failure rate specifications must include failure criteria, operating conditions and ambient conditions. Usually the failure rate of components, when plotted against time, shows a characteristic curve with the following three periods:

I: early failure period, II: useful period, III: wear-out failure period



Unless otherwise specified, the failure rate refers to the useful period (II). During this period, an approximately constant failure rate λ_0 can be assumed.

1.8 AQL values

The AQL (AQL= acceptable quality level) figures are based on a random sampling plan to MIL-STD-1916.

The sampling instructions of this standard are such that a delivered lot will be accepted with a probability of 90% if the percentage of non-conformancies does not exceed the stated AQL figure. As a rule, the percentage of non-conformancies in deliveries from CapXon is significantly below the AQL figure. The acceptance value we apply to inoperatives, i.e. unusable components is $c=0$.

2 Environmental management system

2.1 Environmental policy

CapXon defines the following environmental protection principles:

Comply with the law, Govern the pollution, Produce Cleanly, Reduce the consume, Save resource, Cut down the toxic substance, Make Improvement Continuously, Beautify the environment

2.2 Environmental management system

The CapXon ISO 14001 based environmental management system is applied company wide for implementing the CapXon environmental policy. It is posted on the CapXon Intranet and is thus accessible to all employees.

2.3 Environmental Hazardous Substances Free management system

The CapXon QC080000 based HSF management system is applied company wide for implementing the CapXon environmental Hazardous Substances management. that Capxon products effectively in the management of hazardous substances.

2.4 Energy Management System

CapXon establishes comprehensive energy use management in accordance with the requirements of ISO 50001

Energy Management System in order to meet the social responsibility of low carbon environmental protection and efficiency.

2.5 Certification

2.5.1 The CapXon Group operates an environmental management system that conforms to the requirements of ISO 14001 and is mandatory for all plants. The CapXon Group operates an Energy management system that conforms to the requirements of ISO 50001 and is mandatory for all plants. The CapXon Group operates an environmental Hazardous Substances Free management system that conforms to the requirements of QC 080000 and is mandatory for all plants. The company certificate is posted on the CapXon internet: (www.capxongroup.com).

2.5.2 SONY GP certification: On Nov 2011, CAPXON have already got the SONY GP certification.GP NO.:FC012746

2.5.3 C-ROHS certification: On Dec 2012, CAPXON have already got the C-ROHS certification. products type: SMD type, Snap-in type and Radial type.

2.6 RoHS

The term “RoHS-compatible” shall mean the following:

The components described as “RoHS-compatible” are compatible with the requirements of the regulations listed below (“Regulations”) and with the requirements of the provisions which will result from transformation of the Regulations into national law to the extent such provisions reflect the Regulations:

Directive 2002/95/EC of the European Parliament and of the Council of January 27, 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

("Directive 2002/95/EC");The directive from July 1, 2006 entered into force.

Commission Decision of 1 August 18, 2005 amending Directive 2002/95/EC (2005/618/EC); Commission Decision of October 13, 2005 and of October 21, 2005 amending the Annex to Directive 2002/95/EC (2005/717/EC, 2005/747/EC, 2006/310/EC, 2006/690 .692/EC).

December 3, 2008 The European Commission published its official Web site of the RoHS directive revised draft COM (2008) 809 / 4.

September 3, 2009 RoHS EU issued a revised second draft Directive COM (2008) 809final.

October 22, 2009 EU Environment Public Health and Food Safety Committee (Committee on the environment, public health and food safety) released on COM (2008) 809 of the amendments.

July 1, 2011,the European Parliament and Council issued directive 2011/65/EU(ROHS.2.0) in the official Journal of the European Union to replace the 2002/95/EC. The new directive has been fully implemented on January 1,2013, the old directive 2002/95/EC has been abolished.

RoHS Directive, also known as Amendment RoHS 2.0, the amendment involves a lot of content. But the basic objectives and mechanisms have not been changes, the ultimate goal still is to reduce the electrical and electronic products of certain hazardous substances.

The instruction modified to increase 4 to be "priority review" the use of substances HBCDD, DEHP, DBP and BBP.

2.7 Halogen Free(HF)

Base on customer and environmental regulations on the management and control requirements of halogen , such as the European 2002-95-EC, IEC 61249-2-1, "Montreal Protocol on Substances that Deplete the Ozone Layer", "Controls the Stockholm joint pledge about durable organic pollutant", CapXon has imported halogen-free materials of all electrolytic capacitors completely at the beginning of 1st,June,2009. All products shipped meet the halogen-free requirements on 31th,Oct,2009.

2.8 Banned and Environmental Hazardous Substances in components

As a manufacturer of passive components, we develop our products on the basis of sustainability.

In order to guarantee a standardized procedure for CapXon Group, a mandatory list of Environmental Hazardous Substances of special interest is part of our environmental management system. The planning and development instructions include regulations and guidelines that aim to identify environmental aspects and to optimize products and processes with respect to material use and environmental compliance, to design them with sparing use of resources and to substitute hazardous substances as far as possible.

In consideration of the environmental aspects are checked and recorded in the design reviews: the environmental officer provides support in the assessment of the environmental impacts of a development project.

2.9 Product Series and Specifications for product catalog

CapXon Product Series and Specifications on the Internet (www.capxongroup.com), It is available to refer to check for customers.

2.10 Disposal

All aluminum electrolytic capacitors can be disposed off, reused or recycled. However as disposal is regulated by national law, the respective national provisions have to be observed.

For Conductive Polymer Capacitors

CP-CAP is a solid aluminum capacitor with conductive polymer electrolyte. Please read the following points in order to take the most out of your CP-CAP.

Designing device circuits

1. Circuits where CP-CAPs are prohibited to use

The leakage current of conductive polymer solid aluminum capacitors may vary depending on thermal stresses. Please don't use solid capacitors in the following types of circuits:

- (1) High-impedance circuits that are to sustain voltages.
- (2) Coupling circuits
- (3) Time constant circuits

In addition to the leakage current fluctuation, capacitance may also fluctuate depending on operational temperature and humidity. The fluctuation of the capacitance may cause problem if it is used as a time constant capacitor, which is extremely sensitive to the fluctuation of the capacitance. Do not use it as a time constant capacitance.

- (4) Other circuits that are significantly affected by leakage current. If you want to use 2 or more CP-CAPs in a series connection, please contact us before use.

2. Polarity

The CP-CAP is a polarized solid aluminum electrolytic capacitor. Do not apply either reverse voltages or AC voltages to the polarized capacitors, using reverse polarity may cause a short circuit. Refer to the catalog, product specifications or capacitor body to confirm the polarity prior to use.

3. Applied voltage

Do not apply DC voltages exceeding the full rated voltage. The peak voltage of superimposed AC voltages (ripple voltages) on DC voltages must not exceed the full rated voltage. While there are specifications for surge voltages exceeding the rated voltage, usage conditions apply, and continued operation for extended periods of time under such conditions cannot be guaranteed. Use the within 20% of the rated voltage for applications which may cause the reverse voltage during the transient phenomena when the power is turned off or the source is switched.

4. Ripple current

Do not apply currents in excess of the rated ripple current.

The superimposition of a large ripple current increases the rate of heating within the capacitor. This may reduce the service life of the capacitor or damage the capacitor.

5. Operating temperature

Do not use the CP-CAP at high temperatures (temperatures exceeding the maximum temperature for the capacitor category) Use of the capacitor outside of the maximum temperature for the capacitor category may decrease the service life of the capacitor.

6. Sudden charge and discharge

Do not use the CP-CAP in circuits where the capacitor is repetitively charged and discharged rapidly. Repetitively charging and discharging the capacitor rapidly may reduce the capacitance or may cause damage due to internal heating. Use of a protective circuit to ensure reliability is recommended when rush currents exceed 10A or the rush current is over 10 times of allowable ripple current of CP-CAP.

A protection resistor (1 kΩ) must be inserted to the circuit during the charge and discharge when measuring the leakage current.

7. Failures and life-span

The CP-CAP failure rate in use is based on the failure rate level in the specification requirements. Upper category temperature and category voltage adhere to JIS C 5003 Standard. The confidence level is 60% and the failure rate is 0.5%/1,000 hours (applied rated voltage at category temperature).

The failure modes mainly have 2 types as follows.

(1) Contingency failure

The contingency failure mainly has short circuit. The phenomenon of after short is on following.

- (i) In the event a short circuit causes the current to become relatively small (less than approximately 1A for φ10, less than approximately 0.5A for φ8 and less than approximately 0.2A for smaller than φ6.3), the CP-CAP itself will generate a little heat, but its appearance will not be affected even when electricity is supplied continuously. However, if the short circuit current value exceeds the mentioned values above, the temperature inside the CP-CAP will increase, the internal pressure is raised, rubber sealing is turned over, and odorous gas is released. In this case, keep your face and

hands away from the area.

- (ii) The electrolyte, electrolytic paper, sealing rubber, and plastic spacer used in the CP-CAP are all combustible. If an extremely large electric current flows through the capacitor after shorting, the shorted part may spark, and in a worst case scenario, may ignite. Ensure safety by fully considering the design issues described below when using this capacitor in equipment where safety is a priority.

- Increase safety by using in conjunction with a protective circuit or protective equipment.
- Install measures such as redundant circuits so that the failure of a part of the equipment will not cause unstable operation.

(2) Performance characteristic and failure (life-span)

CP-CAP characteristics can possibly change (capacitance reduction and ESR increase) within the specified range in specifications when it is used in the condition of rated voltage, electric and mechanical performance.

When life span exceeded the specified guarantee time of endurance and damp heat, electric characteristic might change and cause electrolyte insulation. This is called open circuit mode. It is recommended to use the capacitor at a lower temperature than the maximum temperature for the capacitor category.

8. Circuit design

Verify the following before designing the circuit:

- (1) The electrical characteristics of the capacitor will vary depending on differences in temperature and frequency. Only design your after verifying the scope of these factors.
- (2) When connecting two or more capacitors in parallel, ensure that the design takes current balancing into account.
- (3) When two or more capacitors are connected in series, variability in applied voltage may cause over-voltage conditions. Contact CapXon before using capacitors connected in series.

9. Capacitor usage environment

Do not use/expose capacitors to the following conditions.

- (1) Oil, water, salty water, take care to avoid storage in

damp locations.

- (2) Direct sunlight
- (3) Toxic gases such as hydrogen, sulfide, sulfurous acids, nitrous acids, chlorine and chlorine compounds, bromine and bromine compounds, ammonia, etc.
- (4) Ozone, ultraviolet rays and radiation.
- (5) Severe vibration or mechanical shock conditions beyond the limits advised in the product specification section of the catalog.

10. Capacitor mounting

- (1) For the surface mount capacitor, design the copper pads on the PC board in accordance with the catalog or the product specification
- (2) For radial capacitors, design the terminal holes on the PC board to fit the terminal pitch of the capacitor.

11. Leakage current

Heat pressure from soldering and mechanical stress from transportation may cause the leakage current to become large. In such a case, leakage current will gradually decrease by applying voltage less than or equal to the rated voltage at a temperature within the upper category temperature. In close conditions to the upper category temperature, the nearer the applied voltage is to the rated voltage, the faster the leakage current recovery speed is.

Mounting precautions

1. Note

- (1) For the surface mount capacitor, design the copper pads on the PC board in accordance with the catalog or the product specification
- (2) For radial capacitors, design the terminal holes on the PC board to fit the terminal pitch of the capacitor.
- (3) Mount after checking the capacitance and the rated voltage.
- (4) Mount after checking the polarity.
- (5) Do not apply excessive external force to the lead terminal and the CP-CAP itself.
- (6) Ensure that the soldering conditions meet the specifications recommended by CapXon. Note that the leakage current may increase due to thermal stresses that occur during soldering, etc. Note that increased leakage currents gradually decrease when voltage is applied.

2. Soldering using a soldering iron:

- (1) The soldering conditions (temperature and time) are within the ranges specified in the catalog or product specifications.
- (2) The tip of the soldering iron does not come into contact with the capacitor itself.

3. Flow soldering

- (1) Do not dip the body of a capacitor into the solder bath only dip the terminals in. The soldering must be done on the reverse side of PC board.
- (2) Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalog or the product specifications.

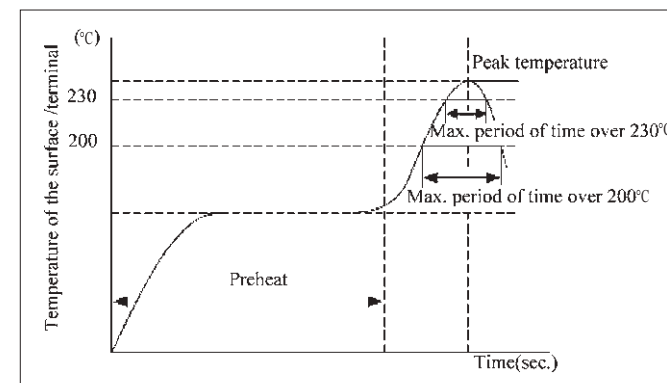
In regards to flow soldering, be sure to solder within the following conditions.

| | Temperature | Duration | Flow number |
|----------------------|--|-------------------|---------------|
| Preheating | 120°C or less (ambient temperature) | 120 sec. or less | 1 time |
| Soldering conditions | 260+5°C or less | 10+1 sec. or less | Twice or less |

- (3) Do not apply flux to any part of capacitors other than their terminals.
- (4) Make sure the capacitors do not come into contact with any other components while soldering.

4. Reflow soldering

- (1) Soldering conditions (preheat, solder temperature and soldering time) should be within the limits prescribed in the catalogs or the product specification.
- (2) The heat level should be appropriate. (Note that the thermal stress on the capacitor varies depending on the type and position of the heater in the reflow oven.)
- (3) Vapor phase soldering (VPS) is not used.
- (4) Except for the surface mount type, reflow soldering must not be used for the capacitors.
- (5) In the case of reflow soldering, capacitive static electricity may decrease after soldering even when the soldering conditions are within the required values.
- (6) Recommended reflow condition of SMD type.



| Voltage range | Preheat | Time maintained above 200°C | Time maintained above 230°C | Peak temp. | Reflow number |
|---------------|-------------------------------|-----------------------------|-----------------------------|------------|---------------|
| 2.5 to 10v | 150 to 180°C 120 sec. max. | 90 sec. max. | 60 sec. max. | 260°C max | only 1 time |
| 16 to 25v | | 90 sec. max. | 60 sec. max. | 250°C max | twice or less |
| | | 80 sec. max. | 50 sec. max. | 240°C max | only 1 time |
| 35 to 100v | | 70 sec. max. | 30 sec. max. | 240°C max | twice or less |

Note : 1) All temperatures are measured on the topside of the Al-case and terminal surface.
 2) The second reflow soldering shall be applied after the temperature of capacitors decreases down to the room temperature.

The leakage current value may increase (from a few μA to a few mA) even within the above conditions. When the CP-CAP is used in a DC circuit, the leakage current will decrease gradually through self-recovery after voltage is applied. If your reflow profile deviates from the above conditions for mounting the CP-CAP, please consult with CapXon.

5. Handling after soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.

- (1) Do not lean or twist the body of the capacitor after soldering the capacitors onto the PC board
- (2) Do not use the capacitors for lifting or carrying the assembly board.
- (3) Do not hit or poke the capacitor after soldering to PC board. When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.
- (4) Do not drop the assembled board.

6. Washing the PC boards

- (1) Do not wash capacitors by using the following cleaning agents. Solvent resistant capacitors are only suitable for washing using the cleaning conditions prescribed in the catalog or the product specification. In particular, ultrasonic cleaning will accelerate damage to capacitors.

- Halogenated solvents; cause capacitors to fail due to corrosion.
Alkali system solvents; corrode (dissolve) an aluminum case.
- Petroleum system solvents; cause the rubber seal material to deteriorate.
- Xylene; causes the rubber seal material to deteriorate.
- Acetone; erases the markings.

- (2) Verify the following points when washing capacitors.
 - Monitor conductivity, pH, specific gravity and the water content of cleaning agents. Contamination adversely affects these characteristics.
 - Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container. In addition, please dry the solvent sufficiently on the PC board and the capacitor

with an air knife (temperature should be less than the maximum rated category temperature of the capacitor) for 10 minutes. Aluminum electrolytic capacitors can be characteristically and catastrophically damaged by halogen ions, particularly by chlorine ions, though the degree of the damage mainly depends upon the characteristics of the electrolyte and rubber seal material. When halogen ions come into contact with the capacitors, the foil corrodes when a voltage is applied. This corrosion causes an extremely high leakage current which results venting and an open circuit.

Storage

The following conditions for storage are recommend.

- (1) Store capacitors in a cool, dry place. Store at a temperature between 5 and 35°C, with a humidity of 75% or less. SMD products are sealed in a special laminated aluminum bag. Use all capacitors once the bag is opened. Return unused capacitors to the bag, and seal it with a zipper. Be sure to follow our recommendations for reflow soldering.
- (2) Store the capacitors in a location free from direct contact with water, salt water, and oil.
- (3) Store in a location where the capacitor is not exposed to toxic gas, such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or chlorine compounds, bromine or other halogen gases, methyl bromide or other halogen compounds, ammonia, or similar.
- (4) Store in a location where the capacitor is not exposed to ozone, ultraviolet radiation, or other radiation.
- (5) It is recommended to store capacitors in their original packaging wherever possible.

For Aluminum Electrolytic Capacitors

When you use aluminum electrolytic capacitors, remember the following.

1.Polarity

- Regular electrolytic Capacitor has polarity.
- Reverse voltage causes short circuit breakage of the capacitor or leakage of electrolyte. Where the polarity in a circuit sometimes reversed or unknown, a bi-polar capacitor should be used.

2.Overvoltage

- Do not apply overvoltage continuously.
- When overvoltage is applied to the capacitor, leakage current increase drastically.
- Applied working voltage to capacitors should not exceed the rated working voltage of capacitor.

3.Operating temperature and life:

- Do not use the capacitor over the max operating temperature.
- Life time of the capacitor depends on the temperature.
- Generally, life time is doubled by decreasing each temperature 10°C.
- Use temperature as low as possible.

4.Vent

- It is recommended at least 3mm of space around the vent.
- If such space is not provided, the vent will not operate completely.

5.Ripple current

- Do not apply a ripple current exceeding the rated maximum ripple current.
- Applying too much ripple current to the capacitor causes great heat generation, invites deterioration of properties of cases breakage.
- Please consult factory if ripple current exceeds the specified limit.

6.Charge and discharging

- Frequent and quick charge/discharge generates heat inside the capacitor, causing increase of leakage current, decrease of capacitance, or breakage occasionally.
- Consult us for assistance in this application.

使用鋁電解電容器注意事項：

1.極性

鋁電解電容器一般是有極性的，極性反接是造成鋁電解電容器短路損壞及漏液的原因，因此在無法辨識電氣迴路上之極性或使用於有極性變換設計之迴路時，請選用無極性電解電容器。

2.過載

請勿連續施加過載電壓。當電壓過載時電解電容器的漏電流會急速增加，所以電解電容器之工作電壓不應超過額定值。

3.使用溫度和壽命

電解電容器之使用溫度請勿超出最高使用溫度之設定範圍。電解電容器的壽命取決於使用溫度，一般來說當電解電容器之使用溫度降低10°C時，其壽命將增為兩倍，因此電解電容器應儘可能在較低溫度下使用。

4.防爆孔

有防爆孔設計之電解電容器其使用時防爆孔側應與其它機構保持最少3mm以上之空間距離，如此條件不能滿足的話，防爆孔將無法正常運作。

5.紋波電流

請勿施加超過額定最高紋波電流容許值以上之紋波電流。施加過大紋波電流將使電解電容器的內溫異常上升，引起電解電容器電氣特性劣化及破損。如有需要施加額定值以上之紋波電流等要求時，請諮詢敝廠人員。

6.充放電

經常及快速的充放電將使電容器之內溫異常上升，使漏電流增加、容量降低，有時還會造成產品之損壞，如對充放電有特殊要求時請諮詢敝廠人員。

7.Storage

- When the capacitor is stored for a long time without applying voltage, leakage current tends to increase.
- This returns to normal by applying the rated voltage to the capacitor before use.
- It is recommended to apply D.C. working voltage to the capacitor for 30 minutes through 1KΩ of protective series resistor, if it is stored for more than 12 months.
- The capacitor should be stored at temperature 5°C to 35°C, with humidity of 75% or less.

7.電解電容器的儲存

當電解電容器經過長時間之放置後，通常其漏電流有增大之傾向。因此在使用經過長時間放置後之電解電容器以前，建議需先施加定額電壓使其電氣特性回復正常；如儲存時間長於12個月以上時，請串排1kΩ之保護電阻後，使其持續負載定額工作電壓30分鐘。另外電解電容器應儲存於溫度介於5°C~35°C及濕度75%或以下之環境。

8.For SMD Soldering

- Improper soldering may shrink or break the insulating sleeve and/or damage the internal element as terminals and lead wires conduct heat into the capacitor.
- Avoid too high a soldering temperature and/or too long a soldering time.
- Solderability 245±5°C, 2±0.5 secs, 95% coverage min.

8.SMD焊

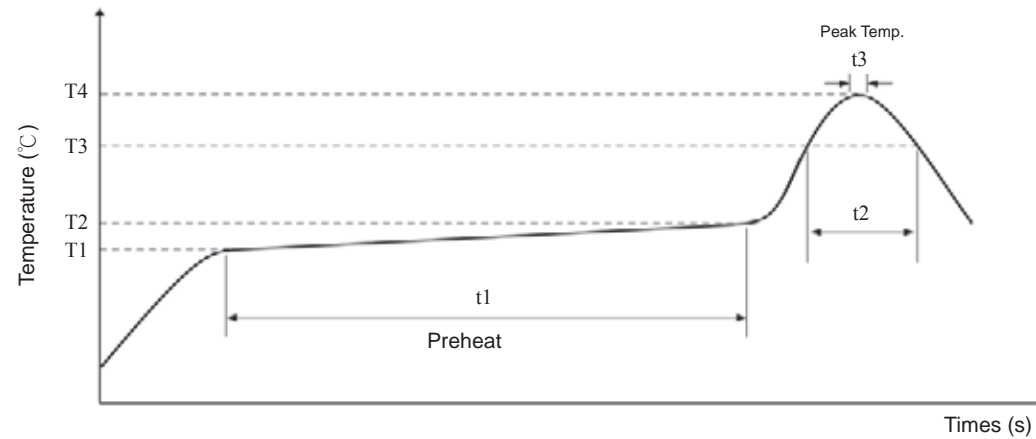
不適當的焊錫溫度及時間可能造成表面膠管之異常收縮破裂，有時高溫也會藉由導針及端子導熱至素子內部，對產品造成不良影響，因此須儘量避免過高溫度及過長時間之焊錫。
 焊接性：245±5°C, 2±0.5 秒, 表面大於95%範圍附著錫。

9. Reflow soldering of SMD

Soldering Heat Resistance as below Temperature profile

9.SMD回流焊

耐焊接熱如下溫度曲線



| Size | Voltage | Preheat | | Time maintained above 230°C | | Peak temp. | | Reflow number |
|---------------|------------|----------------|-----------------|-----------------------------|--------------|------------|-----------|-----------------|
| | | Temp.(T1~T2) | Time(t1) | Temp.(T3) | Time (t2) | Temp.(T4) | Time (t3) | |
| φ3~ φ6.3 | 4 to 50V | 150°C to 180°C | 120sec. max. | above 230°C | 30 sec. max | 260°C max. | 10 sec. | 2 times or less |
| | 63 to 100V | | | above 230°C | 30 sec. max | 255°C max. | 5 sec. | 2 times or less |
| φ8~ φ10 | 4 to 50V | | | above 230°C | 30 sec. max | 250°C max. | 5 sec. | 2 times or less |
| | 63 to 450V | | | above 230°C | 30 sec. max | 240°C max. | 5 sec. | 2 times or less |
| φ12.5~ φ18 | 4 to 50V | | | above 230°C | 20 sec. max. | 245°C max | 5 sec. | 2 times or less |
| | 63 to 450V | | | above 230°C | - | 235°C max | 5 sec. | 2 times or less |

10. Mechanical stress on the lead wire and the terminal

- Do not apply excessive force to the lead wire and the terminal.
- Do not move the capacitor after soldering to the PC board, not carry the PC board by picking up the capacitor.

11. Cleaning of boards after soldering

- If the capacitor is cleaned in halogenated solvent for organic removing solder flux solvent, the solvent may penetrate into the inside of capacitor, and may generate corrosion.

12. Sleeve material

- The standard sleeve material is polyethylene terephthalate.
- If exposed to xylene, toluene, etc, and then subjected to high heat, the sleeve may crack. This sleeve is not insulating material.

13. CapXon's Products meet quality standards specified by JIS-C-5101-1 and the reliability requirements refer to JIS-C-5101-4(non-SMD liquid capacitor), -18(Liquid SMD capacitor), -25(solid SMD capacitor), -26(solid Radial capacitor).

14. None of ozone depleting chemicals (ODC) under the Montreal Protocol is used in manufacturing process of CapXon Electronic Industrial CO., Ltd.

15. About AEC-Q200

The Automotive Electronics Council(AEC) , was setup by American major automotive manufactures, which now are an industry committees consist of various manufacturers of electrical equipment and spare components .It's also responsible for the standardization of reliability test and standard test of electronic components.

AEC-Q200 is the reliability test standard for the determination of passive components, which specifies the test items and the number of test items for various components, including the reliability test standard for aluminum electrolytic capacitors.

For the increasing number of aluminum electrolytic capacitors for on-board use in recent years, our company can provide the experimental results according to the requirements of the guests, corresponding to AEC-Q200.

10. 導針與端子之機械強度

請勿施加過度之外力於導針及端子上。請勿扳開已焊接於PC板上之電解電容器，更不要以電解電容器為施力點提起或移動整塊PC板。

11. 焊錫後之基板清洗

如使用鹵化有機溶劑清洗基板，溶劑有可能滲進電解電容器內部引起腐蝕。

12. 套管材料

一般使用之塑膠套膠材質多為聚對苯二甲酸乙二酯（PET），如塑膠管在浸漬二甲苯或甲苯後再放置於高溫下，將產生分解反應，膠管將失去絕緣功能。

13. 本公司之產品品質符合JIS-C-5101-1指定標準，其信賴性試驗方法依JIS-C-5101-4(非SMD液態電容)，-18（液態SMD電容），-25(固態SMD電容)，-26（固態導針型電容）之規範為基準。

14. 本公司依蒙特利爾協議書之規定，於生產過程中不使用破壞臭氧層之藥品。

15. AEC是車載電子零部件評議會的簡稱，是由美國主要汽車製造商設立，現在由電裝，零部件各製造公司構成的行業團體。負責電子零部件的可靠性試驗及認定標準試驗的標準化工作。

AEC-Q200是被動元器件的認定用可靠性試驗標準，規定了各類元器件的試驗專案及試驗數量等，其中也規定了鋁電解電容器的可靠性試驗標準。

對於近年來逐漸增多的用於車載用途的鋁電解電容器，我公司可對應AEC-Q200，根據客人的要求提供實驗結果。詳情另外諮詢。

PL series Low ESR $\leq 9m\Omega$

Features

- ◆ Very Low ESR at high frequency range.
- ◆ Very Large permissible ripple current.



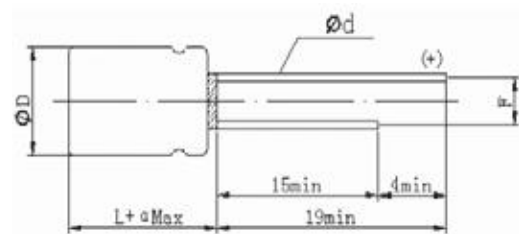
Specifications

| Items | Performance Characteristics | |
|--|---|--|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~16V DC | |
| Capacitance Range | 180 to 3500 μ F | |
| Capacitance Tolerance | $\pm 20\%$ (120Hz , +20°C) | |
| Leakage Current (+20°C , max) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within $\pm 20\%$ of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within $\pm 20\%$ of the value before test |
| | Leakage Current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz \leq freq. < 1KHz | 1KHz \leq freq. < 10KHz | 10KHz \leq freq. < 100KHz | 100KHz \leq freq. < 300KHz |
|-------------|---------------------------|---------------------------|-----------------------------|------------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| ϕ DxL | ϕ D+0.5 | α | F ± 0.5 | ϕ d ± 0.05 |
|------------|--------------|----------|-------------|---------------------|
| 8x8 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x11.5 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz | Maximum Permissible Ripple Current(mA,r.m.s) |
|----------|---------|-------------------|-------------------|----------------------|--------------------|---|
| 2.5 | 560 | 8x8 | 280 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 280 | 0.08 | 9 | 6100 |
| | 680 | 8x8 | 340 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 340 | 0.08 | 9 | 6100 |
| | 820 | 8x8 | 410 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 410 | 0.08 | 9 | 6100 |
| | 1000 | 8x8 | 500 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 500 | 0.08 | 9 | 6100 |
| | 1200 | 8x8 | 600 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 600 | 0.08 | 9 | 6100 |
| | 1500 | 8x8 | 750 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 750 | 0.08 | 9 | 6100 |
| | 1800 | 8x8 | 900 | 0.08 | 9 | 6100 |
| | 2000 | 8x11.5 | 1000 | 0.08 | 9 | 6100 |
| | | 10x12.5 | 1000 | 0.08 | 9 | 6640 |
| 2500 | 10x12.5 | 1250 | 0.08 | 9 | 6640 | |
| 2700 | 10x12.5 | 1350 | 0.08 | 9 | 6640 | |
| 3000 | 10x12.5 | 1500 | 0.08 | 9 | 6640 | |
| 3300 | 10x12.5 | 1650 | 0.08 | 9 | 6640 | |
| 3500 | 10x12.5 | 1750 | 0.08 | 9 | 6640 | |
| 4 | 560 | 8x8 | 224 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 225 | 0.08 | 9 | 6100 |
| | 680 | 8x8 | 272 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 272 | 0.08 | 9 | 6100 |
| | 820 | 8x8 | 328 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 328 | 0.08 | 9 | 6100 |
| | | 10x12.5 | 328 | 0.08 | 9 | 6100 |
| | 1000 | 8x8 | 800 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 800 | 0.08 | 9 | 6100 |
| | 1200 | 8x8 | 960 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 860 | 0.08 | 9 | 6100 |
| | | 10x12.5 | 860 | 0.08 | 9 | 6640 |
| | 1500 | 8x11.5 | 1200 | 0.08 | 9 | 6100 |
| | | 10x12.5 | 1200 | 0.08 | 9 | 6640 |
| | 1800 | 8x11.5 | 1440 | 0.08 | 9 | 6500 |
| 2000 | 10x12.5 | 1600 | 0.08 | 9 | 6640 | |
| 2500 | 10x12.5 | 1500 | 0.08 | 9 | 6640 | |
| 6.3 | 180 | 8x8 | 226.8 | 0.07 | 9 | 6100 |
| | | 8x11.5 | 226.8 | 0.07 | 9 | 6100 |
| | 220 | 8x8 | 277 | 0.07 | 9 | 6100 |
| | | 8x11.5 | 277 | 0.07 | 9 | 6100 |
| | 270 | 8x8 | 340.2 | 0.07 | 9 | 6100 |
| | | 8x11.5 | 340.2 | 0.07 | 9 | 6100 |
| | 330 | 8x8 | 416 | 0.07 | 9 | 6100 |
| | | 8x11.5 | 416 | 0.07 | 9 | 6100 |
| | 390 | 8x8 | 491.4 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 491.4 | 0.08 | 9 | 6100 |
| | 470 | 8x8 | 592 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 592 | 0.08 | 9 | 6100 |
| | 560 | 8x8 | 705.6 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 705.6 | 0.08 | 9 | 6100 |
| | 680 | 8x8 | 428.4 | 0.08 | 9 | 6100 |
| 8x11.5 | | 428.4 | 0.08 | 9 | 6100 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ,100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|----------|---------|-------------------|-------------------|----------------------|--------------------|---|
| 6.3 | 820 | 8x8 | 516.6 | 0.10 | 9 | 6100 |
| | | 8x11.5 | 514.6 | 0.10 | 9 | 6100 |
| | 1000 | 8x8 | 630 | 0.10 | 9 | 6100 |
| | | 8x11.5 | 630 | 0.10 | 9 | 6100 |
| | | 10x12.5 | 630 | 0.10 | 9 | 6640 |
| | 1200 | 8x8 | 756 | 0.10 | 9 | 6100 |
| | | 8x11.5 | 756 | 0.10 | 9 | 6100 |
| | | 10x12.5 | 756 | 0.10 | 9 | 6640 |
| | 1500 | 8x11.5 | 945 | 0.10 | 9 | 6100 |
| | | 10x12.5 | 945 | 0.10 | 9 | 6640 |
| 2000 | 10x12.5 | 1260 | 0.10 | 9 | 6640 | |
| 2200 | 10x12.5 | 1336 | 0.10 | 9 | 6640 | |
| 2500 | 10x12.5 | 1575 | 0.10 | 9 | 6640 | |
| 10 | 180 | 8x8 | 360 | 0.07 | 9 | 5600 |
| | | 8x11.5 | 360 | 0.07 | 9 | 6100 |
| | 220 | 8x8 | 440 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 440 | 0.08 | 9 | 6100 |
| | 270 | 8x8 | 540 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 540 | 0.08 | 9 | 6100 |
| | 330 | 8x8 | 660 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 660 | 0.08 | 9 | 6100 |
| | 390 | 8x8 | 780 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 780 | 0.08 | 9 | 6100 |
| | 470 | 8x8 | 940 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 940 | 0.08 | 9 | 6100 |
| | 560 | 8x8 | 560 | 0.10 | 9 | 5600 |
| | | 8x11.5 | 560 | 0.10 | 9 | 6100 |
| | 680 | 8x8 | 680 | 0.10 | 9 | 5600 |
| | | 8x11.5 | 680 | 0.10 | 9 | 5600 |
| | 680 | 10x12.5 | 680 | 0.10 | 9 | 6100 |
| | | 8x11.5 | 820 | 0.10 | 9 | 5600 |
| | 820 | 10x12.5 | 820 | 0.10 | 9 | 6100 |
| | | 8x11.5 | 1000 | 0.10 | 9 | 5600 |
| 1000 | 10x12.5 | 1000 | 0.10 | 9 | 6100 | |
| | 10x12.5 | 1200 | 0.10 | 9 | 6100 | |
| 1500 | 10x12.5 | 1500 | 0.10 | 9 | 6100 | |
| 16 | 180 | 8x11.5 | 576 | 0.08 | 9 | 5600 |
| | 220 | 8x11.5 | 704 | 0.08 | 9 | 5600 |
| | 270 | 8x8 | 864 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 864 | 0.08 | 9 | 5600 |
| | 330 | 8x8 | 528 | 0.08 | 9 | 5600 |
| | | 8x11.5 | 528 | 0.08 | 9 | 5600 |
| | 330 | 10x12.5 | 528 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 624 | 0.08 | 9 | 5600 |
| | 390 | 10x12.5 | 624 | 0.08 | 9 | 6100 |
| | | 8x11.5 | 752 | 0.10 | 9 | 5600 |
| | 470 | 10x12.5 | 752 | 0.10 | 9 | 6100 |
| | | 8x11.5 | 896 | 0.10 | 9 | 5600 |
| | 560 | 10x12.5 | 896 | 0.10 | 9 | 6100 |
| | | 680 | 10x12.5 | 1000 | 0.10 | 9 |
| 820 | 10x12.5 | 1280 | 0.10 | 9 | 6100 | |
| 1000 | 10x12.5 | 1600 | 0.10 | 9 | 6100 | |

Ripple Current(mA,rms)at 105°C,100KHz

PS series Standard Products

Features

- ◆ Low ESR at high frequency range.
- ◆ Large permissible ripple current.



Conductive Polymer

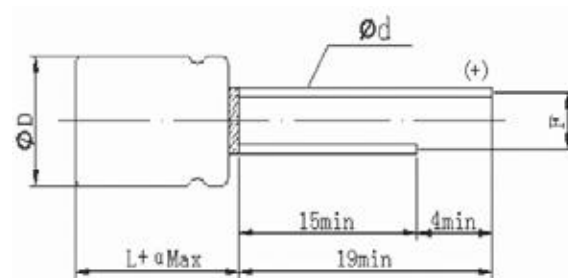
Specifications

| Item | Performance Characteristics | |
|---|---|---|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~25 VDC | |
| Capacitance Range | 39 to 3500 μF | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz ≦ freq. < 1KHz | 1KHz ≦ freq. < 10KHz | 10KHz ≦ freq. < 100KHz | 100KHz ≦ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| φ DxL | φ D+0.5 | α | F ± 0.5 | φ d ± 0.05 |
|---------|---------|-----|---------|------------|
| 8x8 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x11.5 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 560 | 8x8 | 280 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 280 | 0.08 | 12 | 5100 |
| | 680 | 8x8 | 340 | 0.08 | 12 | 5200 |
| | | 8x11.5 | 340 | 0.08 | 12 | 5200 |
| | 820 | 8x8 | 410 | 0.08 | 12 | 5200 |
| | | 8x11.5 | 410 | 0.08 | 12 | 5200 |
| | 1000 | 8x8 | 500 | 0.08 | 12 | 5500 |
| | | 8x11.5 | 500 | 0.08 | 12 | 5500 |
| | 1200 | 8x8 | 600 | 0.08 | 12 | 5500 |
| | | 8x11.5 | 600 | 0.08 | 12 | 5500 |
| | 1500 | 8x8 | 750 | 0.08 | 12 | 5500 |
| | | 8x11.5 | 750 | 0.08 | 12 | 5500 |
| | 2000 | 8x11.5 | 1000 | 0.08 | 12 | 5900 |
| | | 10x12.5 | 1000 | 0.08 | 12 | 5900 |
| | 2200 | 10x12.5 | 1100 | 0.08 | 12 | 5900 |
| 2500 | 10x12.5 | 1250 | 0.08 | 12 | 5900 | |
| 2700 | 10x12.5 | 1350 | 0.08 | 12 | 5900 | |
| 3000 | 10x12.5 | 1500 | 0.08 | 12 | 5900 | |
| 3300 | 10x12.5 | 1650 | 0.08 | 12 | 5900 | |
| 3500 | 10x12.5 | 1750 | 0.10 | 12 | 5900 | |
| 4 | 560 | 8x8 | 448 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 448 | 0.08 | 12 | 5200 |
| | 680 | 8x8 | 544 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 544 | 0.08 | 12 | 5200 |
| | 820 | 8x8 | 656 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 656 | 0.08 | 12 | 5200 |
| | | 10x12.5 | 656 | 0.08 | 12 | 5900 |
| | 1000 | 8x8 | 800 | 0.10 | 12 | 5100 |
| | | 8x11.5 | 800 | 0.10 | 12 | 5500 |
| | | 10x12.5 | 800 | 0.10 | 12 | 5900 |
| | 1200 | 8x11.5 | 960 | 0.10 | 12 | 5500 |
| | | 10x12.5 | 960 | 0.10 | 12 | 5900 |
| | 1500 | 8x11.5 | 600 | 0.10 | 12 | 5500 |
| | | 10x12.5 | 600 | 0.10 | 12 | 5900 |
| | 2000 | 10x12.5 | 800 | 0.10 | 12 | 5900 |
| 2200 | 10x12.5 | 880 | 0.10 | 12 | 5900 | |
| 2500 | 10x12.5 | 1000 | 0.10 | 12 | 5900 | |
| 6.3 | 180 | 8x8 | 226.8 | 0.07 | 21 | 5100 |
| | | 8x11.5 | 226.8 | 0.07 | 21 | 5100 |
| | 220 | 8x8 | 277.2 | 0.07 | 21 | 5100 |
| | | 8x11.5 | 277.2 | 0.07 | 21 | 5100 |
| | 270 | 8x8 | 340.2 | 0.07 | 21 | 5100 |
| | | 8x11.5 | 340.2 | 0.07 | 21 | 5100 |
| | 330 | 8x8 | 415.8 | 0.07 | 15 | 5100 |
| | | 8x11.5 | 415.8 | 0.07 | 15 | 5500 |
| | 390 | 8x8 | 491.4 | 0.08 | 15 | 5100 |
| | | 8x11.5 | 491.4 | 0.08 | 15 | 5500 |
| | 470 | 8x8 | 592.2 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 592.2 | 0.08 | 12 | 5500 |
| | 560 | 8x8 | 705.6 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 705.6 | 0.08 | 12 | 5500 |
| | 680 | 8x8 | 428.4 | 0.08 | 10 | 5100 |
| | | 8x11.5 | 428.4 | 0.08 | 12 | 5500 |
| | | 10x12.5 | 428.4 | 0.08 | 12 | 5900 |
| | 820 | 8x8 | 516.6 | 0.10 | 12 | 5100 |
| 8x11.5 | | 516.6 | 0.10 | 12 | 5500 | |
| 10x12.5 | | 516.6 | 0.10 | 12 | 5900 | |
| 1000 | 8x8 | 630 | 0.10 | 12 | 5100 | |
| | 8x11.5 | 630 | 0.10 | 12 | 5500 | |
| | 10x12.5 | 630 | 0.10 | 12 | 5900 | |

Ripple Current(mA,rms)at 105°C,100KHz

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 6.3 | 1200 | 8x11.5 | 756 | 0.10 | 12 | 5500 |
| | | 10x12.5 | 756 | 0.10 | 12 | 5900 |
| | 1500 | 8x11.5 | 945 | 0.10 | 12 | 5500 |
| | | 10x12.5 | 945 | 0.10 | 12 | 5900 |
| | 2000 | 10x12.5 | 1260 | 0.10 | 12 | 5900 |
| | 2200 | 10x12.5 | 1386 | 0.10 | 12 | 5900 |
| 2500 | 10x12.5 | 1575 | 0.10 | 12 | 5900 | |
| 10 | 180 | 8x8 | 180 | 0.08 | 15 | 5100 |
| | | 8x11.5 | 180 | 0.08 | 15 | 5500 |
| | 220 | 8x8 | 220 | 0.08 | 15 | 5100 |
| | | 8x11.5 | 220 | 0.08 | 15 | 5500 |
| | 270 | 8x8 | 270 | 0.08 | 15 | 5100 |
| | | 8x11.5 | 270 | 0.08 | 15 | 5500 |
| | 330 | 8x8 | 330 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 330 | 0.08 | 12 | 5500 |
| | 390 | 8x8 | 390 | 0.08 | 12 | 5100 |
| | | 8x11.5 | 390 | 0.08 | 12 | 5500 |
| | 470 | 8x8 | 470 | 0.08 | 12 | 5500 |
| | | 8x11.5 | 470 | 0.08 | 12 | 5500 |
| | 560 | 8x8 | 560 | 0.08 | 12 | 5500 |
| | | 8x11.5 | 560 | 0.08 | 12 | 5500 |
| | 680 | 8x8 | 680 | 0.10 | 12 | 5500 |
| | | 8x11.5 | 680 | 0.10 | 12 | 5900 |
| | 820 | 10x12.5 | 680 | 0.10 | 12 | 5900 |
| | | 8x11.5 | 820 | 0.10 | 12 | 5900 |
| 1000 | 10x12.5 | 820 | 0.10 | 12 | 5900 | |
| | 8x11.5 | 1000 | 0.10 | 12 | 5900 | |
| 1200 | 10x12.5 | 1000 | 0.10 | 12 | 5900 | |
| 1500 | 10x12.5 | 1500 | 0.10 | 12 | 5900 | |
| 16 | 100 | 8x11.5 | 160 | 0.08 | 12 | 4800 |
| | 150 | 8x8 | 240 | 0.08 | 12 | 4500 |
| | 180 | 8x8 | 288 | 0.08 | 15 | 4500 |
| | | 8x11.5 | 288 | 0.08 | 15 | 4800 |
| | 220 | 8x8 | 352 | 0.08 | 15 | 4500 |
| | | 8x11.5 | 352 | 0.08 | 15 | 5000 |
| | 270 | 8x8 | 432 | 0.08 | 12 | 4500 |
| | | 8x11.5 | 432 | 0.08 | 15 | 5000 |
| | | 10x12.5 | 432 | 0.08 | 12 | 5500 |
| | 330 | 8x8 | 528 | 0.08 | 12 | 4500 |
| | | 8x11.5 | 528 | 0.08 | 12 | 5000 |
| | | 10x12.5 | 528 | 0.08 | 12 | 5500 |
| | 390 | 8x8 | 624 | 0.08 | 12 | 4500 |
| | | 8x11.5 | 624 | 0.08 | 12 | 5000 |
| | | 10x12.5 | 624 | 0.08 | 12 | 5500 |
| | 470 | 8x8 | 752 | 0.10 | 16 | 4500 |
| | | 8x11.5 | 752 | 0.10 | 12 | 5000 |
| | | 10x12.5 | 752 | 0.10 | 12 | 5500 |
| 560 | 8x8 | 896 | 0.12 | 16 | 4500 | |
| | 8x11.5 | 896 | 0.10 | 12 | 5000 | |
| | 10x12.5 | 896 | 0.10 | 12 | 5500 | |
| 680 | 8x11.5 | 1088 | 0.12 | 14 | 5000 | |
| | 10x12.5 | 1088 | 0.10 | 12 | 5500 | |
| 820 | 10x12.5 | 1312 | 0.10 | 12 | 5500 | |
| 1000 | 10x12.5 | 1600 | 0.10 | 12 | 5500 | |
| 1200 | 10x12.5 | 1920 | 0.12 | 12 | 5500 | |

Ripple Current(mA,rms)at 105°C,100KHz

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|--------------------|---|
| 20 | 39 | 8x8 | 156 | 0.08 | 25 | 3500 |
| | | 8x11.5 | 156 | 0.08 | 20 | 3800 |
| | 47 | 8x8 | 188 | 0.08 | 25 | 3500 |
| | | 8x11.5 | 188 | 0.08 | 20 | 3800 |
| | 68 | 8x8 | 272 | 0.08 | 25 | 3500 |
| | | 8x11.5 | 272 | 0.08 | 20 | 4100 |
| | 82 | 8x8 | 328 | 0.08 | 20 | 3800 |
| | | 8x11.5 | 328 | 0.08 | 20 | 4100 |
| | 100 | 8x8 | 400 | 0.08 | 18 | 3900 |
| | | 8x11.5 | 400 | 0.08 | 18 | 4200 |
| | | 10x12.5 | 400 | 0.08 | 18 | 4500 |
| | 150 | 8x8 | 600 | 0.08 | 18 | 3900 |
| | | 8x11.5 | 600 | 0.08 | 18 | 4200 |
| | | 10x12.5 | 600 | 0.08 | 18 | 4500 |
| | 180 | 8x8 | 720 | 0.08 | 18 | 3900 |
| | | 8x11.5 | 720 | 0.08 | 18 | 4200 |
| | | 10x12.5 | 720 | 0.08 | 18 | 4500 |
| | 220 | 8x8 | 880 | 0.08 | 18 | 3900 |
| | | 8x11.5 | 880 | 0.08 | 18 | 4200 |
| | | 10x12.5 | 880 | 0.08 | 18 | 4500 |
| 270 | 8x11.5 | 1080 | 0.08 | 15 | 4500 | |
| | 10x12.5 | 1080 | 0.08 | 15 | 4900 | |
| 330 | 8x11.5 | 1320 | 0.08 | 15 | 4500 | |
| | 10x12.5 | 1320 | 0.08 | 15 | 4900 | |
| 390 | 8x11.5 | 1560 | 0.08 | 15 | 4500 | |
| | 10x12.5 | 1560 | 0.08 | 15 | 4900 | |
| 470 | 10x12.5 | 1880 | 0.08 | 15 | 4900 | |
| 560 | 10x12.5 | 2240 | 0.10 | 20 | 4500 | |
| 680 | 10x12.5 | 2720 | 0.10 | 20 | 4500 | |
| 820 | 10x12.5 | 3280 | 0.12 | 20 | 4500 | |
| 1000 | 10x12.5 | 2000 | 0.12 | 20 | 4500 | |
| 25 | 39 | 8x8 | 195 | 0.08 | 25 | 3500 |
| | | 8x11.5 | 195 | 0.08 | 20 | 3800 |
| | 47 | 8x8 | 235 | 0.08 | 25 | 3500 |
| | | 8x11.5 | 235 | 0.08 | 20 | 3800 |
| | 68 | 8x8 | 340 | 0.08 | 25 | 3500 |
| | | 8x11.5 | 340 | 0.08 | 20 | 4100 |
| | 82 | 8x8 | 410 | 0.08 | 20 | 3800 |
| | | 8x11.5 | 410 | 0.08 | 20 | 4100 |
| | 100 | 8x8 | 500 | 0.08 | 20 | 3900 |
| | | 8x11.5 | 500 | 0.08 | 20 | 4200 |
| | | 10x12.5 | 500 | 0.08 | 20 | 4500 |
| | 150 | 8x8 | 750 | 0.08 | 20 | 3900 |
| | | 8x11.5 | 750 | 0.08 | 20 | 4200 |
| | | 10x12.5 | 750 | 0.08 | 20 | 4500 |
| | 180 | 8x8 | 900 | 0.08 | 20 | 3900 |
| | | 8x11.5 | 900 | 0.08 | 20 | 4200 |
| | | 10x12.5 | 900 | 0.08 | 20 | 4500 |
| | 220 | 8x8 | 1100 | 0.08 | 20 | 3900 |
| | | 8x11.5 | 1100 | 0.08 | 20 | 4200 |
| | | 10x12.5 | 1100 | 0.08 | 20 | 4500 |
| 270 | 8x11.5 | 1350 | 0.08 | 18 | 4400 | |
| | 10x12.5 | 1350 | 0.08 | 18 | 4800 | |
| 330 | 8x11.5 | 1650 | 0.08 | 18 | 4400 | |
| | 10x12.5 | 1650 | 0.08 | 18 | 4800 | |
| 390 | 10x12.5 | 1950 | 0.08 | 20 | 4500 | |
| 470 | 10x12.5 | 2350 | 0.08 | 20 | 4500 | |
| 560 | 10x12.5 | 2800 | 0.10 | 20 | 4500 | |
| 680 | 10x12.5 | 3400 | 0.12 | 20 | 4500 | |
| 820 | 10x12.5 | 2050 | 0.12 | 20 | 4500 | |

Ripple Current(mA,rms)at 105°C,100KHz

PU series Ultra Low ESR $\leq 7m\Omega$

Features

- ◆ Ultra Low ESR at high frequency range.
- ◆ Ultra Large permissible ripple current.



Conductive Polymer

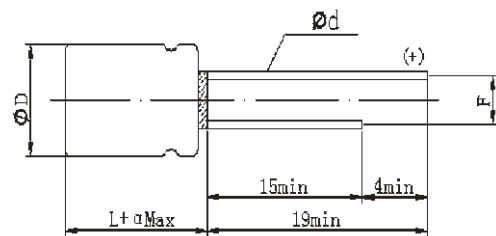
Specifications

| Item | Performance Characteristics | |
|---|---|--|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~10 VDC | |
| Capacitance Range | 180 to 3500 μ F | |
| Capacitance Tolerance | $\pm 20\%$ (120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within $\pm 20\%$ of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within $\pm 20\%$ of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz \leq freq. < 1KHz | 1KHz \leq freq. < 10KHz | 10KHz \leq freq. < 100KHz | 100KHz \leq freq. < 300KHz |
|-------------|---------------------------|---------------------------|-----------------------------|------------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| $\phi D \times L$ | $\phi D + 0.5$ | α | $F \pm 0.5$ | $\phi d \pm 0.05$ |
|-------------------|----------------|----------|-------------|-------------------|
| 8x8 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x11.5 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 560 | 8x8 | 280 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 280 | 0.08 | 7 | 6100 |
| | 680 | 8x8 | 340 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 340 | 0.08 | 7 | 6100 |
| | 820 | 8x8 | 410 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 410 | 0.08 | 7 | 6100 |
| | 1000 | 8x8 | 500 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 500 | 0.08 | 7 | 6100 |
| | 1200 | 8x8 | 600 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 600 | 0.08 | 7 | 6100 |
| | 1500 | 8x8 | 750 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 750 | 0.08 | 7 | 6100 |
| | | 10x12.5 | 750 | 0.08 | 7 | 7100 |
| | 2000 | 8x11.5 | 1000 | 0.08 | 7 | 6100 |
| | | 10x12.5 | 1000 | 0.08 | 7 | 7100 |
| | 2200 | 8x11.5 | 1100 | 0.08 | 7 | 6700 |
| 2500 | 10x12.5 | 1250 | 0.08 | 7 | 7100 | |
| 2700 | 10x12.5 | 1350 | 0.08 | 7 | 7100 | |
| 3000 | 10x12.5 | 1500 | 0.08 | 7 | 7100 | |
| 3300 | 10x12.5 | 1650 | 0.08 | 7 | 7100 | |
| 3500 | 10x12.5 | 1750 | 0.08 | 7 | 7100 | |
| 3900 | 10x12.5 | 1950 | 0.08 | 7 | 7100 | |
| 4 | 560 | 8x8 | 224 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 224 | 0.08 | 7 | 6100 |
| | 680 | 8x8 | 272 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 272 | 0.08 | 7 | 6100 |
| | 820 | 8x8 | 328 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 328 | 0.08 | 7 | 6100 |
| | | 10x12.5 | 328 | 0.08 | 7 | 6600 |
| | 1000 | 8x8 | 800 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 800 | 0.08 | 7 | 6100 |
| | | 10x12.5 | 800 | 0.08 | 7 | 6600 |
| | 1200 | 8x11.5 | 960 | 0.08 | 7 | 6100 |
| | | 10x12.5 | 960 | 0.08 | 7 | 6600 |
| | 1500 | 8x11.5 | 1200 | 0.10 | 7 | 6100 |
| | | 10x12.5 | 1200 | 0.10 | 7 | 6600 |
| | 1800 | 10x12.5 | 1440 | 0.10 | 7 | 6600 |
| | 2000 | 10x12.5 | 1600 | 0.10 | 7 | 6600 |
| 2200 | 10x12.5 | 1760 | 0.10 | 7 | 6600 | |
| 2500 | 10x12.5 | 2000 | 0.10 | 7 | 6600 | |
| 2700 | 10x12.5 | 2160 | 0.10 | 7 | 6600 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 6.3 | 180 | 8x8 | 113.4 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 113.4 | 0.10 | 7 | 6100 |
| | 220 | 8x8 | 138.6 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 138.6 | 0.10 | 7 | 6100 |
| | 270 | 8x8 | 170.1 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 170.1 | 0.10 | 7 | 6100 |
| | 330 | 8x8 | 207.9 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 207.9 | 0.10 | 7 | 6100 |
| | 390 | 8x8 | 245.7 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 245.7 | 0.10 | 7 | 6100 |
| | 470 | 8x8 | 296.1 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 296.1 | 0.10 | 7 | 6100 |
| | 560 | 8x8 | 352.8 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 352.8 | 0.08 | 7 | 6100 |
| | 680 | 8x8 | 428.4 | 0.08 | 7 | 6100 |
| | | 8x11.5 | 428.4 | 0.08 | 7 | 6600 |
| | | 10x12.5 | 428.4 | 0.08 | 7 | 6600 |
| | 820 | 8x8 | 516.6 | 0.10 | 7 | 6100 |
| | | 8x11.5 | 516.6 | 0.10 | 7 | 6600 |
| | | 10x12.5 | 516.6 | 0.10 | 7 | 6600 |
| 1000 | 8x8 | 630 | 0.10 | 7 | 6200 | |
| | 8x11.5 | 630 | 0.10 | 7 | 7100 | |
| | 10x12.5 | 756 | 0.10 | 7 | 7100 | |
| 1200 | 8x11.5 | 756 | 0.10 | 7 | 7100 | |
| | 10x12.5 | 756 | 0.10 | 7 | 7100 | |
| 1500 | 10x12.5 | 945 | 0.10 | 7 | 7100 | |
| 1800 | 10x12.5 | 1134 | 0.10 | 7 | 7100 | |
| 2000 | 10x12.5 | 1260 | 0.10 | 7 | 7100 | |
| 2500 | 10x12.5 | 1575 | 0.10 | 7 | 7100 | |
| 10 | 180 | 8x11.5 | 180 | 0.08 | 7 | 6600 |
| | 220 | 8x11.5 | 220 | 0.08 | 7 | 6600 |
| | 270 | 8x11.5 | 270 | 0.08 | 7 | 6600 |
| | 330 | 8x11.5 | 330 | 0.08 | 7 | 6600 |
| | 390 | 8x11.5 | 390 | 0.08 | 7 | 6600 |
| | | 8x11.5 | 470 | 0.08 | 7 | 6600 |
| | 470 | 10x12.5 | 470 | 0.08 | 7 | 6600 |
| | | 8x11.5 | 560 | 0.08 | 7 | 6600 |
| | 560 | 10x12.5 | 560 | 0.08 | 7 | 6600 |
| | | 8x11.5 | 680 | 0.10 | 7 | 6600 |
| | 680 | 10x12.5 | 680 | 0.10 | 7 | 6600 |
| | | 8x11.5 | 820 | 0.10 | 7 | 7100 |
| | 820 | 10x12.5 | 820 | 0.10 | 7 | 7100 |
| | | 10x12.5 | 1000 | 0.10 | 7 | 7100 |
| | 1200 | 10x12.5 | 1200 | 0.10 | 7 | 7100 |
| 1500 | 10x12.5 | 1500 | 0.10 | 7 | 7100 | |

Ripple Current(mA,rms)at 105°C,100KHz

PX series Low Profile

Features

- ◆ Low profile
- ◆ Low ESR at high frequency range &.Large permissible ripple current.



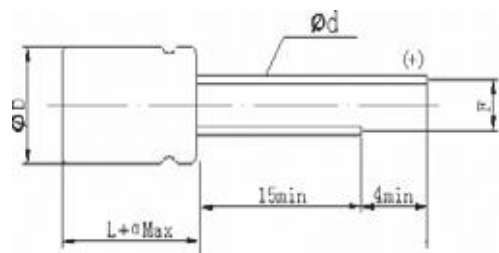
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~25 VDC | |
| Capacitance Range | 10 to 820 μ F | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| φ DxL | φ D+0.5 | α | F±0.5 | φ d±0.05 |
|-----------------|---------|-----|-------|----------|
| 4x5 / 4x7 | 4.0 | 1.0 | 1.5 | 0.45 |
| 4x10 | 5.0 | 1.0 | 1.5 | 0.50 |
| 5x5 / 5x7 | 5.0 | 1.0 | 2.0 | 0.45 |
| 5x8 / 5x9 | 5.0 | 1.0 | 2.0 | 0.5 |
| 5x11 | 6.3 | 1.0 | 2.0 | 0.6 |
| 6.3x5.2 / 6.3x7 | 6.3 | 1.0 | 2.5 | 0.45 |
| 6.3x9 | 6.3 | 1.0 | 2.5 | 0.5 |
| 6.3x11 | 6.3 | 1.0 | 2.5 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 100 | 4x5 | 300 | 0.08 | 30 | 1670 |
| | 150 | 5x5 | 300 | 0.08 | 30 | 1970 |
| | | 6.3x5.2 | 300 | 0.08 | 30 | 2200 |
| | 180 | 5x5 | 300 | 0.08 | 30 | 1970 |
| | 220 | 5x5 | 300 | 0.08 | 30 | 2200 |
| | 330 | 6.3x5.2 | 300 | 0.08 | 25 | 2610 |
| | 390 | 6.3x5.2 | 300 | 0.08 | 20 | 2690 |
| | | 6.3x7 | 300 | 0.08 | 15 | 3100 |
| | 470 | 6.3x5.2 | 300 | 0.08 | 20 | 2690 |
| | | 6.3x7 | 300 | 0.08 | 15 | 3100 |
| 560 | 5x9 | 300 | 0.08 | 15 | 3100 | |
| | 6.3x7 | 300 | 0.08 | 15 | 3100 | |
| 680 | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| 4 | 100 | 5x5 | 300 | 0.08 | 30 | 1970 |
| | | 6.3x5.2 | 300 | 0.08 | 30 | 2200 |
| | 150 | 6.3x7 | 300 | 0.08 | 25 | 2670 |
| | 220 | 6.3x7 | 300 | 0.08 | 20 | 2690 |
| | 270 | 6.3x5.2 | 300 | 0.08 | 25 | 2610 |
| | | 6.3x9 | 300 | 0.08 | 15 | 3300 |
| | 330 | 6.3x5.2 | 300 | 0.08 | 20 | 2690 |
| | | 6.3x7 | 300 | 0.08 | 15 | 3100 |
| | 390 | 6.3x9 | 300 | 0.08 | 15 | 3300 |
| | 470 | 6.3x7 | 300 | 0.08 | 15 | 3100 |
| 560 | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| 6.3 | 82 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 |
| | 100 | 6.3x5.2 | 300 | 0.08 | 25 | 2390 |
| | | 6.3x7 | 300 | 0.08 | 20 | 2690 |
| | | 4x7 | 300 | 0.08 | 35 | 1900 |
| | 150 | 5x7 | 300 | 0.08 | 20 | 2450 |
| | | 5x8 | 300 | 0.08 | 15 | 2690 |
| | | 6.3x5.2 | 300 | 0.08 | 20 | 2690 |
| | | | 300 | 0.08 | 15 | 3100 |
| | 220 | 6.3x7 | 300 | 0.08 | 15 | 3100 |
| | | 6.3x9 | 300 | 0.08 | 15 | 3300 |
| | | 5x7 | 300 | 0.08 | 20 | 2450 |
| | 270 | 5x8 | 300 | 0.08 | 15 | 2690 |
| | | 5x8 | 300 | 0.08 | 15 | 2690 |
| | 330 | 5x9 | 300 | 0.08 | 15 | 3100 |
| | | 6.3x5.2 | 300 | 0.08 | 20 | 2690 |
| | | 6.3x9 | 300 | 0.08 | 15 | 3300 |
| 5x9 | | 300 | 0.08 | 15 | 3100 | |
| 390 | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| 470 | 6.3x7 | 300 | 0.08 | 15 | 3100 | |
| 680 | 6.3x9 | 300 | 0.08 | 15 | 3300 | |
| | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| 820 | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| 10 | 10 | 4x5 | 300 | 0.08 | 80 | 1200 |
| | 22 | 4x5 | 300 | 0.08 | 80 | 1200 |
| | 33 | 5x5 | 300 | 0.08 | 45 | 1670 |
| | | 6.3x5.2 | 300 | 0.08 | 30 | 2200 |
| | 39 | 6.3x7 | 300 | 0.08 | 25 | 2410 |
| | | 5x5 | 300 | 0.08 | 45 | 1670 |
| | 47 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 |
| | | 6.3x7 | 300 | 0.08 | 20 | 2690 |
| | | 6.3x9 | 300 | 0.08 | 18 | 3100 |
| | 56 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 |
| 68 | 6.3x9 | 300 | 0.08 | 18 | 3100 | |
| 82 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) | |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|------|
| 10 | 100 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x9 | 300 | 0.08 | 18 | 3100 | |
| | 150 | 5x7 | 300 | 0.08 | 25 | 2100 | |
| | | 6.3x5.2 | 300 | 0.08 | 25 | 2200 | |
| | | 6.3x9 | 300 | 0.08 | 18 | 3100 | |
| | 180 | 5x11 | 300 | 0.08 | 20 | 2690 | |
| | 220 | 5x11 | 300 | 0.08 | 20 | 2690 | |
| | | 6.3x9 | 300 | 0.08 | 15 | 3300 | |
| | 270 | 5x11 | 300 | 0.08 | 20 | 2690 | |
| | | 6.3x7 | 300 | 0.08 | 20 | 3100 | |
| | | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| | 330 | 6.3x9 | 300 | 0.08 | 15 | 3300 | |
| 470 | 6.3x9 | 300 | 0.08 | 15 | 3300 | | |
| | 6.3x11 | 300 | 0.08 | 15 | 3500 | | |
| 16 | 10 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | 22 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2610 | |
| | 33 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2610 | |
| | 39 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | 47 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2610 | |
| | 82 | 6.3x7 | 300 | 0.08 | 20 | 2690 | |
| | 100 | 5x11 | 300 | 0.08 | 20 | 2690 | |
| | | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x9 | 300 | 0.08 | 20 | 2900 | |
| | | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| | | 150 | 6.3x7 | 300 | 0.08 | 20 | 2690 |
| | | 180 | 6.3x9 | 300 | 0.08 | 20 | 3100 |
| | 220 | 6.3x9 | 300 | 0.08 | 20 | 3100 | |
| | | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| | 270 | 6.3x11 | 300 | 0.08 | 15 | 3500 | |
| 330 | 6.3x9 | 300 | 0.08 | 15 | 3100 | | |
| 20 | 10 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | 15 | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | 22 | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | 33 | 6.3x9 | 300 | 0.08 | 20 | 2900 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | 47 | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | 56 | 6.3x9 | 300 | 0.08 | 20 | 2900 | |
| | 68 | 6.3x9 | 300 | 0.08 | 20 | 2900 | |
| 6.3x11 | | 300 | 0.08 | 20 | 2900 | | |
| 82 | 6.3x11 | 300 | 0.08 | 20 | 2900 | | |
| 25 | 6.8 | 6.3x5.2 | 300 | 0.08 | 40 | 1800 | |
| | 10 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | 15 | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | 22 | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | 27 | 6.3x9 | 300 | 0.08 | 25 | 2670 | |
| | 33 | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| | | 6.3x5.2 | 300 | 0.08 | 30 | 2200 | |
| | 39 | 6.3x7 | 300 | 0.08 | 25 | 2670 | |
| 47 | 6.3x9 | 300 | 0.08 | 25 | 2670 | | |
| 56 | 6.3x11 | 300 | 0.08 | 20 | 2900 | | |
| 68 | 6.3x11 | 300 | 0.08 | 20 | 2900 | | |

Ripple Current(mA,rms)at 105°C,100KHz

PE series

Features

- ◆ Down Size to $\phi 6.3 \times 8$.
- ◆ Low ESR & large capacitance.
- ◆ Large permissible ripple current.



Conductive Polymer

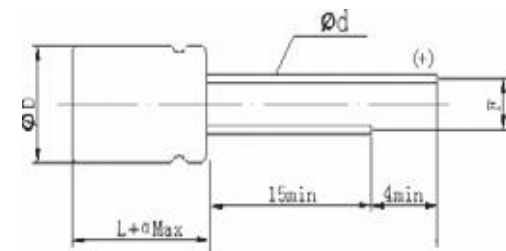
Specifications

| Item | Performance Characteristics | |
|--|---|--|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~16 VDC | |
| Capacitance Range | 270 to 1200 μ F | |
| Capacitance Tolerance | $\pm 20\%$ (120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (100K~300KHz) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within $\pm 20\%$ of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within $\pm 20\%$ of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz \leq freq.<1KHz | 1KHz \leq freq.<10KHz | 10KHz \leq freq.<100KHz | 100KHz \leq freq.<300KHz |
|-------------|-------------------------|-------------------------|---------------------------|----------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| $\phi D \times L$ | $\phi D + 0.5$ | α | $F \pm 0.5$ | $\phi d \pm 0.05$ |
|-------------------|----------------|----------|-------------|-------------------|
| 6.3x8 | 6.3 | 1.0 | 2.5 | 0.6 |

Dimensions & Characteristics

| W.V. (V) | Capacitance(μ F) | Size $\phi D \times L$ (mm) | L.C. (μ A,2min) | tg δ (120Hz,20°C) | ESR (m Ω),100KHz) | Maximum Permissible Ripple Current (mA,r.m.s) |
|-------------|-----------------------|--------------------------------|-------------------------|-----------------------------|------------------------------|--|
| 2.5 | 560 | 6.3x8 | 280 | 8 | 7 | 5600 |
| | 820 | 6.3x8 | 410 | 8 | 7 | 5600 |
| | 1200 | 6.3x8 | 600 | 8 | 7 | 5600 |
| 4 | 560 | 6.3x8 | 448 | 8 | 7 | 5600 |
| | 330 | 6.3x8 | 415.2 | 8 | 8 | 5000 |
| 6.3 | 470 | 6.3x8 | 592.2 | 8 | 7 | 5600 |
| | 560 | 6.3x8 | 705.6 | 8 | 7 | 5600 |
| | 680 | 6.3x8 | 856.8 | 8 | 7 | 5600 |
| 16 | 270 | 6.3x8 | 864 | 8 | 15 | 4500 |

Ripple Current(mA,rms)at 105°C,100KHz

PW series

Features

- ◆ Low height
- ◆ Low ESR at high frequency range.



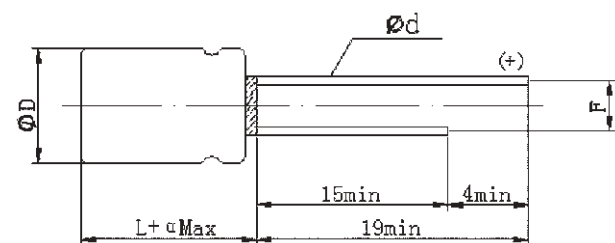
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temp. Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~25V DC | |
| Capacitance Range | 39 to 2500 μF | |
| Capacitance Tolerance | ±20% (120Hz , +20°C) | |
| Leakage Current (+20°C , max) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage Current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| Φ DxL | Φ D+0.5max. | α | F±0.5 | Φ d±0.05 |
|-------|-------------|-----|-------|----------|
| 8x7 | 8.0 | 1.0 | 3.5 | 0.6 |
| 10x7 | 10.0 | 1.5 | 5.0 | 0.6 |
| 10x10 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 820 | 8x7 | 410 | 0.08 | 20 | 3700 |
| | 1000 | 8x7 | 500 | 0.08 | 20 | 3700 |
| | 1200 | 10x7 | 600 | 0.08 | 15 | 4200 |
| | 1500 | 10x7 | 750 | 0.10 | 15 | 4200 |
| | | 10x7 | 900 | 0.10 | 15 | 4200 |
| | 1800 | 10x10 | 900 | 0.10 | 12 | 4500 |
| | | 10x7 | 1000 | 0.10 | 15 | 4200 |
| 2000 | 10x10 | 1000 | 0.10 | 12 | 4500 | |
| | 10x10 | 1250 | 0.10 | 12 | 4500 | |
| 4 | 560 | 8x7 | 448 | 0.08 | 20 | 3700 |
| | 680 | 8x7 | 544 | 0.08 | 20 | 3700 |
| | 820 | 8x7 | 656 | 0.08 | 20 | 3700 |
| | | 10x7 | 656 | 0.08 | 15 | 4200 |
| | 1000 | 10x7 | 800 | 0.10 | 15 | 4200 |
| | 1200 | 10x7 | 960 | 0.10 | 15 | 4200 |
| | | 10x10 | 960 | 0.10 | 12 | 4500 |
| | 1500 | 10x7 | 1200 | 0.10 | 15 | 4200 |
| 10x10 | | 1200 | 0.10 | 12 | 4500 | |
| 6.3 | 1800 | 10x10 | 1440 | 0.10 | 12 | 4500 |
| | 470 | 8x7 | 592 | 0.08 | 20 | 3700 |
| | 560 | 8x7 | 705.6 | 0.08 | 20 | 3700 |
| | 680 | 8x7 | 856.8 | 0.08 | 20 | 3700 |
| | 820 | 8x7 | 1033.2 | 0.10 | 20 | 3700 |
| | | 10x7 | 1033.2 | 0.10 | 15 | 4200 |
| | 1000 | 10x7 | 1260 | 0.10 | 15 | 4200 |
| | | 10x10 | 1260 | 0.10 | 12 | 4500 |
| 1200 | 10x7 | 1512 | 0.10 | 15 | 4200 | |
| | 10x10 | 1512 | 0.10 | 12 | 4500 | |
| 10 | 1500 | 10x10 | 1890 | 0.10 | 12 | 4500 |
| | 330 | 8x7 | 660 | 0.08 | 20 | 3700 |
| | 390 | 8x7 | 780 | 0.08 | 20 | 3700 |
| | 470 | 8x7 | 940 | 0.08 | 20 | 3700 |
| | | 10x7 | 940 | 0.08 | 15 | 4200 |
| | 560 | 10x7 | 1120 | 0.08 | 15 | 4200 |
| | | 10x10 | 1120 | 0.08 | 12 | 4500 |
| | 680 | 10x7 | 1360 | 0.10 | 15 | 4200 |
| 10x10 | | 1360 | 0.10 | 12 | 4500 | |
| 16 | 820 | 10x7 | 1640 | 0.10 | 15 | 4200 |
| | 1000 | 10x10 | 1640 | 0.10 | 12 | 4500 |
| | | 10x10 | 2000 | 0.10 | 12 | 4500 |
| | 180 | 8x7 | 576 | 0.08 | 20 | 3300 |
| | 220 | 8x7 | 704 | 0.08 | 20 | 3300 |
| | 270 | 8x7 | 864 | 0.08 | 20 | 3300 |
| | | 10x7 | 864 | 0.08 | 20 | 3700 |
| | 330 | 8x7 | 1056 | 0.10 | 20 | 3300 |
| 10x7 | | 1056 | 0.10 | 20 | 3700 | |
| 10x10 | | 1056 | 0.10 | 15 | 4200 | |
| 390 | 10x7 | 1248 | 0.10 | 20 | 3700 | |
| | 10x10 | 1248 | 0.10 | 20 | 4200 | |
| 470 | 10x7 | 1504 | 0.10 | 20 | 3700 | |
| | 10x10 | 1504 | 0.10 | 15 | 4200 | |
| 560 | 10x10 | 1792 | 0.10 | 15 | 4200 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 20 | 56 | 8x7 | 224 | 0.08 | 25 | 3000 |
| | 68 | 8x7 | 272 | 0.08 | 25 | 3000 |
| | 82 | 8x7 | 328 | 0.08 | 25 | 3000 |
| | | 10x7 | 328 | 0.08 | 25 | 3400 |
| | 100 | 8x7 | 400 | 0.08 | 25 | 3000 |
| | | 10x7 | 400 | 0.08 | 25 | 3400 |
| | | 10x10 | 400 | 0.08 | 20 | 3800 |
| | 150 | 8x7 | 600 | 0.08 | 25 | 3000 |
| | | 10x7 | 600 | 0.08 | 25 | 3400 |
| | | 10x10 | 600 | 0.08 | 20 | 3800 |
| | 180 | 8x7 | 720 | 0.08 | 25 | 3000 |
| | | 10x7 | 720 | 0.08 | 25 | 3400 |
| | | 10x10 | 720 | 0.08 | 20 | 3800 |
| | 220 | 10x7 | 880 | 0.10 | 25 | 3400 |
| 10x10 | | 880 | 0.10 | 20 | 3800 | |
| 270 | 10x7 | 1080 | 0.10 | 25 | 3400 | |
| | 10x10 | 1080 | 0.10 | 20 | 3800 | |
| 330 | 10x10 | 1320 | 0.10 | 20 | 3800 | |
| 25 | 39 | 8x7 | 195 | 0.08 | 25 | 3000 |
| | 47 | 8x7 | 235 | 0.08 | 25 | 3000 |
| | 56 | 8x7 | 280 | 0.08 | 25 | 3000 |
| | 68 | 8x7 | 340 | 0.08 | 25 | 3000 |
| | | 10x7 | 340 | 0.08 | 25 | 3400 |
| | 82 | 8x7 | 410 | 0.08 | 25 | 3000 |
| | | 10x7 | 410 | 0.08 | 25 | 3400 |
| | | 10x10 | 410 | 0.08 | 20 | 3800 |
| | 100 | 10x7 | 500 | 0.10 | 25 | 3400 |
| | | 10x10 | 500 | 0.10 | 20 | 3800 |
| | 120 | 10x7 | 600 | 0.10 | 25 | 3400 |
| | | 10x10 | 600 | 0.10 | 20 | 3800 |
| | 150 | 10x7 | 750 | 0.10 | 25 | 3400 |
| | | 10x10 | 750 | 0.10 | 20 | 3800 |
| 180 | 10x10 | 900 | 0.10 | 20 | 3800 | |

Ripple Current(mA,rms)at 105°C,100KHz

PH series High Voltage/High Reliability

Features

- ◆ High voltage and high reliability
- ◆ Large permissible ripple current.
- ◆ Low ESR at high frequency range.



Conductive Polymer

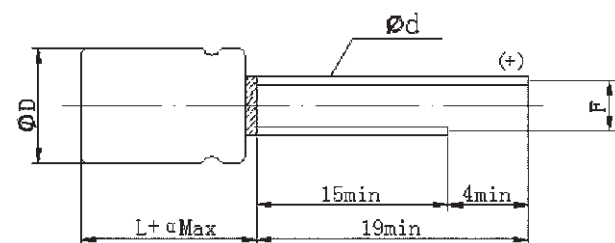
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temp. Range | -55°C~+105°C | |
| Rated Voltage Range | 35 ~100V DC | |
| Capacitance Range | 8.2~220 μ F | |
| Capacitance Tolerance | ±20% (120Hz , +20°C) | |
| Leakage Current | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage Current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| Φ DxL | Φ D+0.5 | α | F±0.5 | Φ d±0.05 |
|------------|---------|-----|-------|----------|
| 6.3x8 | 6.3 | 1.0 | 2.5 | 0.6 |
| 8x8 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x9/8x11.5 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x10 | 10.0 | 1.5 | 5.0 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φDxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|------------------|-------------------|----------------------|---------------------|---|
| 35 | 10 | 6.3x8 | 175 | 0.12 | 40 | 2100 |
| | | 8x8 | 175 | 0.12 | 35 | 2300 |
| | 22 | 6.3x8 | 154 | 0.12 | 40 | 2100 |
| | | 8x11.5 | 154 | 0.12 | 30 | 2890 |
| | 33 | 8x8 | 231 | 0.12 | 30 | 2500 |
| | | 8x11.5 | 231 | 0.12 | 25 | 3100 |
| | 39 | 8x11.5 | 273 | 0.12 | 25 | 3100 |
| | 47 | 8x8 | 329 | 0.12 | 30 | 2700 |
| | | 8x11.5 | 329 | 0.12 | 20 | 3600 |
| | | 10x12.5 | 329 | 0.12 | 20 | 3800 |
| | 56 | 8x8 | 392 | 0.12 | 30 | 2700 |
| | | 8x11.5 | 392 | 0.12 | 20 | 3600 |
| | 68 | 8x8 | 476 | 0.12 | 30 | 2700 |
| | | 8x11.5 | 476 | 0.12 | 20 | 3600 |
| | | 10x12.5 | 476 | 0.12 | 20 | 4000 |
| | 82 | 8x11.5 | 574 | 0.12 | 20 | 3600 |
| | 100 | 8x8 | 700 | 0.12 | 25 | 2800 |
| | | 8x11.5 | 700 | 0.12 | 20 | 3600 |
| | | 10x10 | 700 | 0.12 | 25 | 3000 |
| | | 10x12.5 | 700 | 0.12 | 20 | 4000 |
| 120 | 10x12.5 | 840 | 0.12 | 20 | 4400 | |
| 150 | 10x12.5 | 1050 | 0.12 | 15 | 4400 | |
| 180 | 10x12.5 | 1260 | 0.12 | 20 | 4000 | |
| 220 | 10x12.5 | 1540 | 0.12 | 20 | 4000 | |
| 270 | 10x12.5 | 1890 | 0.12 | 20 | 4000 | |
| 330 | 10x12.5 | 2310 | 0.12 | 18 | 4400 | |
| 50 | 10 | 8x8 | 100 | 0.12 | 45 | 2100 |
| | 12 | 6.3x8 | 120 | 0.12 | 50 | 1800 |
| | 22 | 8x8 | 220 | 0.12 | 45 | 2300 |
| | 27 | 8x11.5 | 390 | 0.12 | 32 | 2700 |
| | 33 | 8x8 | 330 | 0.12 | 45 | 2300 |
| | | 8x11.5 | 330 | 0.12 | 32 | 2700 |
| | | 10x12.5 | 330 | 0.12 | 30 | 3000 |
| | 39 | 8x11.5 | 390 | 0.12 | 32 | 2700 |
| | | 10x12.5 | 390 | 0.12 | 30 | 3000 |
| | 47 | 8x11.5 | 470 | 0.12 | 30 | 2800 |
| | | 10x12.5 | 470 | 0.12 | 25 | 3400 |
| | 56 | 8x11.5 | 560 | 0.12 | 30 | 2800 |
| | | 10x10 | 560 | 0.12 | 30 | 2800 |
| | | 10x12.5 | 560 | 0.12 | 25 | 3400 |
| | 68 | 8x9 | 680 | 0.12 | 40 | 2400 |
| | | 8x11.5 | 680 | 0.12 | 30 | 2800 |
| 10x12.5 | | 680 | 0.12 | 25 | 3400 | |
| 82 | 10x12.5 | 820 | 0.12 | 25 | 3400 | |
| 100 | 10x12.5 | 1000 | 0.12 | 25 | 3400 | |
| 120 | 10x12.5 | 1200 | 0.12 | 25 | 3400 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 63 | 10 | 8x8 | 126 | 0.12 | 45 | 1900 |
| | | 8x11.5 | 126 | 0.12 | 45 | 2100 |
| | 22 | 8x8 | 277.2 | 0.12 | 45 | 2100 |
| | 27 | 8x11.5 | 340 | 0.12 | 35 | 2300 |
| | 33 | 8x11.5 | 415.8 | 0.12 | 35 | 2500 |
| | | 10x10 | 416 | 0.12 | 35 | 2700 |
| | 39 | 8x11.5 | 491.4 | 0.12 | 35 | 2500 |
| | | 10x12.5 | 491.4 | 0.12 | 32 | 2900 |
| | 47 | 8x11.5 | 592.2 | 0.12 | 35 | 2500 |
| | | 10x12.5 | 592.2 | 0.12 | 30 | 3000 |
| 56 | 10x12.5 | 705.6 | 0.12 | 30 | 3000 | |
| 68 | 10x12.5 | 856.8 | 0.12 | 30 | 3000 | |
| 82 | 10x12.5 | 1033.2 | 0.12 | 30 | 3000 | |
| 150 | 10x12.5 | 1890 | 0.12 | 30 | 3000 | |
| 80 | 10 | 8x8 | 160 | 0.12 | 45 | 1900 |
| | 12 | 8x11.5 | 192 | 0.12 | 38 | 2100 |
| | 22 | 10x12.5 | 352 | 0.12 | 35 | 2800 |
| | 27 | 10x12.5 | 432 | 0.12 | 35 | 2800 |
| | 33 | 8x11.5 | 528 | 0.12 | 38 | 2100 |
| | | 10x12.5 | 528 | 0.12 | 35 | 2800 |
| 100 | 6.8 | 8x8 | 136 | 0.12 | 45 | 1800 |
| | 8.2 | 8x11.5 | 164 | 0.12 | 45 | 1800 |
| | 10 | 8x11.5 | 200 | 0.12 | 42 | 2100 |
| | 12 | 8x11.5 | 240 | 0.12 | 42 | 2100 |
| | | 10x12.5 | 240 | 0.12 | 40 | 2300 |
| | 15 | 8x11.5 | 300 | 0.12 | 42 | 2100 |
| | 18 | 10x12.5 | 360 | 0.12 | 35 | 2500 |
| | 22 | 10x12.5 | 440 | 0.12 | 35 | 2800 |
| | 27 | 10x12.5 | 540 | 0.12 | 35 | 2800 |
| 33 | 10x12.5 | 660 | 0.12 | 35 | 2800 | |

Ripple Current(mA,rms)at 105°C,100KHz

PT series 125°C Guaranteed



Features

- ◆ 125°C Guaranteed.
- ◆ Low ESR at high frequency range.

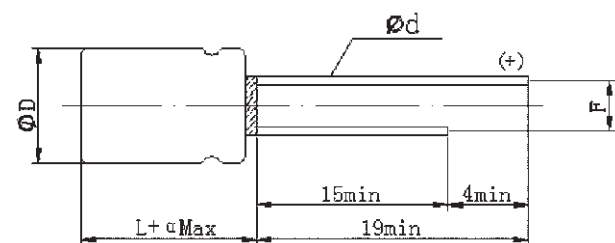
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temp. Range | -55°C~+125°C | |
| Rated Voltage Range | 2.5~50V DC | |
| Capacitance Range | 22 to 2500 μF | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | |
| Leakage Current | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C · 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz · 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 125°C · 2000h · at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C · RH90~95% · 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage Current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| φ D×L | ΦD+0.5max. | α | F | Φ d±0.05 |
|---------|------------|-----|-----|----------|
| 6.3x5.2 | 6.3 | 1 | 2.5 | 0.45 |
| 6.3x11 | 6.3 | 1.5 | 2.5 | 0.6 |
| 8x7 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x8 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x11.5 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x8 | 10.0 | 1.0 | 5.0 | 0.6 |
| 10x10 | 10.0 | 1.5 | 5.0 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Rated Ripple Current | |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|----------------------|----------|
| | | | | | | 100KHz (mA,r.m.s) | |
| | | | | | | 105°C < Tx≤125°C | Tx≤105°C |
| 2.5 | 820 | 8x8 | 410 | 0.08 | 9 | 1741 | 5500 |
| | 1000 | 8x11.5 | 500 | 0.08 | 9 | 1929 | 6100 |
| | 1500 | 8x11.5 | 750 | 0.08 | 9 | 1929 | 6100 |
| | 2000 | 10x12.5 | 1000 | 0.08 | 9 | 2100 | 6640 |
| | 2700 | 10x12.5 | 1350 | 0.08 | 9 | 2100 | 6640 |
| 4 | 150 | 6.3x5.2 | 300 | 0.08 | 40 | 572 | 1810 |
| | 330 | 8x7 | 264 | 0.08 | 30 | 949 | 3000 |
| | 560 | 8x8 | 224 | 0.08 | 9 | 1741 | 5500 |
| | | 8x11.5 | 224 | 0.08 | 9 | 1929 | 6100 |
| | 680 | 10x8 | 544 | 0.08 | 25 | 1170 | 3700 |
| | 820 | 8x8 | 328 | 0.08 | 9 | 1741 | 5500 |
| | 1200 | 8x11.5 | 960 | 0.08 | 9 | 1929 | 6100 |
| | 1500 | 10x12.5 | 1200 | 0.08 | 9 | 2100 | 6640 |
| | 2500 | 10x12.5 | 2000 | 0.08 | 9 | 2100 | 6640 |
| | 6.3 | 82 | 6.3x5.2 | 258 | 0.08 | 40 | 569 |
| 150 | | 8x7 | 472.5 | 0.08 | 30 | 949 | 3000 |
| 330 | | 10x8 | 415.8 | 0.08 | 25 | 1170 | 3700 |
| 390 | | 8x8 | 491.4 | 0.08 | 9 | 1741 | 5500 |
| 470 | | 8x11.5 | 592 | 0.08 | 9 | 1929 | 6100 |
| 680 | | 8x8 | 428 | 0.08 | 9 | 1741 | 5500 |
| | | 10x12.5 | 428 | 0.08 | 9 | 1929 | 6100 |
| 820 | | 10x12.5 | 516.6 | 0.10 | 9 | 1929 | 6100 |
| 1000 | | 8x11.5 | 630 | 0.10 | 9 | 1929 | 6100 |
| 1500 | | 10x12.5 | 945 | 0.10 | 9 | 2100 | 6640 |
| 2000 | 10x12.5 | 1260 | 0.10 | 9 | 2100 | 6640 | |
| 10 | 56 | 6.3x5.2 | 280 | 0.08 | 40 | 569 | 1800 |
| | 120 | 8x7 | 240 | 0.08 | 30 | 949 | 3000 |
| | 220 | 8x11.5 | 220 | 0.08 | 9 | 1929 | 6100 |
| | 270 | 10x8 | 270 | 0.08 | 25 | 1170 | 3700 |
| | 330 | 8x11.5 | 330 | 0.08 | 9 | 1929 | 6100 |
| | 560 | 10x12.5 | 560 | 0.10 | 9 | 1929 | 6100 |
| | 680 | 8x11.5 | 680 | 0.10 | 9 | 1929 | 6100 |
| | 1000 | 10x12.5 | 1000 | 0.10 | 9 | 2100 | 6640 |
| 16 | 39 | 6.3x5.2 | 312 | 0.08 | 40 | 569 | 1800 |
| | 82 | 8x7 | 300 | 0.08 | 30 | 854 | 2700 |
| | 100 | 6.3x11 | 160 | 0.08 | 12 | 1518 | 4800 |
| | 150 | 8x8 | 240 | 0.08 | 18 | 1140 | 3600 |
| | | 10x8 | 240 | 0.08 | 25 | 1044 | 3300 |
| | 180 | 8x11.5 | 288 | 0.08 | 10 | 1771 | 5600 |
| | 220 | 8x11.5 | 352 | 0.08 | 10 | 1771 | 5600 |
| | 270 | 8x11.5 | 432 | 0.08 | 10 | 1771 | 5600 |
| | 330 | 8x11.5 | 528 | 0.08 | 10 | 1771 | 5600 |
| | 470 | 10x12.5 | 752 | 0.10 | 10 | 1929 | 6100 |
| 560 | 10x12.5 | 896 | 0.10 | 10 | 1929 | 6100 | |
| 20 | 22 | 6.3x5.2 | 220 | 0.12 | 60 | 458 | 1450 |
| | 47 | 8x7 | 300 | 0.12 | 30 | 854 | 2700 |
| | 68 | 10x8 | 272 | 0.12 | 30 | 949 | 3000 |
| | 100 | 8x11.5 | 400 | 0.12 | 22 | 1234 | 3900 |
| | 120 | 8x8 | 480 | 0.12 | 25 | 981 | 3100 |
| | 150 | 8x11.5 | 600 | 0.12 | 22 | 1234 | 3900 |
| | | 10x12.5 | 600 | 0.12 | 20 | 1424 | 4500 |
| | 270 | 10x12.5 | 1080 | 0.12 | 20 | 1551 | 4900 |

Ripple Current(mA,rms)at 125°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz | Rated Ripple Current | | Allowable Ripple Current | |
|-------------|---------|-------------------|-------------------|----------------------|--------------------|----------------------|------------|--------------------------|------------|
| | | | | | | 100KHz (mA,r.m.s) | | | |
| | | | | | | 105°C < Tx ≤ 125°C | Tx ≤ 105°C | 105°C < Tx ≤ 125°C | Tx ≤ 105°C |
| 25 | 68 | 8x11.5 | 340 | 0.12 | 24 | 1108 | 3500 | | |
| | 82 | 8x8 | 410 | 0.12 | 25 | 981 | 3100 | | |
| | 100 | 10x12.5 | 500 | 0.12 | 20 | 1424 | 4500 | | |
| | 120 | 8x11.5 | 600 | 0.12 | 22 | 1234 | 3900 | | |
| | 180 | 10x12.5 | 900 | 0.12 | 20 | 1424 | 4500 | | |
| 35 | 39 | 8x8 | 273 | 0.12 | 32 | 823 | 2600 | | |
| | 56 | 8x11.5 | 392 | 0.12 | 25 | 1013 | 3200 | | |
| | 100 | 10x12.5 | 700 | 0.12 | 22 | 1266 | 4000 | | |
| 50 | 22 | 8x8 | 220 | 0.12 | 35 | 790 | 2500 | | |
| | 27 | 8x11.5 | 270 | 0.12 | 32 | 854 | 2700 | | |
| | 33 | 10x10 | 330 | 0.12 | 30 | 1100 | 3476 | | |
| | 47 | 10x12.5 | 470 | 0.12 | 25 | 1297 | 4100 | | |

Ripple Current(mA,rms)at 125°C,100KHz

PF series Long Life to 5,000Hours

Features

- ◆ Super Long Life to 5,000Hours.
- ◆ Low ESR at high frequency range.



Conductive Polymer

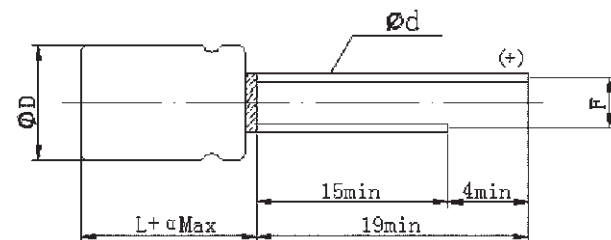
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temp. Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~35V DC | |
| Capacitance Range | 22to 2700 μ F | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | |
| Leakage Current | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C · 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz · 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C · 5000h · at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C · RH90~95% · 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage Current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Diagram of Dimensions:(unit:mm)



| φ DxL | ΦD+0.5max. | α | F | Φd±0.05 |
|---------|------------|-----|-----|---------|
| 4x5 | 4.0 | 1.0 | 1.5 | 0.45 |
| 5x8/5x9 | 5.0 | 1.0 | 2.0 | 0.5 |
| 6.3x5.2 | 6.3 | 1.0 | 2.5 | 0.5 |
| 6.3x8 | 6.3 | 1.5 | 2.5 | 0.6 |
| 6.3x11 | 6.3 | 1.5 | 2.5 | 0.6 |
| 8x7/8x8 | 8.0 | 1.0 | 3.5 | 0.6 |
| 8x11.5 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 100 | 5x8 | 300 | 0.08 | 9 | 4180 |
| | 220 | 5x8 | 300 | 0.08 | 9 | 4180 |
| | 300 | 5x9 | 300 | 0.08 | 9 | 4180 |
| | 330 | 5x8 | 300 | 0.08 | 9 | 4180 |
| | | 6.3x8 | 300 | 0.08 | 9 | 5600 |
| | 390 | 6.3x5.2 | 300 | 0.08 | 15 | 3100 |
| | 470 | 5x8 | 300 | 0.08 | 9 | 4180 |
| | | 6.3x8 | 300 | 0.08 | 9 | 5600 |
| | 560 | 5x8 | 300 | 0.08 | 9 | 4180 |
| | | 6.3x5.2 | 300 | 0.08 | 15 | 3100 |
| | | 6.3x8 | 300 | 0.08 | 9 | 5600 |
| | | 8x8 | 300 | 0.08 | 9 | 6100 |
| | 820 | 6.3x8 | 410 | 0.08 | 9 | 5600 |
| | | 8x7 | 410 | 0.08 | 10 | 5000 |
| 8x8 | | 410 | 0.08 | 9 | 6100 | |
| 1000 | 8x8 | 500 | 0.08 | 9 | 6100 | |
| 1500 | 8x11.5 | 750 | 0.08 | 9 | 6100 | |
| 2000 | 10x12.5 | 1000 | 0.08 | 9 | 6640 | |
| 2700 | 10x12.5 | 1350 | 0.08 | 9 | 6640 | |
| 4 | 270 | 6.3x8 | 300 | 0.08 | 9 | 5000 |
| | 330 | 5x8 | 300 | 0.08 | 9 | 4050 |
| | 390 | 6.3x8 | 312 | 0.08 | 9 | 5000 |
| | 560 | 6.3x8 | 448 | 0.08 | 9 | 5600 |
| | | 8x7 | 448 | 0.08 | 15 | 3900 |
| | 680 | 8x8 | 542 | 0.08 | 9 | 6100 |
| | 820 | 8x8 | 656 | 0.08 | 9 | 6100 |
| | 1000 | 8x11.5 | 800 | 0.08 | 9 | 6100 |
| | 1200 | 10x12.5 | 960 | 0.08 | 9 | 6640 |
| | 1500 | 10x12.5 | 1200 | 0.08 | 9 | 6640 |
| 2000 | 10x12.5 | 1600 | 0.08 | 9 | 6640 | |
| 6.3 | 220 | 6.3x5.2 | 300 | 0.08 | 18 | 2980 |
| | | 6.3x8 | 300 | 0.08 | 10 | 4500 |
| | 270 | 5x8 | 340.2 | 0.08 | 10 | 3700 |
| | | 5x8 | 415.8 | 0.08 | 10 | 3700 |
| | 330 | 6.3x8 | 415.8 | 0.08 | 9 | 5000 |
| | | 8x7 | 491.4 | 0.08 | 15 | 3900 |
| | 390 | 8x8 | 491.4 | 0.08 | 9 | 6100 |
| | | 6.3x8 | 592.2 | 0.08 | 9 | 5100 |
| | 470 | 8x8 | 592.2 | 0.08 | 9 | 6100 |
| | | 6.3x8 | 705.6 | 0.08 | 9 | 5100 |
| | 560 | 8x8 | 705.6 | 0.08 | 9 | 6100 |
| | | 8x8 | 428 | 0.08 | 9 | 6100 |
| | 820 | 8x8 | 516.6 | 0.10 | 9 | 6100 |
| | | 10x12.5 | 516.6 | 0.10 | 9 | 6640 |
| 1000 | 8x11.5 | 630 | 0.10 | 9 | 6100 | |
| 1200 | 8x11.5 | 756 | 0.10 | 9 | 6100 | |
| 1500 | 10x12.5 | 945 | 0.10 | 9 | 6640 | |
| 2000 | 10x12.5 | 1260 | 0.10 | 9 | 6640 | |
| 10 | 10 | 4x5 | 300 | 0.08 | 100 | 700 |
| | 68 | 6.3x8 | 300 | 0.08 | 10 | 4500 |
| | 100 | 6.3x8 | 300 | 0.08 | 10 | 4500 |
| | 150 | 6.3x8 | 300 | 0.08 | 10 | 4500 |
| | 270 | 8x7 | 270 | 0.08 | 22 | 3300 |
| 8x11.5 | | 270 | 0.08 | 9 | 5600 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 10 | 330 | 8x11.5 | 330 | 0.08 | 9 | 5600 |
| | 390 | 8x8 | 390 | 0.08 | 9 | 6100 |
| | 470 | 8x8 | 470 | 0.08 | 9 | 6100 |
| | | 10x12.5 | 470 | 0.08 | 9 | 6100 |
| | 560 | 8x8 | 560 | 0.10 | 9 | 6100 |
| | | 10x12.5 | 560 | 0.10 | 9 | 6100 |
| | 680 | 8x11.5 | 680 | 0.10 | 9 | 6100 |
| | 820 | 10x12.5 | 820 | 0.10 | 9 | 6640 |
| 1000 | 10x12.5 | 1000 | 0.10 | 9 | 6640 | |
| 16 | 100 | 6.3x5.2 | 300 | 0.08 | 24 | 2490 |
| | | 6.3x8 | 300 | 0.08 | 15 | 3500 |
| | | 6.3x11 | 300 | 0.08 | 12 | 4800 |
| | 150 | 6.3x5.2 | 300 | 0.08 | 24 | 3200 |
| | | 8x7 | 300 | 0.08 | 22 | 3300 |
| | 180 | 6.3x11 | 288 | 0.08 | 12 | 5600 |
| | | 8x8 | 288 | 0.08 | 10 | 5100 |
| | | 10x12.5 | 288 | 0.08 | 10 | 5600 |
| | 220 | 8x7 | 352 | 0.08 | 22 | 3300 |
| | | 8x8 | 352 | 0.08 | 10 | 5100 |
| | 270 | 8x7 | 432 | 0.08 | 22 | 3300 |
| | | 8x8 | 432 | 0.08 | 10 | 5100 |
| | | 10x12.5 | 432 | 0.08 | 10 | 5600 |
| | 330 | 8x8 | 528 | 0.10 | 10 | 4700 |
| | | 8x11.5 | 528 | 0.08 | 10 | 5600 |
| | 390 | 10x12.5 | 624 | 0.08 | 10 | 6100 |
| | 470 | 8x11.5 | 752 | 0.10 | 10 | 5400 |
| | | 10x12.5 | 752 | 0.10 | 10 | 6100 |
| | | 8x11.5 | 896 | 0.10 | 10 | 6100 |
| | 560 | 10x12.5 | 896 | 0.10 | 10 | 6100 |
| 10x12.5 | | 1600 | 0.10 | 12 | 5400 | |
| 120 | 6.3x5.2 | 480 | 0.12 | 25 | 3200 | |
| 150 | 10x12.5 | 600 | 0.12 | 14 | 5000 | |
| 180 | 8x7 | 720 | 0.12 | 25 | 3200 | |
| 330 | 10x12.5 | 1320 | 0.12 | 14 | 5000 | |
| 390 | 8x11.5 | 1560 | 0.12 | 14 | 4950 | |
| 560 | 10x12.5 | 2240 | 0.12 | 12 | 5400 | |
| 680 | 10x12.5 | 2720 | 0.12 | 12 | 5400 | |
| 25 | 56 | 6.3x5.2 | 280 | 0.12 | 30 | 2800 |
| | 68 | 8x11.5 | 340 | 0.12 | 20 | 4100 |
| | 82 | 6.3x8 | 410 | 0.12 | 28 | 2780 |
| | | 8x7 | 410 | 0.12 | 28 | 3000 |
| | 100 | 8x11.5 | 500 | 0.12 | 20 | 4100 |
| | | 10x12.5 | 500 | 0.12 | 18 | 4650 |
| | 180 | 8x8 | 900 | 0.12 | 18 | 3770 |
| | | 8x11.5 | 900 | 0.12 | 18 | 4200 |
| | 220 | 8x11.5 | 1100 | 0.12 | 18 | 4200 |
| | 270 | 10x12.5 | 1350 | 0.12 | 18 | 4650 |
| 330 | 10x12.5 | 1650 | 0.12 | 14 | 5000 | |
| 390 | 10x12.5 | 1950 | 0.12 | 14 | 5000 | |
| 35 | 22 | 6.3x5.2 | 300 | 0.12 | 35 | 2600 |
| | 33 | 10x12.5 | 231 | 0.12 | 25 | 3100 |
| | 39 | 8x7 | 273 | 0.12 | 32 | 2800 |
| | 68 | 8x11.5 | 476 | 0.12 | 20 | 3600 |
| | 82 | 8x11.5 | 574 | 0.12 | 20 | 3600 |
| | 120 | 10x12.5 | 840 | 0.12 | 18 | 4000 |
| 150 | 10x12.5 | 1050 | 0.12 | 18 | 4000 | |

Ripple Current(mA,rms)at 105°C,100KHz

PM series SMD type & Low Profile



Features

- ◆ SMD type & Low profile
- ◆ Low ESR at high frequency range & Large permissible ripple current.

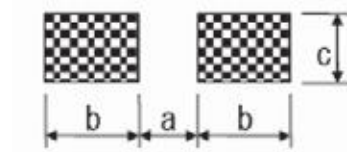
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~100V DC | |
| Capacitance Range | 4.7 to 560 μ F | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C · 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz · 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C · 2000h · at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C · RH90~95% · 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

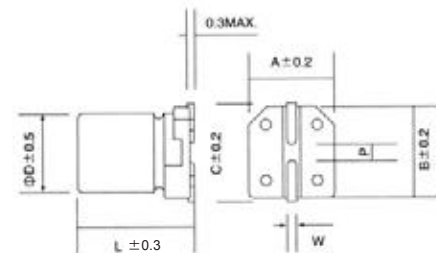
| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Recommended land pattern:(unit:mm)



| φ DxL | a | b | c |
|---------|-----|-----|-----|
| 4x5.5 | 1.0 | 2.6 | 1.6 |
| 5x5.5 | 1.4 | 3.0 | 1.6 |
| 5x5.8 | 1.4 | 3.0 | 1.6 |
| 6.3x5.8 | 2.1 | 3.5 | 1.6 |
| 6.3x7.7 | 2.1 | 3.5 | 1.6 |

Diagram of Dimensions:(unit:mm)



| φ DxL | A | B | C | W | P |
|---------|-----|-----|-----|------------|-----|
| 4x5.5 | 4.3 | 4.3 | 5.1 | 0.5 to 0.8 | 1.0 |
| 5x5.5 | 5.3 | 5.3 | 5.9 | 0.5 to 0.8 | 1.4 |
| 5x5.8 | 5.3 | 5.3 | 5.9 | 0.5 to 0.8 | 1.4 |
| 6.3x5.8 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 6.3x7.7 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φDxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|------------------|-------------------|----------------------|--------------------|---|
| 2.5 | 82 | 5x5.8 | 300 | 0.08 | 30 | 2100 |
| | 100 | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | 150 | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | 180 | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | 220 | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | 270 | 5x5.8 | 300 | 0.08 | 22 | 2610 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | 330 | 6.3x5.8 | 300 | 0.08 | 15 | 3100 |
| | | 6.3x5.8 | 300 | 0.08 | 25 | 2610 |
| | 390 | 6.3x5.8 | 300 | 0.08 | 15 | 3100 |
| | | 6.3x5.8 | 300 | 0.08 | 20 | 2800 |
| | 470 | 6.3x5.8 | 300 | 0.08 | 15 | 3600 |
| 6.3x7.7 | | 300 | 0.08 | 15 | 3100 | |
| 560 | 6.3x5.8 | 300 | 0.08 | 15 | 3600 | |
| | 6.3x7.7 | 300 | 0.08 | 15 | 3600 | |
| 4 | 47 | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | 56 | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | 68 | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | 100 | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | 120 | 5x5.8 | 300 | 0.08 | 22 | 2500 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | 150 | 5x5.8 | 300 | 0.08 | 22 | 2500 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | | 6.3x7.7 | 300 | 0.08 | 20 | 3100 |
| | 180 | 6.3x5.8 | 300 | 0.08 | 22 | 2500 |
| | | 5x5.8 | 300 | 0.08 | 22 | 2610 |
| | 220 | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | | 6.3x7.7 | 300 | 0.08 | 20 | 3100 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | 270 | 6.3x7.7 | 300 | 0.08 | 20 | 3100 |
| | | 6.3x5.8 | 300 | 0.08 | 20 | 2800 |
| | 330 | 6.3x5.8 | 300 | 0.08 | 15 | 3100 |
| 6.3x7.7 | | 300 | 0.08 | 15 | 3600 | |
| 6.3x5.8 | | 300 | 0.08 | 20 | 2800 | |
| 390 | 6.3x5.8 | 300 | 0.08 | 15 | 3600 | |
| | 6.3x7.7 | 300 | 0.08 | 15 | 3600 | |
| 470 | 6.3x7.7 | 300 | 0.08 | 15 | 3600 | |
| 6.3 | 47 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | 56 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | 68 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2690 |
| | 82 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2690 |
| | 100 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | 120 | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | | 5x5.8 | 300 | 0.08 | 25 | 2310 |
| | 150 | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | | 5x5.8 | 300 | 0.08 | 22 | 2610 |
| | | 6.3x7.7 | 300 | 0.08 | 20 | 3100 |
| | 180 | 5x5.8 | 300 | 0.08 | 22 | 2610 |
| | | 6.3x5.8 | 300 | 0.08 | 22 | 2800 |
| | | 6.3x7.7 | 300 | 0.08 | 20 | 3100 |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 6.3 | 220 | 6.3x5.8 | 300 | 0.08 | 20 | 3000 |
| | | 6.3x5.8 | 300 | 0.08 | 15 | 3100 |
| | | 6.3x7.7 | 300 | 0.08 | 15 | 3600 |
| | 270 | 6.3x5.8 | 300 | 0.08 | 20 | 3000 |
| | | 6.3x7.7 | 300 | 0.08 | 15 | 3600 |
| | 330 | 6.3x5.8 | 300 | 0.08 | 20 | 3100 |
| | | 6.3x7.7 | 300 | 0.08 | 15 | 3600 |
| 6.3x7.7 | | 300 | 0.08 | 10 | 4200 | |
| 390 | 6.3x7.7 | 300 | 0.08 | 15 | 3600 | |
| 10 | 4.7 | 4x5.5 | 300 | 0.08 | 120 | 980 |
| | 6.8 | 4x5.5 | 300 | 0.08 | 120 | 980 |
| | 10 | 4x5.5 | 300 | 0.08 | 80 | 1200 |
| | 15 | 4x5.5 | 300 | 0.08 | 80 | 1200 |
| | 22 | 4x5.5 | 300 | 0.08 | 80 | 1200 |
| | 33 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | 39 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | 47 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | | 6.3x7.7 | 300 | 0.08 | 20 | 2800 |
| | 56 | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | 68 | 6.3x7.7 | 300 | 0.08 | 20 | 2800 |
| | | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | 82 | 6.3x7.7 | 300 | 0.08 | 20 | 2800 |
| | | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | 100 | 6.3x7.7 | 300 | 0.08 | 20 | 2800 |
| | | 5x5.5 | 300 | 0.08 | 30 | 2000 |
| | | 6.3x5.8 | 300 | 0.08 | 30 | 2200 |
| | 120 | 6.3x5.8 | 300 | 0.08 | 25 | 2610 |
| | 150 | 6.3x5.8 | 300 | 0.08 | 25 | 2610 |
| | | 6.3x7.7 | 300 | 0.08 | 20 | 3100 |
| | 180 | 6.3x5.8 | 300 | 0.08 | 25 | 2610 |
| 6.3x7.7 | | 300 | 0.08 | 20 | 3100 | |
| 220 | 6.3x5.8 | 300 | 0.08 | 25 | 2610 | |
| | 6.3x7.7 | 300 | 0.08 | 20 | 3100 | |
| 270 | 6.3x7.7 | 300 | 0.08 | 20 | 3100 | |
| 330 | 6.3x7.7 | 300 | 0.08 | 20 | 3100 | |
| 16 | 10 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |
| | 15 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |
| | 22 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |
| | 33 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 16 | 39 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |
| | 47 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |
| | 56 | 5x5.8 | 400 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 30 | 2610 |
| | 68 | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 400 | 0.08 | 25 | 2690 |
| | 82 | 6.3x5.8 | 400 | 0.08 | 35 | 2200 |
| 6.3x7.7 | | 400 | 0.08 | 25 | 2690 | |
| 100 | 6.3x5.8 | 400 | 0.08 | 30 | 2490 | |
| | 6.3x7.7 | 400 | 0.08 | 25 | 2690 | |
| 150 | 6.3x7.7 | 400 | 0.08 | 25 | 2690 | |
| 180 | 6.3x5.8 | 400 | 0.12 | 25 | 3200 | |
| 20 | 10 | 5x5.8 | 600 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 600 | 0.08 | 40 | 2200 |
| | 15 | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 22 | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | 27 | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 33 | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | 39 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| 47 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 | |
| | 6.3x5.8 | 600 | 0.08 | 35 | 2200 | |
| 56 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 | |
| | 6.3x5.8 | 600 | 0.12 | 25 | 3200 | |
| 120 | 6.3x5.8 | 600 | 0.12 | 25 | 3200 | |
| 25 | 6.8 | 6.3x5.8 | 600 | 0.08 | 40 | 2000 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 10 | 6.3x7.7 | 600 | 0.08 | 35 | 2670 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 15 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 22 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 33 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| | 39 | 6.3x7.7 | 600 | 0.08 | 30 | 2670 |
| | | 6.3x5.8 | 600 | 0.08 | 35 | 2200 |
| 35 | 18 | 6.3x5.8 | 600 | 0.12 | 64 | 900 |
| | 22 | 6.3x5.8 | 600 | 0.12 | 50 | 1300 |
| | 27 | 6.3x5.8 | 600 | 0.12 | 50 | 1530 |
| | 47 | 6.3x7.7 | 600 | 0.12 | 50 | 1600 |
| | 56 | 6.3x7.7 | 600 | 0.12 | 35 | 2100 |
| 50 | 8.2 | 6.3x5.8 | 600 | 0.12 | 80 | 800 |
| | 12 | 6.3x5.8 | 600 | 0.12 | 80 | 800 |
| | 15 | 6.3x5.8 | 600 | 0.12 | 80 | 800 |
| 63 | 5.6 | 6.3x5.8 | 600 | 0.12 | 100 | 700 |
| | 8.2 | 6.3x5.8 | 600 | 0.12 | 100 | 700 |
| 100 | 4.7 | 6.3x7.7 | 600 | 0.12 | 100 | 1060 |

Ripple Current(mA,rms)at 105°C,100KHz

PD series SMD type & Large capacitance



Features

- ◆ SMD type & Large capacitance
- ◆ Ultra low ESR at high frequency range & Large permissible ripple current.
- ◆ Long life and high reliability(reliability: 0.1% / 1000Hrs).

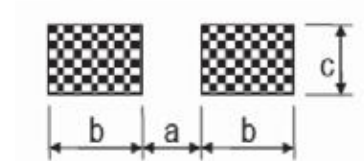
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~100V DC | |
| Capacitance Range | 10 to 3300 μF | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C · 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz · 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C · 2000h · at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C · RH90~95% · 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

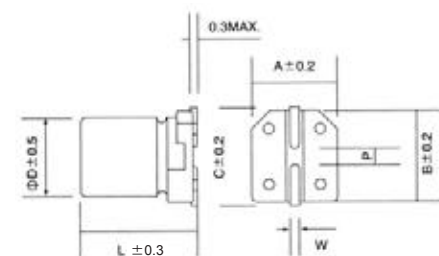
| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Recommended land pattern:(unit:mm)



| φ DxL | a | b | c |
|---------|-----|-----|-----|
| 8x11.7 | 2.8 | 4.2 | 1.9 |
| 10x12.4 | 4.3 | 4.4 | 1.9 |

Diagram of Dimensions:(unit:mm)



| φ DxL | A | B | C | W | P |
|---------|------|------|------|------------|-----|
| 8x11.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 10x12.4 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φDxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 560 | 8x11.7 | 280 | 0.08 | 9 | 5200 |
| | 680 | 8x11.7 | 340 | 0.08 | 9 | 5200 |
| | 820 | 8x11.7 | 410 | 0.08 | 9 | 5400 |
| | 1000 | 8x11.7 | 500 | 0.08 | 9 | 5400 |
| | 1500 | 8x11.7 | 750 | 0.08 | 9 | 5400 |
| | | 10x12.4 | 750 | 0.08 | 9 | 5600 |
| | 2500 | 10x12.4 | 1250 | 0.08 | 9 | 5600 |
| | 2700 | 10x12.4 | 1350 | 0.10 | 9 | 5600 |
| 3300 | 10x12.4 | 1650 | 0.10 | 9 | 5600 | |
| 4 | 560 | 8x11.7 | 448 | 0.08 | 9 | 5200 |
| | 680 | 8x11.7 | 544 | 0.08 | 9 | 5200 |
| | 820 | 8x11.7 | 656 | 0.08 | 9 | 5200 |
| | 1000 | 8x11.7 | 800 | 0.10 | 9 | 5200 |
| | 1200 | 8x11.7 | 960 | 0.10 | 9 | 5200 |
| | | 10x12.4 | 960 | 0.10 | 9 | 5600 |
| | 1500 | 8x11.7 | 1200 | 0.10 | 9 | 5200 |
| | | 10x12.4 | 1200 | 0.10 | 9 | 5600 |
| | 1800 | 10x12.4 | 1440 | 0.10 | 9 | 5600 |
| | 2200 | 10x12.4 | 1760 | 0.10 | 9 | 5600 |
| 2500 | 10x12.4 | 2000 | 0.10 | 9 | 5600 | |
| 2700 | 10x12.4 | 2160 | 0.10 | 9 | 5600 | |
| 6.3 | 180 | 8x11.7 | 227 | 0.08 | 9 | 5200 |
| | 270 | 8x11.7 | 340 | 0.08 | 9 | 5200 |
| | 330 | 8x11.7 | 416 | 0.08 | 9 | 5200 |
| | 390 | 8x11.7 | 491 | 0.08 | 9 | 5200 |
| | 470 | 8x11.7 | 592 | 0.08 | 9 | 5200 |
| | 560 | 8x11.7 | 706 | 0.08 | 9 | 5200 |
| | 680 | 10x12.4 | 856 | 0.08 | 9 | 5500 |
| | 820 | 8x11.7 | 1033 | 0.10 | 9 | 5200 |
| | | 10x12.4 | 1033 | 0.10 | 9 | 5500 |
| | 1000 | 8x11.7 | 1260 | 0.10 | 9 | 5200 |
| | | 10x12.4 | 1260 | 0.10 | 9 | 5500 |
| | 1500 | 10x12.4 | 1890 | 0.10 | 9 | 5500 |
| | 2000 | 10x12.4 | 2520 | 0.10 | 9 | 5500 |
| | 2200 | 10x12.4 | 2772 | 0.10 | 9 | 5500 |
| 10 | 180 | 8x11.7 | 360 | 0.08 | 9 | 5200 |
| | 220 | 8x11.7 | 440 | 0.08 | 9 | 5200 |
| | 270 | 8x11.7 | 540 | 0.08 | 9 | 5200 |
| | 330 | 8x11.7 | 660 | 0.08 | 9 | 5200 |
| | 390 | 8x11.7 | 780 | 0.08 | 9 | 5200 |
| | 470 | 8x11.7 | 940 | 0.08 | 9 | 5200 |
| | | 10x12.4 | 940 | 0.08 | 9 | 5500 |
| | 560 | 8x11.7 | 1120 | 0.08 | 9 | 5200 |
| | | 10x12.4 | 1120 | 0.08 | 9 | 5500 |
| | 680 | 8x11.7 | 1360 | 0.10 | 9 | 5200 |
| | | 10x12.4 | 1360 | 0.10 | 9 | 5500 |
| | 820 | 10x12.4 | 1640 | 0.10 | 9 | 5500 |
| | 1000 | 10x12.4 | 2000 | 0.10 | 9 | 5500 |
| | 1200 | 10x12.4 | 2400 | 0.10 | 9 | 5500 |
| 1500 | 10x12.4 | 3000 | 0.10 | 9 | 5500 | |
| 16 | 180 | 8x11.7 | 576 | 0.08 | 15 | 4700 |
| | 220 | 8x11.7 | 704 | 0.08 | 15 | 4700 |
| | | 10x12.4 | 704 | 0.08 | 15 | 5100 |
| | 270 | 8x11.7 | 864 | 0.08 | 15 | 4700 |
| | | 10x12.4 | 864 | 0.08 | 15 | 5100 |
| | 330 | 8x11.7 | 1056 | 0.08 | 15 | 4700 |
| | | 10x12.4 | 1056 | 0.08 | 15 | 5100 |
| | 390 | 8x11.7 | 1248 | 0.10 | 15 | 4700 |
| 470 | 10x12.4 | 1504 | 0.10 | 15 | 5100 | |
| 560 | 8x11.7 | 1792 | 0.12 | 14 | 4950 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 16 | 680 | 10x12.4 | 2176 | 0.10 | 15 | 5100 |
| | 820 | 10x12.4 | 2624 | 0.10 | 15 | 5100 |
| | 1000 | 10x12.4 | 3200 | 0.12 | 14 | 5400 |
| 20 | 39 | 8x11.7 | 156 | 0.08 | 20 | 4210 |
| | 68 | 8x11.7 | 272 | 0.08 | 20 | 4210 |
| | 82 | 8x11.7 | 328 | 0.08 | 20 | 4210 |
| | 100 | 8x11.7 | 400 | 0.08 | 20 | 4210 |
| | | 10x12.4 | 400 | 0.08 | 20 | 4800 |
| | 150 | 10x12.4 | 600 | 0.10 | 20 | 4800 |
| | 180 | 10x12.4 | 720 | 0.10 | 20 | 4800 |
| | 220 | 8x11.7 | 880 | 0.10 | 22 | 4000 |
| | | 10x12.4 | 880 | 0.10 | 20 | 4800 |
| | 270 | 8x11.7 | 1080 | 0.10 | 22 | 4000 |
| | | 10x12.4 | 1080 | 0.10 | 20 | 4800 |
| | 330 | 10x12.4 | 1320 | 0.10 | 20 | 4800 |
| | 390 | 8x11.7 | 1560 | 0.12 | 14 | 4950 |
| | 470 | 10x12.4 | 1880 | 0.12 | 20 | 4800 |
| | 680 | 10x12.4 | 2720 | 0.12 | 16 | 5000 |
| 25 | 33 | 8x11.7 | 165 | 0.08 | 25 | 3800 |
| | 47 | 8x11.7 | 235 | 0.08 | 20 | 4210 |
| | 56 | 10x12.4 | 280 | 0.08 | 28 | 3800 |
| | 82 | 8x11.7 | 410 | 0.08 | 20 | 4210 |
| | 100 | 8x11.7 | 500 | 0.10 | 20 | 4210 |
| | | 10x12.4 | 500 | 0.10 | 20 | 4800 |
| | 180 | 8x11.7 | 900 | 0.10 | 25 | 3800 |
| | | 10x12.4 | 900 | 0.10 | 20 | 4800 |
| | 220 | 8x11.7 | 1100 | 0.10 | 25 | 3800 |
| | | 10x12.4 | 1100 | 0.10 | 20 | 4800 |
| | 270 | 10x12.4 | 1350 | 0.10 | 20 | 4800 |
| | 330 | 8x11.7 | 1650 | 0.12 | 20 | 4210 |
| | | 10x12.4 | 1650 | 0.12 | 22 | 4200 |
| | 390 | 10x12.4 | 1950 | 0.12 | 22 | 4200 |
| | 470 | 10x12.4 | 2350 | 0.12 | 25 | 3800 |
| 35 | 39 | 8x11.7 | 273 | 0.12 | 32 | 2700 |
| | 68 | 8x11.7 | 476 | 0.12 | 28 | 3300 |
| | 82 | 8x11.7 | 574 | 0.12 | 28 | 3300 |
| | 100 | 10x12.4 | 700 | 0.12 | 25 | 3800 |
| | 120 | 8x11.7 | 840 | 0.12 | 25 | 3800 |
| | 150 | 8x11.7 | 1050 | 0.12 | 25 | 3800 |
| | | 10x12.4 | 1050 | 0.12 | 25 | 3800 |
| | 180 | 10x12.4 | 1260 | 0.12 | 22 | 4100 |
| | 220 | 10x12.4 | 1540 | 0.12 | 22 | 4100 |
| | 270 | 10x12.4 | 1890 | 0.12 | 20 | 4400 |
| 330 | 10x12.4 | 2310 | 0.12 | 20 | 4400 | |
| 50 | 10 | 8x11.7 | 100 | 0.12 | 40 | 1800 |
| | 22 | 8x11.7 | 220 | 0.12 | 40 | 1800 |
| | 33 | 8x11.7 | 330 | 0.12 | 35 | 2000 |
| | 39 | 8x11.7 | 390 | 0.12 | 30 | 2300 |
| | 47 | 8x11.7 | 470 | 0.12 | 30 | 2300 |
| | 56 | 8x11.7 | 560 | 0.12 | 30 | 2500 |
| | | 10x12.4 | 560 | 0.12 | 25 | 3000 |
| | 68 | 10x12.4 | 680 | 0.12 | 25 | 3000 |
| 100 | 10x12.4 | 1000 | 0.12 | 25 | 3000 | |
| 63 | 22 | 8x11.7 | 277 | 0.12 | 35 | 1800 |
| | 27 | 8x11.7 | 340 | 0.12 | 35 | 2200 |
| | 33 | 8x11.7 | 416 | 0.12 | 35 | 2200 |
| | | 10x12.4 | 416 | 0.12 | 30 | 2500 |
| | 39 | 8x11.7 | 491 | 0.12 | 35 | 2200 |
| | 47 | 10x12.4 | 592 | 0.12 | 30 | 2500 |
| | 56 | 10x12.4 | 706 | 0.12 | 30 | 2500 |
| 68 | 10x12.4 | 856.8 | 0.12 | 30 | 2500 | |
| 80 | 12 | 8x11.7 | 192 | 0.12 | 40 | 1800 |
| | 22 | 10x12.4 | 352 | 0.12 | 38 | 2300 |
| | 47 | 10x12.4 | 752 | 0.12 | 40 | 1800 |
| 100 | 10 | 8x11.7 | 200 | 0.12 | 45 | 1700 |
| | 18 | 10x12.4 | 360 | 0.12 | 40 | 2100 |
| | 22 | 10x12.4 | 440 | 0.12 | 40 | 2100 |

Ripple Current(mA,rms)at 105°C,100KHz

PV series SMD type & Low height

Features

- ◆ SMD type , Low height & Large capacitance
- ◆ Low ESR at high frequency range &.Large permissible ripple current.
- ◆ Long life and high reliability(reliability: 0.1% / 1000Hrs).



Conductive Polymer

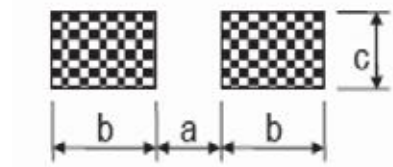
Specifications

| Item | Performance Characteristics | |
|---|---|---|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 2.5~100V DC | |
| Capacitance Range | 6.8 to 2500 μF | |
| Capacitance Tolerance | ±20% (120Hz , +20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz , 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C , 2000h , at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C , RH90~95% , 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

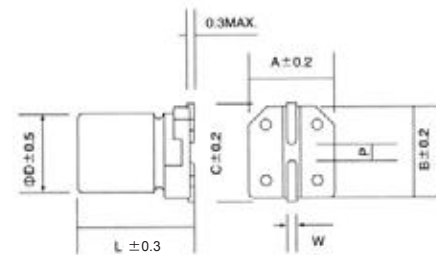
| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Recommended land pattern:(unit:mm)



| φ DxL | a | b | c |
|---------|-----|-----|-----|
| 8x7.7 | 2.8 | 4.2 | 1.9 |
| 8x8.7 | 2.8 | 4.2 | 1.9 |
| 8x10.5 | 2.8 | 4.2 | 1.9 |
| 10x8.7 | 4.3 | 4.4 | 1.9 |
| 10x10.5 | 4.3 | 4.4 | 1.9 |

Diagram of Dimensions:(unit:mm)



| φ DxL | A | B | C | W | P |
|---------|------|------|------|----------|-----|
| 8x7.7 | 8.3 | 8.3 | 9.0 | 0.7to1.1 | 3.1 |
| 8x8.7 | 8.3 | 8.3 | 9.0 | 0.7to1.1 | 3.1 |
| 8x10.5 | 8.3 | 8.3 | 9.0 | 0.7to1.1 | 3.1 |
| 10x8.7 | 10.3 | 10.3 | 11.0 | 0.7to1.1 | 4.5 |
| 10x10.5 | 10.3 | 10.3 | 11.0 | 0.7to1.1 | 4.5 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 2.5 | 560 | 8x7.7 | 280 | 0.08 | 20 | 3500 |
| | 680 | 8x7.7 | 340 | 0.08 | 20 | 3500 |
| | 820 | 8x7.7 | 410 | 0.08 | 20 | 3500 |
| | 1000 | 8x8.7 | 500 | 0.08 | 11 | 4800 |
| | 1200 | 10x8.7 | 600 | 0.08 | 20 | 3700 |
| | 1500 | 10x8.7 | 750 | 0.10 | 20 | 3700 |
| | 2200 | 10x10.5 | 1100 | 0.10 | 11 | 5500 |
| | 2500 | 10x10.5 | 1250 | 0.10 | 11 | 5500 |
| 4 | 330 | 8x7.7 | 264 | 0.08 | 20 | 3500 |
| | 390 | 8x8.7 | 312 | 0.08 | 15 | 4200 |
| | 470 | 8x8.7 | 376 | 0.08 | 15 | 4200 |
| | 560 | 8x7.7 | 448 | 0.08 | 20 | 3500 |
| | | 8x8.7 | 448 | 0.08 | 11 | 4800 |
| | 680 | 8x7.7 | 544 | 0.08 | 20 | 3500 |
| | | 8x8.7 | 544 | 0.08 | 11 | 4800 |
| | 820 | 8x8.7 | 656 | 0.08 | 11 | 4800 |
| | | 10x10.5 | 656 | 0.08 | 11 | 5100 |
| | 1000 | 8x10.5 | 800 | 0.10 | 11 | 5100 |
| | 1200 | 10x10.5 | 960 | 0.10 | 11 | 5500 |
| | 1500 | 10x10.5 | 1200 | 0.10 | 11 | 5500 |
| 2000 | 10x10.5 | 1600 | 0.10 | 11 | 5500 | |
| 6.3 | 220 | 8x7.7 | 277.2 | 0.08 | 20 | 3500 |
| | 270 | 8x7.7 | 340.2 | 0.08 | 20 | 3500 |
| | 330 | 8x7.7 | 415.8 | 0.08 | 20 | 3500 |
| | 390 | 8x7.7 | 491 | 0.08 | 20 | 3500 |
| | 470 | 8x7.7 | 592.2 | 0.08 | 20 | 3500 |
| | | 8x8.7 | 592 | 0.08 | 11 | 4800 |
| | 680 | 8x8.7 | 856 | 0.10 | 11 | 4800 |
| | 820 | 10x8.7 | 1033.2 | 0.10 | 20 | 3700 |
| | 1000 | 10x8.7 | 1260 | 0.10 | 20 | 3700 |
| | 1200 | 10x10.5 | 1512 | 0.10 | 11 | 5500 |
| | 1500 | 10x10.5 | 1890 | 0.10 | 11 | 5500 |
| | 10 | 330 | 8x7.7 | 660 | 0.08 | 20 |
| 390 | | 8x7.7 | 780 | 0.08 | 20 | 3500 |
| 470 | | 8x8.7 | 940 | 0.08 | 11 | 4800 |
| 560 | | 10x8.7 | 1120 | 0.08 | 20 | 3700 |
| | | 10x10.5 | 1120 | 0.08 | 11 | 4800 |
| 680 | | 10x8.7 | 1360 | 0.10 | 20 | 3700 |
| | | 10x10.5 | 1360 | 0.10 | 11 | 4800 |
| 820 | | 10x10.5 | 1640 | 0.10 | 11 | 5100 |
| 16 | 68 | 8x7.7 | 217.6 | 0.08 | 25 | 3300 |
| | 150 | 8x7.7 | 480 | 0.08 | 25 | 3300 |
| | 180 | 8x7.7 | 576 | 0.08 | 23 | 3500 |
| | | 8x8.7 | 576 | 0.08 | 16 | 4800 |
| | 220 | 8x7.7 | 704 | 0.08 | 23 | 3500 |
| | | 8x8.7 | 704 | 0.08 | 16 | 4800 |
| | 270 | 8x8.7 | 864 | 0.10 | 16 | 4800 |
| | | 10x10.5 | 864 | 0.10 | 16 | 5100 |
| | 330 | 10x8.7 | 1056 | 0.10 | 23 | 3700 |
| | | 10x10.5 | 1056 | 0.10 | 16 | 5100 |
| | 390 | 10x8.7 | 1248 | 0.10 | 23 | 3700 |
| | | 10x10.5 | 1248 | 0.10 | 16 | 5100 |
| 470 | 10x10.5 | 1504 | 0.10 | 16 | 5100 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 20 | 27 | 8x8.7 | 400 | 0.10 | 25 | 3300 |
| | 68 | 8x8.7 | 272 | 0.10 | 22 | 3500 |
| | 82 | 8x8.7 | 328 | 0.10 | 22 | 3500 |
| | 100 | 8x8.7 | 400 | 0.10 | 22 | 3500 |
| | 120 | 10x8.7 | 480 | 0.10 | 30 | 2800 |
| | 150 | 8x8.7 | 600 | 0.10 | 22 | 3500 |
| | | 10x8.7 | 600 | 0.10 | 27 | 3100 |
| | 180 | 10x8.7 | 720 | 0.10 | 27 | 3100 |
| | | 10x10.5 | 720 | 0.10 | 22 | 3700 |
| | 220 | 10x8.7 | 880 | 0.10 | 27 | 3100 |
| 10x10.5 | | 880 | 0.10 | 22 | 3700 | |
| 270 | 10x10.5 | 1080 | 0.10 | 22 | 3700 | |
| 330 | 10x10.5 | 1320 | 0.10 | 22 | 3700 | |
| 25 | 47 | 10x8.7 | 400 | 0.10 | 30 | 2800 |
| | 68 | 8x8.7 | 340 | 0.10 | 22 | 3500 |
| | 82 | 8x8.7 | 410 | 0.10 | 22 | 3500 |
| | | 10x8.7 | 410 | 0.10 | 27 | 3100 |
| | 100 | 8x8.7 | 500 | 0.10 | 22 | 3500 |
| | | 10x8.7 | 500 | 0.10 | 27 | 3100 |
| | 120 | 8x8.7 | 600 | 0.10 | 22 | 3500 |
| | 150 | 8x8.7 | 750 | 0.10 | 25 | 3300 |
| | 180 | 10x10.5 | 900 | 0.10 | 22 | 3700 |
| 270 | 10x10.5 | 1350 | 0.10 | 25 | 3500 | |
| 35 | 56 | 8x7.7 | 392 | 0.12 | 40 | 2200 |
| | 68 | 8x7.7 | 476 | 0.12 | 35 | 2400 |
| | 82 | 8x8.7 | 574 | 0.12 | 35 | 2600 |
| | 100 | 8x8.7 | 700 | 0.12 | 30 | 3000 |
| | | 10x10.5 | 700 | 0.12 | 30 | 3200 |
| | 120 | 10x10.5 | 840 | 0.12 | 30 | 3200 |
| 150 | 10x10.5 | 1050 | 0.12 | 30 | 3200 | |
| 50 | 10 | 8x8.7 | 100 | 0.12 | 45 | 1500 |
| | 33 | 8x8.7 | 330 | 0.12 | 40 | 1900 |
| | 47 | 8x10.5 | 470 | 0.12 | 35 | 2200 |
| | | 10x10.5 | 470 | 0.12 | 35 | 2500 |
| 68 | 10x10.5 | 680 | 0.12 | 35 | 2600 | |
| 63 | 10 | 8x8.7 | 126 | 0.12 | 45 | 1500 |
| | 22 | 8x8.7 | 277 | 0.12 | 40 | 1700 |
| | 27 | 8x8.7 | 340 | 0.12 | 40 | 1900 |
| | 33 | 8x8.7 | 416 | 0.12 | 40 | 1900 |
| | | 10x10.5 | 416 | 0.12 | 35 | 2200 |
| 47 | 10x10.5 | 592 | 0.12 | 35 | 2200 | |
| 80 | 10 | 8x8.7 | 160 | 0.12 | 45 | 1600 |
| | 15 | 10x10.5 | 240 | 0.12 | 40 | 1900 |
| 100 | 6.8 | 8x8.7 | 136 | 0.12 | 48 | 1500 |
| | 12 | 10x10.5 | 240 | 0.12 | 45 | 1900 |
| | 15 | 8x8.7 | 300 | 0.12 | 48 | 1500 |

Ripple Current(mA,rms)at 105°C,100KHz

PR series SMD type & Long Life to 5,000Hours



Features

- ◆ SMD type .
- ◆ Long Life to 5,000Hours.

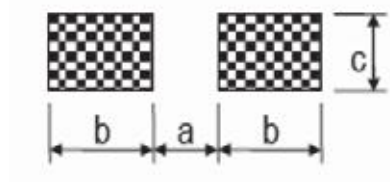
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -55°C~+105°C | |
| Rated Voltage Range | 6.3~50V DC | |
| Capacitance Range | 10 to 1500 μF | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C · 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (100K~300KHz) | Not to exceed the values shown in Standard Ratings | |
| Endurance 105°C · 5000h · at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C · RH90~95% · 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

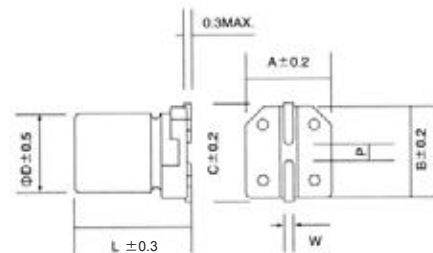
| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Recommended land pattern:(unit:mm)



| φ DxL | a | b | c |
|---------|-----|-----|-----|
| 6.3x5.8 | 2.1 | 3.5 | 1.6 |
| 6.3x7.7 | 2.1 | 3.5 | 1.6 |
| 8x7.7 | 2.8 | 4.2 | 1.9 |
| 8x8.7 | 2.8 | 4.2 | 1.9 |
| 8x11.7 | 2.8 | 4.2 | 1.9 |
| 10x8.7 | 4.3 | 4.4 | 1.9 |
| 10x10.5 | 4.3 | 4.4 | 1.9 |
| 10x12.4 | 4.3 | 4.4 | 1.9 |

Diagram of Dimensions:(unit:mm)



| φ DxL | W | H | C | R | P |
|---------|------|------|------|------------|-----|
| 6.3x5.8 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 6.3x7.7 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 8x7.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 8x8.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 8x11.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 10x8.7 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |
| 10x10.5 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |
| 10x12.4 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 6.3 | 100 | 6.3x5.8 | 300 | 0.08 | 32 | 2300 |
| | 220 | 6.3x5.8 | 300 | 0.08 | 32 | 2300 |
| | | 6.3x5.8 | 300 | 0.08 | 20 | 2800 |
| | 270 | 6.3x7.7 | 340.2 | 0.08 | 22 | 3000 |
| | 470 | 8x7.7 | 592.2 | 0.08 | 22 | 3700 |
| | 820 | 8x11.7 | 1033.2 | 0.08 | 12 | 5000 |
| | 1000 | 10x10.5 | 1260 | 0.08 | 15 | 4700 |
| 1500 | 10x12.4 | 1890 | 0.08 | 12 | 5300 | |
| 10 | 56 | 6.3x5.8 | 300 | 0.08 | 32 | 2300 |
| | 120 | 6.3x7.7 | 300 | 0.08 | 22 | 2900 |
| | 150 | 6.3x7.7 | 300 | 0.08 | 22 | 2900 |
| | 180 | 6.3x7.7 | 360 | 0.08 | 22 | 2900 |
| | 270 | 8x7.7 | 540 | 0.08 | 22 | 3200 |
| | 330 | 10x8.7 | 660 | 0.08 | 22 | 3700 |
| | 470 | 8x11.7 | 940 | 0.08 | 12 | 4500 |
| | 560 | 10x10.5 | 1120 | 0.08 | 15 | 4200 |
| | 820 | 10x12.4 | 1640 | 0.08 | 12 | 4800 |
| 1000 | 10x12.4 | 2000 | 0.08 | 12 | 4800 | |
| 16 | 47 | 6.3x5.8 | 400 | 0.10 | 48 | 1700 |
| | 82 | 6.3x7.7 | 400 | 0.10 | 28 | 2400 |
| | 100 | 6.3x7.7 | 400 | 0.10 | 28 | 2400 |
| | 120 | 6.3x7.7 | 400 | 0.12 | 28 | 2400 |
| | | 8x7.7 | 400 | 0.12 | 28 | 3000 |
| | 150 | 8x8.7 | 480 | 0.12 | 26 | 3100 |
| | | 10x8.7 | 480 | 0.12 | 33 | 3100 |
| | 180 | 8x11.7 | 576 | 0.12 | 18 | 4200 |
| | | 10x8.7 | 576 | 0.12 | 33 | 3100 |
| | 220 | 8x11.7 | 704 | 0.12 | 18 | 4200 |
| | 270 | 10x10.5 | 864 | 0.12 | 23 | 3800 |
| | 330 | 10x10.5 | 1056 | 0.12 | 23 | 3800 |
| | 390 | 10x12.4 | 1248 | 0.12 | 18 | 4500 |
| 560 | 10x12.4 | 1792 | 0.12 | 18 | 4500 | |
| 680 | 10x12.4 | 2176 | 0.12 | 18 | 4500 | |
| 20 | 22 | 6.3x5.8 | 600 | 0.10 | 48 | 1700 |
| | 33 | 6.3x5.8 | 600 | 0.10 | 48 | 1700 |
| | 47 | 6.3x7.7 | 600 | 0.10 | 33 | 2300 |
| | 56 | 6.3x7.7 | 600 | 0.10 | 33 | 2300 |
| | 68 | 6.3x7.7 | 600 | 0.10 | 33 | 2300 |
| | 82 | 8x7.7 | 600 | 0.12 | 33 | 2900 |
| | 120 | 8x7.7 | 600 | 0.12 | 33 | 2900 |
| | 150 | 8x11.7 | 600 | 0.12 | 23 | 4000 |
| | 180 | 8x11.7 | 720 | 0.12 | 23 | 4000 |
| | | 10x10.5 | 720 | 0.12 | 25 | 3650 |
| | 220 | 10x10.5 | 880 | 0.12 | 25 | 3650 |
| 330 | 10x12.4 | 1320 | 0.12 | 23 | 4200 | |

Ripple Current(mA,rms)at 105°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 25 | 10 | 6.3x5.8 | 600 | 0.10 | 58 | 1600 |
| | 22 | 6.3x5.8 | 600 | 0.10 | 58 | 1600 |
| | 39 | 6.3x7.7 | 600 | 0.10 | 33 | 2300 |
| | 47 | 6.3x7.7 | 600 | 0.10 | 33 | 2300 |
| | | 8x11.7 | 600 | 0.12 | 23 | 3700 |
| | 56 | 8x7.7 | 600 | 0.12 | 33 | 2900 |
| | 68 | 8x7.7 | 600 | 0.12 | 33 | 2900 |
| | | 8x11.7 | 600 | 0.12 | 23 | 4000 |
| | 82 | 8x8.7 | 600 | 0.12 | 27 | 3200 |
| | | 8x11.7 | 600 | 0.12 | 23 | 4000 |
| | | 10x8.7 | 600 | 0.12 | 33 | 2900 |
| | 100 | 6.3x7.7 | 600 | 0.12 | 40 | 2000 |
| | | 8x8.7 | 600 | 0.12 | 27 | 3200 |
| | 120 | 8x11.7 | 600 | 0.12 | 23 | 4000 |
| 10x10.5 | | 600 | 0.12 | 25 | 3650 | |
| 150 | 10x12.4 | 750 | 0.12 | 23 | 4200 | |
| 180 | 10x12.4 | 900 | 0.12 | 23 | 4200 | |
| 220 | 8x11.7 | 1100 | 0.12 | 23 | 4000 | |
| | 10x12.4 | 1100 | 0.12 | 23 | 4200 | |
| 35 | 10 | 6.3x5.8 | 600 | 0.12 | 75 | 980 |
| | 18 | 6.3x7.7 | 600 | 0.12 | 60 | 1400 |
| | 22 | 8x11.7 | 600 | 0.12 | 35 | 2300 |
| | 27 | 6.3x7.7 | 600 | 0.12 | 60 | 1400 |
| | 33 | 8x11.7 | 600 | 0.12 | 35 | 2300 |
| | 39 | 8x8.7 | 600 | 0.12 | 40 | 1800 |
| | 56 | 8x11.7 | 600 | 0.12 | 35 | 2300 |
| | 68 | 10x10.5 | 600 | 0.12 | 32 | 2500 |
| | 100 | 10x10.5 | 700 | 0.12 | 32 | 2500 |
| | | 10x12.4 | 700 | 0.12 | 30 | 3100 |
| | 150 | 10x10.5 | 700 | 0.12 | 32 | 2500 |
| 10x12.4 | | 700 | 0.12 | 30 | 3100 | |
| 50 | 10 | 8x7.7 | 100 | 0.12 | 75 | 1400 |
| | 12 | 6.3x7.7 | 120 | 0.12 | 75 | 1400 |
| | 22 | 8x8.7 | 220 | 0.12 | 50 | 1800 |
| | | 8x11.7 | 220 | 0.12 | 40 | 2400 |
| | | 10x8.7 | 220 | 0.12 | 55 | 1800 |
| | 27 | 8x11.7 | 270 | 0.12 | 40 | 2400 |
| | 33 | 10x10.5 | 330 | 0.12 | 42 | 2200 |
| | | 10x12.4 | 330 | 0.12 | 30 | 3000 |
| | 47 | 10x12.4 | 470 | 0.12 | 30 | 3000 |
| | 56 | 10x12.4 | 560 | 0.12 | 30 | 3000 |
| 68 | 10x12.4 | 680 | 0.12 | 30 | 3000 | |
| 100 | 10x12.4 | 1000 | 0.12 | 26 | 3650 | |

Ripple Current(mA,rms)at 105°C,100KHz

PG series SMD type & 125°C Guaranteed

Features

- ◆ SMD type .
- ◆ 125°C Guaranteed



Conductive Polymer

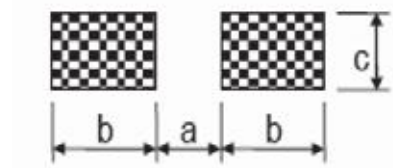
Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -55°C~+125°C | |
| Rated Voltage Range | 6.3~50V DC | |
| Capacitance Range | 10 to 1500 μF | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | |
| Leakage Current (+20°C,max.) | Not to exceed the values shown in Standard Ratings (Rated voltage applied, after 2 minutes at 20°C) | |
| Dissipation Factor (tan δ , at 20°C · 120Hz) | Not to exceed the values shown in Standard Ratings | |
| ESR (at 100KHz · 20°C) | Not to exceed the values shown in Standard Ratings | |
| Endurance 125°C · 2000h · at rated voltage | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |
| Moisture Resistance Stored at 60°C · RH90~95% · 1000h | Capacitance Change | Within ±20% of the value before test |
| | Leakage current | Not to exceed the value specified |
| | ESR | Not to exceed 150% of the value specified |
| | Dissipation Factor | Not to exceed 150% of the value specified |

Frequency Coefficient for Ripple Current

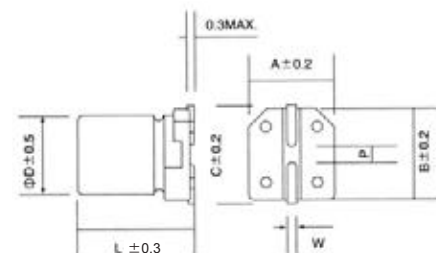
| Frequency | 120Hz ≤ freq. < 1KHz | 1KHz ≤ freq. < 10KHz | 10KHz ≤ freq. < 100KHz | 100KHz ≤ freq. < 300KHz |
|-------------|----------------------|----------------------|------------------------|-------------------------|
| Coefficient | 0.05 | 0.3 | 0.7 | 1 |

Recommended land pattern:(unit:mm)



| φ DxL | a | b | c |
|---------|-----|-----|-----|
| 6.3x5.8 | 2.1 | 3.5 | 1.6 |
| 6.3x7.7 | 2.1 | 3.5 | 1.6 |
| 8x7.7 | 2.8 | 4.2 | 1.9 |
| 8x8.7 | 2.8 | 4.2 | 1.9 |
| 8x11.7 | 2.8 | 4.2 | 1.9 |
| 10x8.7 | 4.3 | 4.4 | 1.9 |
| 10x10.5 | 4.3 | 4.4 | 1.9 |
| 10x12.4 | 4.3 | 4.4 | 1.9 |

Diagram of Dimensions:(unit:mm)



| φ DxL | W | H | C | R | P |
|---------|------|------|------|------------|-----|
| 6.3x5.8 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 6.3x7.7 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 8x7.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 8x8.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 8x11.7 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 10x8.7 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |
| 10x10.5 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |
| 10x12.4 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Rated Ripple Current | |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|----------------------|----------|
| | | | | | | 100KHz (mA,r.m.s) | |
| | | | | | | 105°C < Tx≤125°C | Tx≤105°C |
| 6.3 | 100 | 6.3x5.8 | 300 | 0.08 | 35 | 695 | 2200 |
| | 270 | 6.3x7.7 | 340.2 | 0.08 | 25 | 885 | 2800 |
| | 470 | 8x7.7 | 592.2 | 0.08 | 25 | 1100 | 3500 |
| | 820 | 8x11.7 | 1033.2 | 0.08 | 15 | 1490 | 4700 |
| | 1000 | 10x10.5 | 1260 | 0.08 | 18 | 1390 | 4400 |
| | 1500 | 10x12.4 | 1890 | 0.08 | 15 | 1610 | 5100 |
| 10 | 56 | 6.3x5.8 | 300 | 0.08 | 35 | 695 | 2200 |
| | 120 | 6.3x7.7 | 300 | 0.08 | 25 | 885 | 2800 |
| | 150 | 6.3x7.7 | 300 | 0.08 | 25 | 885 | 2800 |
| | 180 | 6.3x7.7 | 360 | 0.08 | 25 | 885 | 2800 |
| | 270 | 8x7.7 | 540 | 0.08 | 25 | 950 | 3000 |
| | 330 | 10x8.7 | 660 | 0.08 | 25 | 1100 | 3500 |
| | 470 | 8x11.7 | 940 | 0.08 | 15 | 1330 | 4200 |
| | 560 | 10x10.5 | 1120 | 0.08 | 18 | 1265 | 4000 |
| 16 | 820 | 10x12.4 | 1640 | 0.08 | 15 | 1420 | 4500 |
| | 47 | 6.3x5.8 | 400 | 0.10 | 50 | 505 | 1600 |
| | 82 | 6.3x7.7 | 400 | 0.10 | 30 | 695 | 2200 |
| | 100 | 6.3x7.7 | 400 | 0.10 | 30 | 695 | 2200 |
| | 120 | 8x7.7 | 400 | 0.12 | 30 | 885 | 2800 |
| | 150 | 8x8.7 | 480 | 0.12 | 28 | 950 | 3000 |
| | | 10x8.7 | 480 | 0.12 | 35 | 930 | 3000 |
| | 180 | 8x11.7 | 576 | 0.12 | 20 | 1200 | 3800 |
| | | 10x8.7 | 576 | 0.12 | 35 | 930 | 3000 |
| | 220 | 8x11.7 | 704 | 0.12 | 20 | 1200 | 3800 |
| | 270 | 10x10.5 | 864 | 0.12 | 25 | 1105 | 3500 |
| | 330 | 10x10.5 | 1056 | 0.12 | 25 | 1105 | 3500 |
| 390 | 10x12.4 | 1248 | 0.12 | 20 | 1265 | 4000 | |
| 560 | 10x12.4 | 1792 | 0.12 | 20 | 1265 | 4000 | |
| 20 | 22 | 6.3x5.8 | 600 | 0.10 | 50 | 505 | 1600 |
| | 33 | 6.3x5.8 | 600 | 0.10 | 50 | 505 | 1600 |
| | 47 | 6.3x7.7 | 600 | 0.10 | 35 | 695 | 2200 |
| | 56 | 6.3x7.7 | 600 | 0.10 | 35 | 695 | 2200 |
| | 68 | 6.3x7.7 | 600 | 0.10 | 35 | 695 | 2200 |
| | 82 | 8x7.7 | 600 | 0.12 | 35 | 885 | 2800 |
| | 120 | 8x7.7 | 600 | 0.12 | 35 | 885 | 2800 |
| | 150 | 8x11.7 | 600 | 0.12 | 25 | 1200 | 3800 |
| | 180 | 8x11.7 | 720 | 0.12 | 25 | 1200 | 3800 |
| | | 10x10.5 | 720 | 0.12 | 27 | 1105 | 3500 |
| | 220 | 10x10.5 | 880 | 0.12 | 27 | 1105 | 3500 |
| | 330 | 10x12.4 | 1320 | 0.12 | 25 | 1265 | 4000 |
| 25 | 10 | 6.3x5.8 | 600 | 0.10 | 60 | 474 | 1500 |
| | 22 | 6.3x5.8 | 600 | 0.10 | 60 | 474 | 1500 |
| | 39 | 6.3x7.7 | 600 | 0.10 | 35 | 695 | 2200 |
| | 47 | 6.3x7.7 | 600 | 0.10 | 35 | 695 | 2200 |
| | 47 | 8x11.7 | 600 | 0.12 | 25 | 1100 | 3500 |
| | 56 | 8x7.7 | 600 | 0.12 | 35 | 885 | 2800 |
| | 68 | 8x7.7 | 600 | 0.12 | 35 | 885 | 2800 |
| | | 8x11.7 | 600 | 0.12 | 25 | 1200 | 3800 |
| | 82 | 8x8.7 | 600 | 0.12 | 30 | 950 | 3000 |
| | | 10x8.7 | 600 | 0.12 | 35 | 885 | 2800 |
| | 100 | 8x11.7 | 600 | 0.12 | 25 | 1200 | 3800 |
| | 120 | 8x11.7 | 600 | 0.12 | 25 | 1200 | 3800 |
| 10x10.5 | | 600 | 0.12 | 27 | 1105 | 3500 | |
| 150 | 10x12.4 | 750 | 0.12 | 25 | 1265 | 4000 | |
| 180 | 10x12.4 | 900 | 0.12 | 25 | 1265 | 4000 | |

Ripple Current(mA,rms)at 125°C,100KHz

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz | Rated Ripple Current | | Allowable Ripple Current | |
|-------------|---------|-------------------|-------------------|----------------------|--------------------|----------------------|------------|--------------------------|------------|
| | | | | | | 100KHz (mA,r.m.s) | | | |
| | | | | | | 105°C < Tx ≤ 125°C | Tx ≤ 105°C | 105°C < Tx ≤ 125°C | Tx ≤ 105°C |
| 35 | 10 | 6.3x5.8 | 600 | 0.12 | 75 | 310 | 980 | | |
| | 18 | 6.3x7.7 | 600 | 0.12 | 60 | 450 | 1400 | | |
| | 22 | 8x11.7 | 600 | 0.12 | 35 | 730 | 2300 | | |
| | 27 | 6.3x7.7 | 600 | 0.12 | 60 | 450 | 1400 | | |
| | 33 | 8x11.7 | 600 | 0.12 | 35 | 730 | 2300 | | |
| | 39 | 8x8.7 | 600 | 0.12 | 40 | 570 | 1800 | | |
| | 56 | 8x11.7 | 600 | 0.12 | 35 | 730 | 2300 | | |
| | 68 | 10x10.5 | 600 | 0.12 | 32 | 800 | 2500 | | |
| | 100 | 10x10.5 | 700 | 0.12 | 32 | 800 | 2500 | | |
| | | 10x12.4 | 700 | 0.12 | 30 | 980 | 3100 | | |
| 150 | 8x11.7 | 1050 | 0.12 | 25 | 1650 | 4800 | | | |
| 180 | 10x10.5 | 1260 | 0.12 | 30 | 1390 | 4400 | | | |
| 50 | 10 | 8x7.7 | 100 | 0.12 | 75 | 450 | 1400 | | |
| | 12 | 6.3x7.7 | 120 | 0.12 | 75 | 450 | 1400 | | |
| | | 8x8.7 | 220 | 0.12 | 50 | 570 | 1800 | | |
| | 22 | 8x11.7 | 220 | 0.12 | 40 | 760 | 2400 | | |
| | | 10x8.7 | 220 | 0.12 | 55 | 570 | 1800 | | |
| | 27 | 8x11.7 | 270 | 0.12 | 40 | 760 | 2400 | | |
| | 33 | 10x10.5 | 330 | 0.12 | 42 | 700 | 2200 | | |
| | | 10x12.4 | 330 | 0.12 | 30 | 885 | 2800 | | |
| | 47 | 10x12.4 | 470 | 0.12 | 30 | 885 | 2800 | | |
| | 100 | 10x12.4 | 1000 | 0.12 | 30 | 885 | 2800 | | |
| 180 | 10x12.4 | 1800 | 0.12 | 24 | 950 | 3000 | | | |

Ripple Current(mA,rms)at 125°C,100KHz

AS series Low ESR, Long Life & High Voltage



Features

- ◆ Voltage Range: 16 to 100Vdc, Capacitance Range: 10 to 560 μ F
- ◆ Endurance Range: 105°C 3,000 hours to 10,000 hours
- ◆ RoHS Compliant
- ◆ AEC-Q200 Compliant

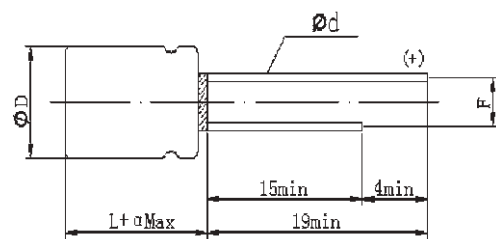
Specifications

| Items | Performance Characteristics | | |
|--|---|------------------------|--|
| Operating Temperature Range | -55°C~+105°C | | |
| Rated Voltage Range | 16~100V DC | | |
| Surge Voltage (V) | 16 | 25 35 40 50 63 80 100 | |
| | 20 | 32 44 50 63 79 100 125 | |
| Capacitance Range | 10 to 560 μ F | | |
| Capacitance Tolerance | \pm 20% (120Hz, +20°C) | | |
| Leakage Current (+20°C, max) | 0.01CV or 3 μ A, whichever is greater | | |
| | (Rated voltage applied, after 2 minutes at 20°C) | | |
| Dissipation Factor (tan δ , at 120Hz, 20°C) | Not to exceed the values shown in Standard Ratings | | |
| ESR (at 100kHz, 20°C) | Not to exceed the values shown in Standard Ratings | | |
| Endurance | 105°C rated voltage applied (with the rated ripple current) | Test | |
| | | 16V | ϕ 6.3: 3,000hours, D \geq ϕ 8: 7,000hours |
| | | \geq 25V | ϕ 6.3: 5,000hours, D \geq ϕ 8: 10,000hours |
| | | Δ C/C | Within \pm 30% of the initial value |
| | | tan δ | Less than 200% of the specified value |
| | | ESR | Less than 200% of the specified value |
| LC | Less than the specified value | | |

Multiplier for Ripple Current vs. Frequency

| Frequency | 120Hz \leq freq.<1kHz | 1kHz \leq freq.<10kHz | 10kHz \leq freq.<100kHz | 100kHz \leq freq.<300kHz |
|-------------|-------------------------|-------------------------|---------------------------|----------------------------|
| Coefficient | 0.1 | 0.3 | 0.6 | 1.0 |

Diagram of Dimensions:(unit:mm)



| Φ DxL | Φ D+0.5max. | α | F \pm 0.5 | Φ d \pm 0.05 |
|------------|------------------|----------|-------------|---------------------|
| 6.3x8 | 6.3 | 1.0 | 2.5 | 0.6 |
| 8x9 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x10 | 10.0 | 1.5 | 5.0 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 16 | 120 | 6.3x8 | 19.2 | 0.16 | 40 | 1500 |
| | 270 | 8x9 | 43.2 | 0.16 | 26 | 2000 |
| | 470 | 10x10 | 75.2 | 0.16 | 21 | 2600 |
| | 560 | 10x12.5 | 89.6 | 0.16 | 15 | 3000 |
| 25 | 68 | 6.3x8 | 17 | 0.16 | 45 | 1400 |
| | 150 | 8x9 | 37.5 | 0.16 | 27 | 1900 |
| | 270 | 10x10 | 67.5 | 0.16 | 22 | 2530 |
| | 330 | 10x12.5 | 82.5 | 0.16 | 16 | 2900 |
| 35 | 47 | 6.3x8 | 16.5 | 0.16 | 60 | 1300 |
| | 100 | 8x9 | 35 | 0.16 | 30 | 1800 |
| | 150 | 10x10 | 52.5 | 0.16 | 23 | 2470 |
| | 220 | 10x12.5 | 77 | 0.16 | 17 | 2830 |
| 40 | 27 | 6.3x8 | 10.8 | 0.16 | 70 | 1250 |
| | 56 | 8x9 | 22.4 | 0.16 | 32 | 1750 |
| | 100 | 10x10 | 40 | 0.16 | 24 | 2400 |
| | 120 | 10x10 | 48 | 0.16 | 18 | 2750 |
| 50 | 15 | 6.3x8 | 7.5 | 0.16 | 80 | 1200 |
| | 33 | 8x9 | 16.5 | 0.16 | 35 | 1670 |
| | 56 | 10x10 | 28 | 0.16 | 25 | 2320 |
| | 82 | 10x12.5 | 41 | 0.16 | 19 | 2650 |
| 63 | 10 | 6.3x8 | 6.3 | 0.16 | 100 | 1060 |
| | 22 | 8x9 | 13.9 | 0.16 | 40 | 1560 |
| | 33 | 10x10 | 20.8 | 0.16 | 30 | 2100 |
| | 47 | 10x10 | 29.6 | 0.16 | 30 | 2100 |
| | 56 | 10x12.5 | 35.3 | 0.16 | 22 | 2400 |
| 80 | 12 | 10x10 | 9.6 | 0.16 | 70 | 1600 |
| | 15 | 10x10 | 12 | 0.16 | 70 | 1600 |
| | 18 | 10x12.5 | 14.4 | 0.16 | 50 | 1830 |
| 100 | 10 | 10x10 | 10 | 0.16 | 80 | 1450 |
| | 12 | 10x10 | 12 | 0.16 | 80 | 1450 |
| | 15 | 10x12.5 | 15 | 0.16 | 60 | 1660 |

Ripple Current(mA,rms)at 105°C,100KHz

AT series 125°C High Reliability , High Ripple Current



Features

- ◆ Voltage Range: 16V to 40Vdc, Capacitance Range: 27 to 560 μ F
- ◆ Endurance Range: 125°C 2,000 hours to 3,000 hours
- ◆ RoHS Compliant
- ◆ AEC-Q200 Compliant

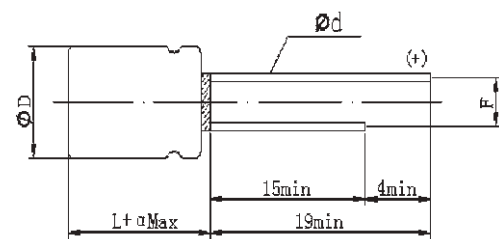
Specifications

| Items | Performance Characteristics | | | | | | | | | |
|--|---|-------|---------------------------------------|----|----|----|----|----|----|----|
| Operating Temperature Range | -55°C~+125°C | | | | | | | | | |
| Rated Voltage Range | 16~40V DC | | | | | | | | | |
| Surge Voltage (V) | <table border="1"> <tr> <td>16</td> <td>25</td> <td>35</td> <td>40</td> </tr> <tr> <td>20</td> <td>32</td> <td>44</td> <td>50</td> </tr> </table> | | 16 | 25 | 35 | 40 | 20 | 32 | 44 | 50 |
| 16 | 25 | 35 | 40 | | | | | | | |
| 20 | 32 | 44 | 50 | | | | | | | |
| Capacitance Range | 27 to 560 μ F | | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz , +20°C) | | | | | | | | | |
| Leakage Current (+20°C , max) | 0.01CV or 3 μA, whichever is greater (Rated voltage applied, after 2 minutes at 20°C) | | | | | | | | | |
| Dissipation Factor (tan δ , at 120Hz , 20°C) | Not to exceed the values shown in Standard Ratings | | | | | | | | | |
| ESR (at 100kHz , 20°C) | Not to exceed the values shown in Standard Ratings | | | | | | | | | |
| Endurance | 105°C rated voltage applied (with the rated ripple current) | Test | | | | | | | | |
| | | 16V | φ 6.3: 2,000hours, D≥ φ 8: 2,500hours | | | | | | | |
| | | ≥25V | φ 6.3: 2,000hours, D≥ φ 8: 3,000hours | | | | | | | |
| | | ΔC/C | Within ±30% of the initial value | | | | | | | |
| | | tan δ | Less than 200% of the specified value | | | | | | | |
| | | ESR | Less than 200% of the specified value | | | | | | | |
| LC | Less than the specified value | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| Frequency | 120Hz≤freq.<1kHz | 1kHz≤freq.<10kHz | 10kHz≤freq.<100kHz | 100kHz≤freq.<300kHz |
|-------------|------------------|------------------|--------------------|---------------------|
| Coefficient | 0.1 | 0.3 | 0.6 | 1.0 |

Diagram of Dimensions:(unit:mm)



| ΦDxL | ΦD+0.5max. | α | F±0.5 | Φd±0.05 |
|---------|------------|-----|-------|---------|
| 6.3x8 | 6.3 | 1.0 | 2.5 | 0.6 |
| 8x9 | 8.0 | 1.5 | 3.5 | 0.6 |
| 10x10 | 10.0 | 1.5 | 5.0 | 0.6 |
| 10x12.5 | 10.0 | 1.5 | 5.0 | 0.6 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 16 | 120 | 6.3x8 | 19.2 | 0.16 | 32 | 1440 |
| | 270 | 8x9 | 43.2 | 0.16 | 23 | 1970 |
| | 470 | 10x10 | 75.2 | 0.16 | 18 | 2620 |
| | 560 | 10x12.5 | 89.6 | 0.16 | 14 | 3030 |
| 25 | 68 | 6.3x8 | 17 | 0.16 | 35 | 1380 |
| | 150 | 8x9 | 37.5 | 0.16 | 25 | 1880 |
| | 270 | 10x10 | 67.5 | 0.16 | 19 | 2500 |
| | 330 | 10x12.5 | 82.5 | 0.16 | 14 | 2890 |
| 35 | 47 | 6.3x8 | 16.5 | 0.16 | 45 | 1280 |
| | 100 | 8x9 | 35 | 0.16 | 28 | 1780 |
| | 150 | 10x10 | 52.5 | 0.16 | 20 | 2440 |
| | 220 | 10x12.5 | 77 | 0.16 | 15 | 2800 |
| 40 | 27 | 6.3x8 | 10.8 | 0.16 | 48 | 1230 |
| | 56 | 8x9 | 22.4 | 0.16 | 30 | 1710 |
| | 100 | 10x10 | 40 | 0.16 | 21 | 2360 |
| | 120 | 10x12.5 | 48 | 0.16 | 16 | 2700 |

Ripple Current(mA,rms)at 125°C,100KHz

AA series SMD type & Long Life to 10000 Hours



Features

- ◆ SMD type
- ◆ Voltage Range: 25 to 80Vdc, Capacitance Range: 10 to 330 μ F
- ◆ Endurance : 105°C 10,000 hours
- ◆ RoHS Compliant
- ◆ AEC-Q200 Compliant

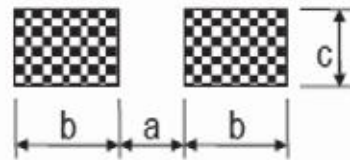
Specifications

| Items | Performance Characteristics | | |
|---|---|--------------|---------------------------------------|
| Operating Temperature Range | -55°C~+105°C | | |
| Rated Voltage Range | 25~80V DC | | |
| Surge Voltage (V) | 25 | 35 50 63 80 | |
| | 32 | 44 63 79 100 | |
| Capacitance Range | 10 to 330 μ F | | |
| Capacitance Tolerance | \pm 20% (120Hz , +20°C) | | |
| Leakage Current (+20°C , max) | 0.01CV or 3 μ A, whichever is greater | | |
| | (Rated voltage applied, after 2 minutes at 20°C) | | |
| Dissipation Factor (tan δ , at 120Hz , 20°C) | 0.08 to 0.14 | | |
| ESR (at 100kHz , 20°C) | Not to exceed the values shown in Standard Ratings | | |
| Endurance | 105°C rated voltage applied (with the rated ripple current) | Test | 10,000 hours |
| | | Δ C/C | Within \pm 30% of the initial value |
| | | tan δ | Less than 200% of the specified value |
| | | ESR | Less than 200% of the specified value |
| | | LC | Less than the specified value |

Multiplier for Ripple Current vs. Frequency

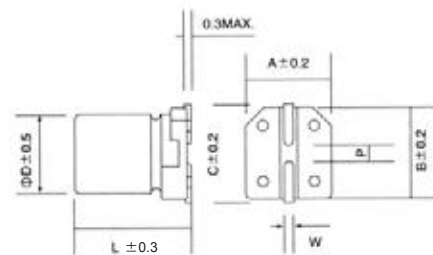
| Frequency | 120Hz≤freq.<1kHz | 1kHz≤freq.<10kHz | 10kHz≤freq.<100kHz | 100kHz≤freq.<300kHz |
|-------------|------------------|------------------|--------------------|---------------------|
| Coefficient | 0.1 | 0.3 | 0.6 | 1.0 |

Recommended land pattern:(unit:mm)



| ϕ DxL | a | b | c |
|------------|-----|-----|-----|
| 5x5.8 | 1.4 | 3.0 | 1.6 |
| 6.3x5.8 | 2.1 | 3.5 | 1.6 |
| 6.3x7.7 | 2.1 | 3.5 | 1.6 |
| 8x10.5 | 2.8 | 4.2 | 1.9 |
| 10x10.5 | 4.3 | 4.4 | 1.9 |

Diagram of Dimensions:(unit:mm)



| ϕ DxL | W | H | C | R | P |
|------------|------|------|------|------------|-----|
| 5x5.8 | 5.3 | 5.3 | 5.9 | 0.5 to 0.8 | 1.4 |
| 6.3x5.8 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 6.3x7.7 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 8x10.5 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 10x10.5 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 25 | 33 | 5x5.8 | 8.3 | 0.14 | 80 | 900 |
| | 56 | 6.3x5.8 | 14 | 0.14 | 50 | 1300 |
| | 100 | 6.3x7.7 | 25 | 0.14 | 30 | 2000 |
| | 220 | 8x10.5 | 55 | 0.14 | 27 | 2300 |
| | 330 | 10x10.5 | 82.5 | 0.14 | 20 | 2500 |
| 35 | 22 | 5x5.8 | 7.7 | 0.12 | 100 | 900 |
| | 27 | 6.3x5.8 | 9.5 | 0.12 | 60 | 1300 |
| | 47 | 6.3x5.8 | 16.5 | 0.12 | 60 | 1300 |
| | 68 | 6.3x7.7 | 23.8 | 0.12 | 35 | 2000 |
| | 150 | 8x10.5 | 52.5 | 0.12 | 27 | 2300 |
| | 270 | 10x10.5 | 94.5 | 0.12 | 20 | 2500 |
| 50 | 10 | 5x5.8 | 5 | 0.10 | 120 | 750 |
| | 22 | 6.3x5.8 | 11 | 0.10 | 80 | 1100 |
| | 33 | 6.3x7.7 | 16.5 | 0.10 | 40 | 1600 |
| | 68 | 8x10.5 | 34 | 0.10 | 30 | 1800 |
| | 100 | 10x10.5 | 50 | 0.10 | 28 | 2000 |
| 63 | 10 | 6.3x5.8 | 6.3 | 0.08 | 120 | 1000 |
| | 22 | 6.3x7.7 | 13.9 | 0.08 | 80 | 1500 |
| | 33 | 8x10.5 | 20.8 | 0.08 | 40 | 1700 |
| | 56 | 10x10.5 | 35.3 | 0.08 | 30 | 1800 |
| 80 | 22 | 8x10.5 | 17.6 | 0.08 | 45 | 1550 |
| | 33 | 10x10.5 | 26.4 | 0.08 | 36 | 1700 |

Ripple Current(mA,rms)at 105°C,100KHz

AC series SMD type & 125°C Guaranteed



Features

- ◆ SMD type
- ◆ Voltage Range: 25 to 80Vdc, Capacitance Range: 10 to 330 μF
- ◆ Endurance : 125°C 4,000 hours
- ◆ RoHS Compliant
- ◆ AEC-Q200 Compliant

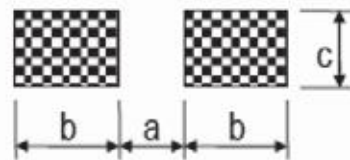
Specifications

| Items | Performance Characteristics | | |
|--|---|--------------|---------------------------------------|
| Operating Temperature Range | -55°C~+105°C | | |
| Rated Voltage Range | 25~80V DC | | |
| Surge Voltage (V) | 25 | 35 50 63 80 | |
| | 32 | 44 63 79 100 | |
| Capacitance Range | 10 to 330 μF | | |
| Capacitance Tolerance | ±20% (120Hz · +20°C) | | |
| Leakage Current (+20°C · max) | 0.01CV or 3 μA, whichever is greater | | |
| | (Rated voltage applied, after 2 minutes at 20°C) | | |
| Dissipation Factor (tan δ · at 120Hz · 20°C) | 0.08 to 0.14 | | |
| ESR (at 100kHz · 20°C) | Not to exceed the values shown in Standard Ratings | | |
| Endurance | 125°C rated voltage applied (with the rated ripple current) | Test | 4,000 hours |
| | | ΔC/C | Within ±30% of the initial value |
| | | tan δ | Less than 200% of the specified value |
| | | ESR | Less than 200% of the specified value |
| | | LC | Less than the specified value |

Multiplier for Ripple Current vs. Frequency

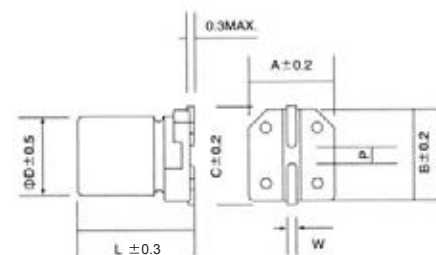
| Frequency | 120Hz≤freq.<1kHz | 1kHz≤freq.<10kHz | 10kHz≤freq.<100kHz | 100kHz≤freq.<300kHz |
|-------------|------------------|------------------|--------------------|---------------------|
| Coefficient | 0.1 | 0.3 | 0.6 | 1.0 |

Recommended land pattern:(unit:mm)



| φ DxL | a | b | c |
|---------|-----|-----|-----|
| 5x5.8 | 1.4 | 3.0 | 1.6 |
| 6.3x5.8 | 2.1 | 3.5 | 1.6 |
| 6.3x7.7 | 2.1 | 3.5 | 1.6 |
| 8x10.5 | 2.8 | 4.2 | 1.9 |
| 10x10.5 | 4.3 | 4.4 | 1.9 |

Diagram of Dimensions:(unit:mm)



| φ DxL | W | H | C | R | P |
|---------|------|------|------|------------|-----|
| 5x5.8 | 5.3 | 5.3 | 5.9 | 0.5 to 0.8 | 1.4 |
| 6.3x5.8 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 6.3x7.7 | 6.5 | 6.5 | 7.2 | 0.5 to 0.8 | 2.2 |
| 8x10.5 | 8.3 | 8.3 | 9.0 | 0.7 to 1.1 | 3.1 |
| 10x10.5 | 10.3 | 10.3 | 11.0 | 0.7 to 1.1 | 4.5 |

Standard Ratings

| W.V. (V) | Cap(μF) | Size φ DxL(mm) | L.C. (μA,2min) | tg δ (120Hz,20°C) | ESR (mΩ),100KHz) | Maximum Permissible Ripple Current(mA,r.m.s) |
|-------------|---------|-------------------|-------------------|----------------------|---------------------|---|
| 25 | 33 | 5x5.8 | 8.3 | 0.14 | 80 | 550 |
| | 56 | 6.3x5.8 | 14 | 0.14 | 50 | 900 |
| | 100 | 6.3x7.7 | 25 | 0.14 | 30 | 1400 |
| | 220 | 8x10.5 | 55 | 0.14 | 27 | 1600 |
| | 330 | 10x10.5 | 82.5 | 0.14 | 20 | 2000 |
| 35 | 22 | 5x5.8 | 7.7 | 0.12 | 100 | 550 |
| | 47 | 6.3x5.8 | 16.5 | 0.12 | 60 | 900 |
| | 68 | 6.3x7.7 | 23.8 | 0.12 | 35 | 1400 |
| | 150 | 8x10.5 | 52.5 | 0.12 | 27 | 1600 |
| | 270 | 10x10.5 | 94.5 | 0.12 | 20 | 2000 |
| 50 | 10 | 5x5.8 | 5 | 0.10 | 120 | 500 |
| | 22 | 6.3x5.8 | 11 | 0.10 | 80 | 750 |
| | 33 | 6.3x7.7 | 16.5 | 0.10 | 40 | 1100 |
| | 68 | 8x10.5 | 34 | 0.10 | 30 | 1250 |
| | 100 | 10x10.5 | 50 | 0.10 | 28 | 1600 |
| | 120 | 10x10.5 | 60 | 0.10 | 28 | 1600 |
| 63 | 10 | 6.3x5.8 | 6.3 | 0.08 | 120 | 700 |
| | 22 | 6.3x7.7 | 13.9 | 0.08 | 80 | 900 |
| | 33 | 8x10.5 | 20.8 | 0.08 | 40 | 1100 |
| | 56 | 10x10.5 | 35.3 | 0.08 | 30 | 1400 |
| | 68 | 10x10.5 | 42.8 | 0.08 | 30 | 1400 |
| 80 | 22 | 8x10.5 | 17.6 | 0.08 | 45 | 1050 |
| | 33 | 10x10.5 | 26.4 | 0.08 | 36 | 1360 |
| | 47 | 10x10.5 | 37.6 | 0.08 | 36 | 1360 |

Ripple Current(mA,rms)at 125°C,100KHz

EV Series

Features

- ◆ Chip type long life capacitance in large case sizes
- ◆ Chip type with Endurance of 1000 hours at +105°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic insertion machine using carrier tape
- ◆ RoHS Compliant
- ◆ AEC-Q200 qualified



Specifications

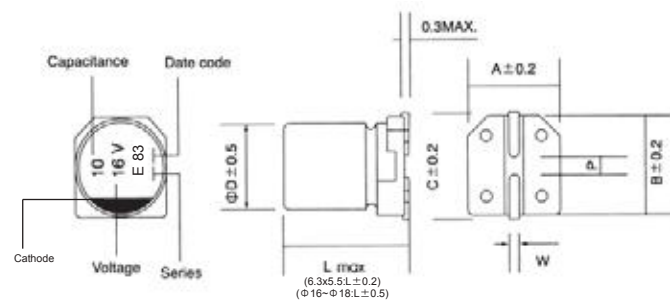
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---------------------------|---------------------------|--------------------|------------------------------|-------|---------------------------|----|-----------------|--------|----|----|----|----|----|-----------------|-------|----|----|----|----|----|----|
| Operating Temperature Range | -55~ +105°C | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3~50 VDC | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 1500 μF | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td rowspan="2">D.F.(%)max</td> <td>φ4~6.3</td> <td>30</td> <td>24</td> <td>20</td> <td>18</td> <td>16</td> <td>14</td> </tr> <tr> <td>φ8~10</td> <td>35</td> <td>28</td> <td>24</td> <td>18</td> <td>16</td> <td>14</td> </tr> </table> | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F.(%)max | φ4~6.3 | 30 | 24 | 20 | 18 | 16 | 14 | φ8~10 | 35 | 28 | 24 | 18 | 16 | 14 |
| | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | |
| D.F.(%)max | φ4~6.3 | 30 | 24 | 20 | 18 | 16 | 14 | | | | | | | | | | | | | | | | |
| | φ8~10 | 35 | 28 | 24 | 18 | 16 | 14 | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Working voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td> <td>8</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table> | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | Z-40°C / Z+20°C | 8 | 8 | 4 | 4 | 3 | 3 | |
| | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 8 | 8 | 4 | 4 | 3 | 3 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test condition Duration time :1000 Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :Within ±25% of initial value for capacitance of 16V or less Within ±20% of initial value for capacitance of 25V or more Dissipation factor :Less than 200% of specified value Leakage current :Less than specified value | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition Duration time :1000 Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C :Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Resistance to soldering heat | The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed under. | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Leakage current</td> <td>Less than specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±10% of initial value</td> </tr> <tr> <td>tan δ</td> <td>Less than specified value</td> </tr> </table> | Leakage current | Less than specified value | Capacitance change | Within ±10% of initial value | tan δ | Less than specified value | | | | | | | | | | | | | | | | |
| | Leakage current | Less than specified value | | | | | | | | | | | | | | | | | | | | | |
| Capacitance change | Within ±10% of initial value | | | | | | | | | | | | | | | | | | | | | | |
| tan δ | Less than specified value | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

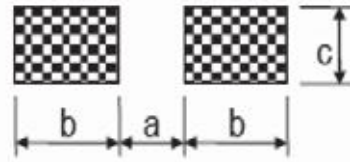
| CAP(μF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | ≥10K |
|-----------------------|--------|-----|------|------|------|
| 0.1 ≤ CAP ≤ 100 μF | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |
| 100 < CAP ≤ 1500 μF | 0.8 | 1.0 | 1.10 | 1.15 | 1.20 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x5.5 | 22 |
| 6.3 | 33 | 4x5.5 | 30 |
| 6.3 | 47 | 4x5.5 | 36 |
| 6.3 | 100 | 5x5.5 | 60 |
| 6.3 | 150 | 6.3x5.5 | 86 |
| 6.3 | 220 | 6.3x5.5 | 89 |
| 6.3 | 220 | 6.3x7.7 | 102 |
| 6.3 | 220 | 8x6.5 | 102 |
| 6.3 | 330 | 6.3x7.7 | 105 |
| 6.3 | 330 | 8x6.5 | 105 |
| 6.3 | 470 | 8x10.5 | 210 |
| 6.3 | 1000 | 8x10.5 | 202 |
| 6.3 | 1000 | 10x10.5 | 230 |
| 6.3 | 1500 | 10x10.5 | 310 |
| 10 | 22 | 4x5.5 | 27 |
| 10 | 33 | 4x5.5 | 25 |
| 10 | 33 | 5x5.5 | 40 |
| 10 | 47 | 5x5.5 | 46 |
| 10 | 100 | 5x5.5 | 52 |
| 10 | 100 | 6.3x5.5 | 60 |
| 10 | 150 | 6.3x5.5 | 86 |
| 10 | 220 | 6.3x7.7 | 105 |
| 10 | 220 | 8x6.5 | 105 |
| 10 | 330 | 8x10.5 | 195 |
| 10 | 470 | 8x10.5 | 210 |
| 10 | 1000 | 10x10.5 | 310 |
| 16 | 10 | 4x5.5 | 18 |
| 16 | 22 | 4x5.5 | 30 |
| 16 | 33 | 5x5.5 | 40 |
| 16 | 47 | 5x5.5 | 51 |
| 16 | 100 | 6.3x5.5 | 60 |
| 16 | 150 | 6.3x7.7 | 95 |
| 16 | 150 | 8x6.5 | 95 |
| 16 | 220 | 6.3x7.7 | 105 |
| 16 | 330 | 8x10.5 | 195 |
| 16 | 470 | 8x10.5 | 210 |
| 25 | 4.7 | 4x5.5 | 16 |
| 25 | 10 | 4x5.5 | 26 |
| 25 | 22 | 5x5.5 | 38 |
| 25 | 33 | 5x5.5 | 48 |
| 25 | 47 | 6.3x5.5 | 63 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 100 | 6.3x7.7 | 91 |
| 25 | 100 | 8x6.5 | 91 |
| 25 | 150 | 8x10.5 | 140 |
| 25 | 220 | 8x10.5 | 155 |
| 25 | 330 | 8x10.5 | 175 |
| 25 | 330 | 10x10.5 | 198 |
| 25 | 470 | 10x10.5 | 300 |
| 35 | 4.7 | 4x5.5 | 16 |
| 35 | 10 | 4x5.5 | 27 |
| 35 | 22 | 5x5.5 | 37 |
| 35 | 22 | 6.3x5.5 | 42 |
| 35 | 33 | 6.3x5.5 | 50 |
| 35 | 33 | 6.3x7.7 | 58 |
| 35 | 47 | 6.3x5.5 | 58 |
| 35 | 47 | 6.3x7.7 | 66 |
| 35 | 100 | 6.3x7.7 | 84 |
| 35 | 100 | 8x6.5 | 84 |
| 35 | 150 | 8x10.5 | 155 |
| 35 | 220 | 8x10.5 | 167 |
| 35 | 220 | 10x10.5 | 190 |
| 35 | 330 | 10x10.5 | 300 |
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 2.6 |
| 50 | 0.33 | 4x5.5 | 3.2 |
| 50 | 0.47 | 4x5.5 | 3.8 |
| 50 | 1 | 4x5.5 | 6.3 |
| 50 | 2.2 | 4x5.5 | 11 |
| 50 | 3.3 | 4x5.5 | 14 |
| 50 | 4.7 | 4x5.5 | 19 |
| 50 | 4.7 | 5x5.5 | 22 |
| 50 | 10 | 5x5.5 | 29 |
| 50 | 10 | 6.3x5.5 | 33 |
| 50 | 22 | 6.3x5.5 | 51 |
| 50 | 33 | 6.3x7.7 | 60 |
| 50 | 33 | 8x6.5 | 60 |
| 50 | 47 | 6.3x7.7 | 66 |
| 50 | 47 | 8x6.5 | 66 |
| 50 | 100 | 8x10.5 | 140 |
| 50 | 150 | 10x10.5 | 180 |
| 50 | 220 | 10x10.5 | 220 |

LV Series

Features

- ◆ 85°C standard, case diameter $\phi 4 \sim \phi 10\text{mm}$
- ◆ Reflow soldering is available
- ◆ Available for high density mounting
- ◆ RoHS Compliant
- ◆ AEC-Q200 qualified



Specifications

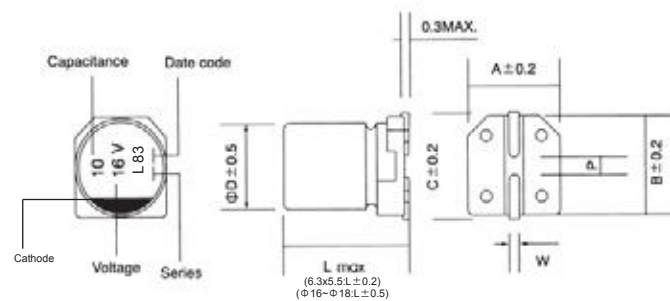
| Item | Performance Characteristics | |
|--|---|--|
| Operating Temperature Range | -40~ +85°C | |
| Rated Voltage Range | 4~100VDC | 160~450VDC |
| Capacitance Range | 0.1 to 6800 μF | 3.3 to 68 μF |
| Capacitance Tolerance | $\pm 20\%$ (120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | $I \leq 0.01 \text{ CV}$ or 3 (μA) whichever is greater (2 minutes) | $I \leq 0.04 \text{ CV} + 100 \mu\text{A}$ (1 minute) |
| Dissipation Factor ($\tan \delta$, at 20°C , 120Hz) | Rated voltage(VDC) | 4 6.3 10 16 25 35 50 63 100 160~250 >250 |
| | D.F.(%)max | $\phi 4 \sim 6.3$ 42 30 22 18 16 14 14 12 10 - - $\phi 8 \sim 10$ 45 34 26 20 16 14 14 12 10 15 20 $\geq \phi 12.5$ 45 40 36 24 18 15 14 12 10 15 20 |
| | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | |
| | Rated voltage(VDC) | 4 6.3 10 16 25 35 50 63 100 160~250 400 450 |
| | Z-25°C/Z+20°C | 7 4 3 2 2 2 2 3 3 3 6 6 |
| Z-40°C/Z+20°C | 15 8 8 4 4 3 3 4 4 6 10 15 | |
| Endurance | Test conditions | |
| | Duration time | :2000 Hrs |
| | Ambient temperature | :+85°C |
| | Applied voltage | :Rated DC working voltage |
| | After test requirement at +20°C: | |
| | Capacitance change | :Within $\pm 25\%$ of the initial value |
| | Dissipation factor | :Not more than 200% of specified value |
| Leakage current | :Not more than the specified value | |
| Shelf Life | Test conditions | |
| | Duration time | :1000 Hrs |
| | Ambient temperature | :+85°C |
| | Applied voltage | :None |
| | After test requirement at +20°C | : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |
| Resistance to soldering heat | The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed under. | |
| | Leakage current | Less than specified value |
| | Capacitance change | Within $\pm 10\%$ of initial value |
| | $\tan \delta$ | Less than specified value |

Multiplier for Ripple Current vs. Frequency

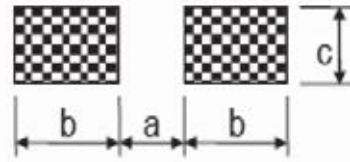
| CAP(μF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | $\geq 10\text{K}$ |
|--|--------|-----|------|------|-------------------|
| $0.1 \leq \text{CAP} \leq 100 \mu\text{F}$ | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |
| $100 < \text{CAP}$ | 0.8 | 1.0 | 1.10 | 1.15 | 1.20 |

| ϕD | L | A | B | C | W | P |
|----------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 4 | 47 | 4x5.5 | 28 |
| 4 | 100 | 5x5.5 | 34 |
| 4 | 150 | 6.3x6.1 | 50 |
| 4 | 220 | 6.3x5.5 | 61 |
| 4 | 330 | 6.3x7.7 | 135 |
| 4 | 330 | 8x6.5 | 145 |
| 4 | 470 | 8x6.5 | 180 |
| 4 | 470 | 8x10.5 | 220 |
| 4 | 560 | 8x10.5 | 242 |
| 4 | 680 | 8x10.5 | 285 |
| 4 | 1000 | 10x10.5 | 370 |
| 4 | 1200 | 10x10.5 | 410 |
| 4 | 1500 | 10x10.5 | 470 |
| 6.3 | 22 | 4x5.5 | 29 |
| 6.3 | 33 | 4x5.5 | 33 |
| 6.3 | 33 | 5x5.5 | 37 |
| 6.3 | 47 | 4x5.5 | 40 |
| 6.3 | 47 | 5x5.5 | 46 |
| 6.3 | 100 | 5x5.5 | 70 |
| 6.3 | 100 | 6.3x6.1 | 85 |
| 6.3 | 150 | 6.3x6.1 | 100 |
| 6.3 | 220 | 6.3x6.1 | 130 |
| 6.3 | 220 | 6.3x7.7 | 141 |
| 6.3 | 220 | 8x6.5 | 150 |
| 6.3 | 330 | 6.3x7.7 | 197 |
| 6.3 | 330 | 8x6.5 | 210 |
| 6.3 | 470 | 8x10.5 | 380 |
| 6.3 | 560 | 8x10.5 | 410 |
| 6.3 | 680 | 8x10.5 | 460 |
| 6.3 | 1000 | 8x10.5 | 480 |
| 6.3 | 1000 | 10x10.5 | 500 |
| 6.3 | 1200 | 10x10.5 | 510 |
| 6.3 | 1500 | 10x10.5 | 530 |
| 6.3 | 3300 | 12.5x14 | 750 |
| 6.3 | 6800 | 16x17 | 1330 |
| 10 | 10 | 4x5.5 | 21 |
| 10 | 22 | 4x5.5 | 33 |
| 10 | 22 | 5x5.5 | 37 |
| 10 | 33 | 4x5.5 | 41 |
| 10 | 33 | 5x5.5 | 43 |
| 10 | 47 | 5x5.5 | 52 |
| 10 | 100 | 6.3x5.5 | 76 |
| 10 | 150 | 6.3x6.1 | 88 |
| 10 | 220 | 6.3x7.7 | 170 |
| 10 | 220 | 8x6.5 | 190 |
| 10 | 330 | 8x10.5 | 330 |
| 10 | 470 | 8x10.5 | 420 |
| 10 | 560 | 10x10.5 | 450 |
| 10 | 680 | 10x10.5 | 480 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 10 | 1000 | 10x10.5 | 510 |
| 10 | 2200 | 12.5x14 | 730 |
| 10 | 4700 | 16x17 | 1200 |
| 16 | 10 | 4x5.5 | 23 |
| 16 | 22 | 4x5.5 | 37 |
| 16 | 33 | 5x5.5 | 45 |
| 16 | 47 | 5x5.5 | 50 |
| 16 | 47 | 6.3x5.5 | 60 |
| 16 | 100 | 6.3x5.5 | 100 |
| 16 | 100 | 6.3x6.1 | 108 |
| 16 | 150 | 6.3x7.7 | 135 |
| 16 | 220 | 6.3x7.7 | 185 |
| 16 | 220 | 8x10.5 | 290 |
| 16 | 330 | 8x10.5 | 330 |
| 16 | 470 | 8x10.5 | 430 |
| 16 | 470 | 10x10.5 | 460 |
| 16 | 560 | 10x10.5 | 500 |
| 16 | 680 | 10x10.5 | 550 |
| 16 | 1000 | 12.5x14 | 600 |
| 16 | 1200 | 12.5x14 | 660 |
| 16 | 1500 | 12.5x14 | 710 |
| 16 | 3300 | 16x17 | 1200 |
| 25 | 4.7 | 4x5.5 | 18 |
| 25 | 10 | 4x5.5 | 27 |
| 25 | 22 | 5x5.5 | 40 |
| 25 | 22 | 6.3x5.5 | 46 |
| 25 | 33 | 5x5.5 | 46 |
| 25 | 33 | 6.3x5.5 | 54 |
| 25 | 47 | 6.3x5.5 | 60 |
| 25 | 47 | 6.3x6.1 | 68 |
| 25 | 100 | 6.3x7.7 | 150 |
| 25 | 100 | 8x6.5 | 160 |
| 25 | 150 | 8x10.5 | 200 |
| 25 | 220 | 8x10.5 | 300 |
| 25 | 330 | 8x10.5 | 390 |
| 25 | 470 | 10x10.5 | 480 |
| 25 | 560 | 12.5x14 | 520 |
| 25 | 680 | 12.5x14 | 580 |
| 25 | 1000 | 12.5x14 | 660 |
| 25 | 2200 | 16x17 | 1150 |
| 35 | 4.7 | 4x5.5 | 18 |
| 35 | 10 | 4x5.5 | 29 |
| 35 | 22 | 5x5.5 | 45 |
| 35 | 22 | 6.3x5.5 | 48 |
| 35 | 33 | 6.3x5.5 | 58 |
| 35 | 47 | 6.3x5.5 | 65 |
| 35 | 47 | 6.3x6.1 | 70 |
| 35 | 47 | 8x6.5 | 115 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 35 | 100 | 6.3x7.7 | 250 |
| 35 | 100 | 8x10.5 | 280 |
| 35 | 150 | 8x10.5 | 300 |
| 35 | 220 | 8x10.5 | 350 |
| 35 | 220 | 10x10.5 | 400 |
| 35 | 330 | 10x10.5 | 460 |
| 35 | 470 | 12.5x14 | 590 |
| 35 | 560 | 12.5x14 | 600 |
| 35 | 680 | 12.5x14 | 610 |
| 35 | 1500 | 16x17 | 1060 |
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 2 |
| 50 | 0.33 | 4x5.5 | 2.8 |
| 50 | 0.47 | 4x5.5 | 4 |
| 50 | 1 | 4x5.5 | 8.4 |
| 50 | 2.2 | 4x5.5 | 14 |
| 50 | 3.3 | 4x5.5 | 17 |
| 50 | 4.7 | 4x5.5 | 22 |
| 50 | 10 | 5x5.5 | 30 |
| 50 | 10 | 6.3x5.5 | 35 |
| 50 | 22 | 6.3x6.1 | 60 |
| 50 | 22 | 6.3x7.7 | 75 |
| 50 | 22 | 8x6.5 | 80 |
| 50 | 33 | 6.3x7.7 | 188 |
| 50 | 33 | 8x6.5 | 200 |
| 50 | 47 | 6.3x7.7 | 225 |
| 50 | 47 | 8x6.5 | 240 |
| 50 | 100 | 8x10.5 | 300 |
| 50 | 150 | 10x10.5 | 320 |
| 50 | 220 | 10x10.5 | 450 |
| 50 | 330 | 12.5x14 | 520 |
| 50 | 470 | 16x17 | 925 |
| 50 | 1000 | 16x17 | 940 |
| 63 | 0.1 | 4x5.5 | 1 |
| 63 | 0.22 | 4x5.5 | 2 |
| 63 | 0.33 | 4x5.5 | 3 |
| 63 | 0.47 | 4x5.5 | 4 |
| 63 | 1 | 4x5.5 | 8 |
| 63 | 2.2 | 4x5.5 | 14 |
| 63 | 3.3 | 5x5.5 | 18 |
| 63 | 4.7 | 5x5.5 | 23 |
| 63 | 4.7 | 6.3x5.5 | 27 |
| 63 | 10 | 6.3x5.5 | 35 |
| 63 | 22 | 6.3x7.7 | 75 |
| 63 | 22 | 8x6.5 | 75 |
| 63 | 33 | 8x10.5 | 160 |
| 63 | 47 | 8x10.5 | 170 |
| 63 | 100 | 10x10.5 | 270 |
| 63 | 100 | 12.5x14 | 340 |
| 63 | 150 | 12.5x14 | 380 |
| 63 | 220 | 12.5x14 | 460 |
| 63 | 330 | 16x17 | 560 |
| 63 | 470 | 16x17 | 700 |
| 80 | 1 | 4x5.5 | 8 |
| 80 | 2.2 | 5x5.5 | 16 |
| 80 | 3.3 | 6.3x5.5 | 25 |
| 80 | 4.7 | 6.3x5.5 | 30 |
| 80 | 10 | 6.3x7.7 | 40 |
| 80 | 22 | 6.3x7.7 | 70 |
| 80 | 33 | 8x10.5 | 160 |
| 80 | 47 | 10x10.5 | 195 |
| 80 | 100 | 12.5x14 | 380 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 80 | 150 | 12.5x14 | 450 |
| 80 | 220 | 16x17 | 550 |
| 100 | 1 | 4x5.5 | 8 |
| 100 | 2.2 | 6.3x5.5 | 18 |
| 100 | 2.2 | 6.3x6.1 | 20 |
| 100 | 3.3 | 6.3x5.5 | 25 |
| 100 | 3.3 | 6.3x6.1 | 28 |
| 100 | 4.7 | 6.3x7.7 | 38 |
| 100 | 4.7 | 8x6.5 | 38 |
| 100 | 10 | 6.3x7.7 | 50 |
| 100 | 22 | 8x10.5 | 120 |
| 100 | 33 | 10x10.5 | 190 |
| 100 | 47 | 12.5x14 | 330 |
| 100 | 100 | 12.5x14 | 380 |
| 100 | 150 | 16x17 | 560 |
| 160 | 10 | 8x10.5 | 70 |
| 160 | 12 | 8x10.5 | 80 |
| 160 | 18 | 10x10.5 | 100 |
| 160 | 22 | 10x10.5 | 150 |
| 160 | 27 | 12.5x14 | 235 |
| 160 | 33 | 12.5x14 | 250 |
| 160 | 39 | 12.5x14 | 270 |
| 160 | 47 | 16x17 | 400 |
| 160 | 68 | 16x17 | 500 |
| 200 | 10 | 10x10.5 | 100 |
| 200 | 10 | 12.5x14 | 130 |
| 200 | 22 | 12.5x14 | 235 |
| 200 | 27 | 12.5x14 | 250 |
| 200 | 33 | 12.5x14 | 270 |
| 200 | 39 | 16x17 | 370 |
| 200 | 47 | 16x17 | 420 |
| 200 | 68 | 16x17 | 520 |
| 250 | 4.7 | 8x10.5 | 70 |
| 250 | 6.8 | 10x10.5 | 95 |
| 250 | 10 | 10x10.5 | 115 |
| 250 | 15 | 12.5x14 | 180 |
| 250 | 22 | 16x17 | 280 |
| 250 | 27 | 16x17 | 305 |
| 250 | 33 | 16x17 | 340 |
| 250 | 39 | 16x17 | 370 |
| 250 | 47 | 16x17 | 430 |
| 400 | 3.3 | 10x10.5 | 50 |
| 400 | 4.7 | 10x10.5 | 90 |
| 400 | 4.7 | 12.5x14 | 115 |
| 400 | 6.8 | 12.5x14 | 130 |
| 400 | 8.2 | 12.5x14 | 140 |
| 400 | 10 | 12.5x14 | 145 |
| 400 | 10 | 16x17 | 160 |
| 400 | 12 | 16x17 | 175 |
| 400 | 15 | 16x17 | 170 |
| 400 | 18 | 16x17 | 195 |
| 400 | 22 | 16x17 | 235 |
| 450 | 4.7 | 12.5x14 | 115 |
| 450 | 6.8 | 12.5x14 | 130 |
| 450 | 8.2 | 12.5x14 | 140 |
| 450 | 10 | 12.5x14 | 145 |
| 450 | 10 | 16x17 | 160 |
| 450 | 12 | 16x17 | 175 |
| 450 | 15 | 16x17 | 170 |
| 450 | 18 | 16x17 | 195 |
| 450 | 22 | 16x17 | 235 |

HV Series

Features

- ◆ Long life of 2000 hrs at 105°C
- ◆ Reflow soldering is available
- ◆ Available for high density mounting
- ◆ RoHS Compliant
- ◆ AEC-Q200 qualified



Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | |
|---|---|--|-----|----|----|----|----|----|----|-----|---------|-------|-----|----|
| Operating Temperature Range | -55~ +105°C | -40~ +105°C | | | | | | | | | | | | |
| Rated Voltage Range | 6.3~100 VDC | 160~450 VDC | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 6800 μF | 2.2 to 68 μF | | | | | | | | | | | | |
| Capacitance Tolerance | ± 20%(120Hz, +20°C) | | | | | | | | | | | | | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes, whichever is greater measured with rated working voltage applied | | | | | | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated voltage(VDC) | | | | | | | | | | | | | |
| | Rated voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160~250 | > 250 | | |
| | D.F.(%)max | φ 4~6.3 | 42 | 30 | 22 | 18 | 16 | 14 | 14 | 12 | 10 | - | - | |
| | | φ 8~10 | 45 | 34 | 26 | 20 | 16 | 14 | 14 | 12 | 10 | 15 | 20 | |
| | | ≥ φ 12.5 | 45 | 40 | 36 | 24 | 18 | 15 | 14 | 12 | 10 | 15 | 20 | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | |
| | Rated voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160~250 | 400 | 450 | |
| | Z-25°C/Z+20°C | 7 | 4 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 6 | 6 | |
| | | Z-40°C/Z+20°C | 15 | 8 | 8 | 4 | 4 | 3 | 3 | 4 | 4 | 6 | 10 | 15 |
| Endurance | Test conditions | | | | | | | | | | | | | |
| | Duration time | :2000 Hrs | | | | | | | | | | | | |
| | Ambient temperature | :+105°C | | | | | | | | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | | | | | | | | |
| | After test requirement at +20°C: | | | | | | | | | | | | | |
| | Capacitance change | :Within ±25% of the initial value | | | | | | | | | | | | |
| | Dissipation factor | :Not more than 200% of specified value | | | | | | | | | | | | |
| Leakage current | :Not more than the specified value | | | | | | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | | | | | | |
| | Ambient temperature | :+105°C | | | | | | | | | | | | |
| | Applied voltage | :None | | | | | | | | | | | | |
| After test requirement at +20°C : Same limits as Endurance. | | | | | | | | | | | | | | |
| Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | |
| Resistance to soldering heat | The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed under. | | | | | | | | | | | | | |
| | Leakage current | Less than specified value | | | | | | | | | | | | |
| | Capacitance change | Within ± 10% of initial value | | | | | | | | | | | | |
| | tan δ | Less than specified value | | | | | | | | | | | | |

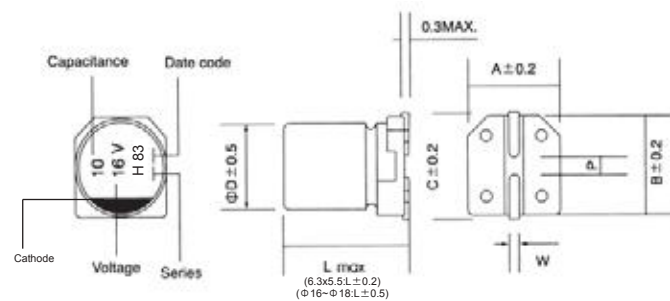
SMD

Multiplier for Ripple Current vs. Frequency

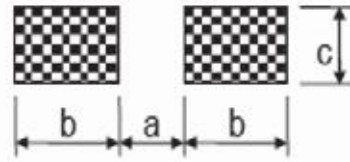
| CAP(μF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | ≥10K |
|-----------------------|--------|-----|------|------|------|
| 0.1 ≤ CAP ≤ 100 μF | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |
| 100 < CAP | 0.8 | 1.0 | 1.10 | 1.15 | 1.20 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x5.5 | 23 |
| 6.3 | 33 | 4x5.5 | 28 |
| 6.3 | 47 | 4x5.5 | 37 |
| 6.3 | 47 | 5x5.5 | 40 |
| 6.3 | 100 | 5x5.5 | 46 |
| 6.3 | 100 | 6.3x5.5 | 57 |
| 6.3 | 150 | 6.3x5.5 | 70 |
| 6.3 | 150 | 8x6.5 | 90 |
| 6.3 | 220 | 6.3x7.7 | 90 |
| 6.3 | 220 | 8x6.5 | 130 |
| 6.3 | 330 | 6.3x7.7 | 140 |
| 6.3 | 330 | 8x10.5 | 170 |
| 6.3 | 470 | 8x10.5 | 210 |
| 6.3 | 560 | 8x10.5 | 310 |
| 6.3 | 680 | 8x10.5 | 330 |
| 6.3 | 680 | 10x10.5 | 370 |
| 6.3 | 1000 | 8x10.5 | 420 |
| 6.3 | 1000 | 10x10.5 | 480 |
| 6.3 | 1200 | 10x10.5 | 500 |
| 6.3 | 1500 | 10x10.5 | 520 |
| 6.3 | 1800 | 12.5x14 | 600 |
| 6.3 | 2200 | 12.5x14 | 650 |
| 6.3 | 3300 | 12.5x14 | 700 |
| 6.3 | 6800 | 16x17 | 930 |
| 10 | 22 | 4x5.5 | 25 |
| 10 | 33 | 4x5.5 | 34 |
| 10 | 47 | 5x5.5 | 42 |
| 10 | 100 | 6.3x5.5 | 55 |
| 10 | 100 | 8x6.5 | 60 |
| 10 | 150 | 6.3x5.5 | 90 |
| 10 | 150 | 8x6.5 | 110 |
| 10 | 220 | 6.3x7.7 | 140 |
| 10 | 220 | 8x6.5 | 160 |
| 10 | 330 | 8x10.5 | 195 |
| 10 | 470 | 8x10.5 | 350 |
| 10 | 470 | 10x10.5 | 420 |
| 10 | 560 | 10x10.5 | 450 |
| 10 | 680 | 10x10.5 | 480 |
| 10 | 1000 | 10x10.5 | 530 |
| 10 | 1200 | 12.5x14 | 570 |
| 10 | 1500 | 12.5x14 | 750 |
| 10 | 4700 | 16x17 | 880 |
| 16 | 10 | 4x5.5 | 20 |
| 16 | 22 | 4x5.5 | 31 |
| 16 | 22 | 5x5.5 | 35 |
| 16 | 33 | 5x5.5 | 36 |
| 16 | 33 | 6.3x5.5 | 40 |
| 16 | 47 | 5x5.5 | 45 |
| 16 | 47 | 6.3x5.5 | 56 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 16 | 100 | 6.3x7.7 | 58 |
| 16 | 100 | 8x6.5 | 62 |
| 16 | 150 | 6.3x7.7 | 125 |
| 16 | 150 | 8x6.5 | 140 |
| 16 | 220 | 6.3x7.7 | 170 |
| 16 | 220 | 8x10.5 | 185 |
| 16 | 330 | 8x10.5 | 250 |
| 16 | 470 | 8x10.5 | 370 |
| 16 | 470 | 10x10.5 | 420 |
| 16 | 560 | 10x10.5 | 480 |
| 16 | 680 | 10x10.5 | 540 |
| 16 | 1000 | 12.5x14 | 580 |
| 16 | 1200 | 12.5x14 | 590 |
| 16 | 1500 | 12.5x14 | 620 |
| 16 | 3300 | 16x17 | 850 |
| 25 | 4.7 | 4x5.5 | 12 |
| 25 | 10 | 4x5.5 | 22 |
| 25 | 22 | 5x5.5 | 38 |
| 25 | 33 | 6.3x5.5 | 48 |
| 25 | 47 | 6.3x7.7 | 56 |
| 25 | 47 | 8x6.5 | 60 |
| 25 | 100 | 6.3x7.7 | 110 |
| 25 | 100 | 8x10.5 | 160 |
| 25 | 150 | 8x10.5 | 175 |
| 25 | 220 | 8x10.5 | 180 |
| 25 | 220 | 10x10.5 | 190 |
| 25 | 330 | 8x10.5 | 290 |
| 25 | 470 | 10x10.5 | 440 |
| 25 | 560 | 12.5x14 | 490 |
| 25 | 680 | 12.5x14 | 510 |
| 25 | 1000 | 12.5x14 | 600 |
| 25 | 2200 | 16x17 | 805 |
| 35 | 4.7 | 4x5.5 | 14 |
| 35 | 10 | 4x5.5 | 24 |
| 35 | 22 | 5x5.5 | 40 |
| 35 | 22 | 6.3x5.5 | 46 |
| 35 | 33 | 6.3x7.7 | 47 |
| 35 | 33 | 8x6.5 | 50 |
| 35 | 47 | 6.3x7.7 | 60 |
| 35 | 47 | 8x6.5 | 65 |
| 35 | 100 | 6.3x7.7 | 130 |
| 35 | 100 | 8x10.5 | 180 |
| 35 | 150 | 8x10.5 | 190 |
| 35 | 220 | 8x10.5 | 250 |
| 35 | 220 | 10x10.5 | 280 |
| 35 | 330 | 10x10.5 | 360 |
| 35 | 470 | 12.5x14 | 460 |
| 35 | 560 | 12.5x14 | 500 |
| 35 | 1500 | 16x17 | 740 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 2 |
| 50 | 0.33 | 4x5.5 | 3 |
| 50 | 0.47 | 4x5.5 | 4 |
| 50 | 1 | 4x5.5 | 8 |
| 50 | 2.2 | 4x5.5 | 11 |
| 50 | 3.3 | 4x5.5 | 13 |
| 50 | 4.7 | 4x5.5 | 18 |
| 50 | 10 | 6.3x5.5 | 28 |
| 50 | 22 | 6.3x7.7 | 50 |
| 50 | 22 | 8x6.5 | 55 |
| 50 | 33 | 6.3x7.7 | 95 |
| 50 | 33 | 8x10.5 | 135 |
| 50 | 47 | 6.3x7.7 | 115 |
| 50 | 47 | 8x10.5 | 155 |
| 50 | 100 | 10x10.5 | 315 |
| 50 | 150 | 10x10.5 | 330 |
| 50 | 220 | 10x10.5 | 350 |
| 50 | 330 | 12.5x14 | 400 |
| 50 | 470 | 16x17 | 570 |
| 50 | 1000 | 16x17 | 655 |
| 63 | 0.1 | 4x5.5 | 0.7 |
| 63 | 0.22 | 4x5.5 | 1.6 |
| 63 | 0.33 | 4x5.5 | 2.5 |
| 63 | 0.47 | 4x5.5 | 3.5 |
| 63 | 1 | 4x5.5 | 7 |
| 63 | 2.2 | 4x5.5 | 11 |
| 63 | 3.3 | 5x5.5 | 14 |
| 63 | 4.7 | 5x5.5 | 22 |
| 63 | 10 | 6.3x5.5 | 40 |
| 63 | 22 | 6.3x7.7 | 58 |
| 63 | 33 | 8x10.5 | 112 |
| 63 | 47 | 8x10.5 | 119 |
| 63 | 100 | 10x10.5 | 280 |
| 63 | 220 | 12.5x14 | 300 |
| 63 | 470 | 16x17 | 630 |
| 80 | 1 | 4x5.5 | 7 |
| 80 | 2.2 | 5x5.5 | 12 |
| 80 | 3.3 | 6.3x5.5 | 17 |
| 80 | 4.7 | 6.3x5.5 | 25 |
| 80 | 10 | 6.3x7.7 | 35 |
| 80 | 22 | 6.3x7.7 | 58 |
| 80 | 33 | 8x10.5 | 112 |
| 80 | 47 | 10x10.5 | 160 |
| 80 | 100 | 12.5x14 | 380 |
| 80 | 150 | 16x17 | 500 |
| 80 | 220 | 16x17 | 600 |
| 100 | 1 | 4x5.5 | 7 |
| 100 | 2.2 | 6.3x6.1 | 15 |
| 100 | 2.2 | 6.3x5.5 | 13 |
| 100 | 3.3 | 6.3x6.1 | 20 |
| 100 | 4.7 | 6.3x7.7 | 28 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 100 | 10 | 6.3x7.7 | 35 |
| 100 | 22 | 8x10.5 | 85 |
| 100 | 33 | 10x10.5 | 135 |
| 100 | 47 | 12.5x14 | 240 |
| 100 | 150 | 16x17 | 500 |
| 160 | 10 | 8x10.5 | 57 |
| 160 | 12 | 8x10.5 | 60 |
| 160 | 18 | 10x10.5 | 65 |
| 160 | 22 | 10x10.5 | 70 |
| 160 | 27 | 12.5x14 | 85 |
| 160 | 33 | 12.5x14 | 95 |
| 160 | 39 | 12.5x14 | 105 |
| 160 | 47 | 16x17 | 260 |
| 160 | 68 | 16x17 | 300 |
| 200 | 10 | 10x10.5 | 64 |
| 200 | 10 | 12.5x14 | 80 |
| 200 | 22 | 12.5x14 | 105 |
| 200 | 27 | 12.5x14 | 115 |
| 200 | 33 | 12.5x14 | 170 |
| 200 | 33 | 16x17 | 220 |
| 200 | 47 | 16x17 | 260 |
| 250 | 4.7 | 8x10.5 | 50 |
| 250 | 6.8 | 10x10.5 | 60 |
| 250 | 10 | 10x10.5 | 75 |
| 250 | 15 | 12.5x14 | 120 |
| 250 | 22 | 16x17 | 180 |
| 250 | 27 | 16x17 | 200 |
| 250 | 33 | 16x17 | 230 |
| 250 | 39 | 16x17 | 260 |
| 250 | 47 | 16x17 | 285 |
| 400 | 2.2 | 8x10.5 | 27 |
| 400 | 3.3 | 8x10.5 | 34 |
| 400 | 3.9 | 10x10.5 | 40 |
| 400 | 4.7 | 10x10.5 | 40 |
| 400 | 4.7 | 12.5x14 | 50 |
| 400 | 6.8 | 12.5x14 | 60 |
| 400 | 8.2 | 12.5x14 | 65 |
| 400 | 10 | 12.5x14 | 70 |
| 400 | 10 | 16x17 | 85 |
| 400 | 12 | 16x17 | 95 |
| 400 | 22 | 16x17 | 120 |
| 450 | 3.3 | 10x10.5 | 40 |
| 450 | 3.9 | 10x10.5 | 40 |
| 450 | 4.7 | 12.5x14 | 50 |
| 450 | 6.8 | 12.5x14 | 60 |
| 450 | 8.2 | 12.5x14 | 65 |
| 450 | 10 | 12.5x14 | 70 |
| 450 | 10 | 16x17 | 85 |
| 450 | 12 | 16x17 | 95 |
| 450 | 15 | 16x17 | 100 |
| 450 | 22 | 16x17 | 120 |

JV Series Long Life, High CV



Features

- ◆ Chip type long life capacitance in large case sizes
- ◆ Chip type with Endurance of 3000 hours at +105°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic insertion machine using carrier tape
- ◆ RoHS Compliant

Specifications

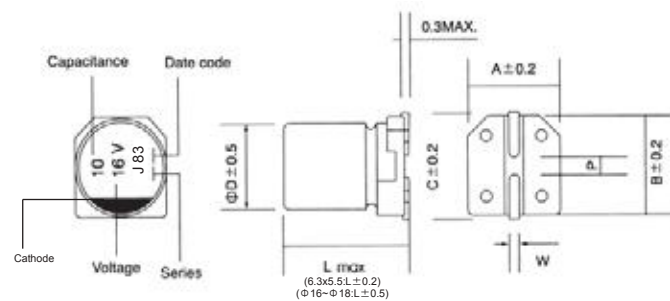
| Item | Performance Characteristics |
|---|---|
| Operating Temperature Range | -55~+105°C |
| Rated Voltage Range | 6.3~50 VDC |
| Capacitance Range | 0.1 to 1000 μF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 6.3 10 16 25 35 50 |
| | D.F.(%)max. 28 24 20 16 13 12 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max (at: 120Hz) |
| | Working voltage(VDC) 6.3 10 16 25 35 50 |
| | Z-25°C / Z+20°C 4 3 2 2 2 2 |
| | Z-40°C / Z+20°C 10 7 5 3 3 3 |
| Endurance | Test condition Duration time : 3000 Hrs Ambient temperature : +105°C Applied voltage : Rated DC working voltage |
| | After test requirement at +20°C Capacitance change : Within ±30% of initial value Dissipation factor : Less than 300% of specified value Leakage current : Less than specified value |
| Shelf Life | Test condition Duration time : 1000 Hrs Ambient temperature : +105°C Applied voltage : None |
| | After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |
| Resistance to soldering heat | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 30 seconds. |
| | Leakage current Less than specified value |
| | Capacitance change Within ±10% of initial value |
| | tan δ Less than specified value |

Multiplier for Ripple Current vs. Frequency

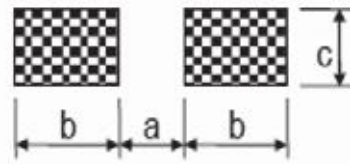
| CAP(μF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | ≥10K |
|-----------------------|--------|-----|------|------|------|
| 0.1 ≤ CAP ≤ 100 μF | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |
| 100 < CAP ≤ 1000 μF | 0.8 | 1.0 | 1.10 | 1.15 | 1.20 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x5.5 | 22 |
| 6.3 | 33 | 5x5.5 | 33 |
| 6.3 | 47 | 5x5.5 | 36 |
| 6.3 | 100 | 6.3x5.5 | 68 |
| 6.3 | 220 | 6.3x7.7 | 120 |
| 6.3 | 330 | 8x10.5 | 230 |
| 6.3 | 470 | 10x10.5 | 290 |
| 6.3 | 1000 | 10x10.5 | 360 |
| 10 | 22 | 5x5.5 | 30 |
| 10 | 33 | 5x5.5 | 35 |
| 10 | 47 | 6.3x5.5 | 52 |
| 10 | 100 | 6.3x7.7 | 81 |
| 10 | 220 | 8x10.5 | 142 |
| 10 | 330 | 10x10.5 | 280 |
| 10 | 470 | 10x10.5 | 305 |
| 16 | 10 | 4x5.5 | 18 |
| 16 | 22 | 5x5.5 | 31 |
| 16 | 33 | 6.3x5.5 | 48 |
| 16 | 47 | 6.3x5.5 | 51 |
| 16 | 100 | 6.3x7.7 | 83 |
| 16 | 220 | 10x10.5 | 222 |
| 16 | 330 | 10x10.5 | 305 |
| 16 | 470 | 10x10.5 | 330 |
| 25 | 4.7 | 4x5.5 | 16 |
| 25 | 10 | 4x5.5 | 26 |
| 25 | 22 | 6.3x5.5 | 44 |
| 25 | 33 | 6.3x5.5 | 50 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 47 | 6.3x7.7 | 66 |
| 25 | 100 | 8x10.5 | 118 |
| 25 | 220 | 10x10.5 | 300 |
| 25 | 330 | 10x10.5 | 395 |
| 25 | 470 | 10x10.5 | 470 |
| 35 | 4.7 | 4x5.5 | 16 |
| 35 | 10 | 5x5.5 | 27 |
| 35 | 22 | 6.3x5.5 | 45 |
| 35 | 33 | 6.3x7.7 | 58 |
| 35 | 47 | 8x10.5 | 93 |
| 35 | 100 | 10x10.5 | 155 |
| 35 | 220 | 10x10.5 | 340 |
| 35 | 330 | 10x10.5 | 420 |
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 3 |
| 50 | 0.33 | 4x5.5 | 3 |
| 50 | 0.47 | 4x5.5 | 5 |
| 50 | 1 | 4x5.5 | 8 |
| 50 | 2.2 | 4x5.5 | 12 |
| 50 | 3.3 | 4x5.5 | 17 |
| 50 | 4.7 | 5x5.5 | 22 |
| 50 | 10 | 6.3x5.5 | 33 |
| 50 | 22 | 6.3x7.7 | 58 |
| 50 | 33 | 8x10.5 | 140 |
| 50 | 47 | 8x10.5 | 170 |
| 50 | 100 | 10x10.5 | 300 |

MV Series Chip type ,Long Life, High CV



Features

- ◆ Chip type long life capacitance in large case sizes
- ◆ Chip type with Endurance of 5000 hours at +105°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic insertion machine using carrier tape
- ◆ Complied to the RoHS directive
- ◆ RoHS Compliant

Specifications

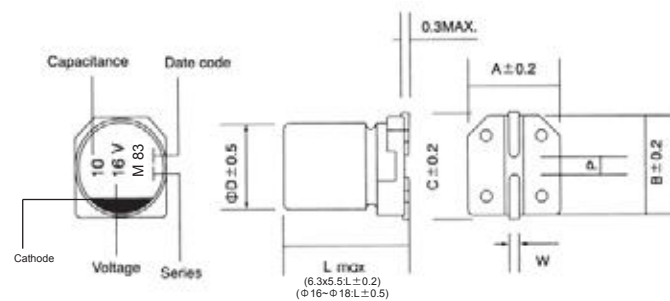
| Item | Performance Characteristics | | | | | | |
|--|---|-------------------------------------|----|----|----|----|----|
| Operating Temperature Range | -40~+105°C | | | | | | |
| Rated Voltage Range | 6.3~50 VDC | | | | | | |
| Capacitance Range | 0.1 to 1000 μF | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | D.F.(%)max. | 32 | 28 | 22 | 16 | 13 | 12 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max (at: 120Hz) | | | | | | |
| | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 |
| | Z-40°C / Z+20°C | 10 | 7 | 5 | 3 | 3 | 3 |
| Endurance | Test condition | | | | | | |
| | Duration time | : 5000 Hrs | | | | | |
| | Ambient temperature | : +105°C | | | | | |
| | Applied voltage | : Rated DC working voltage | | | | | |
| | After test requirement at +20°C | | | | | | |
| | Capacitance change | : Within ±30% of initial value | | | | | |
| | Dissipation factor | : Less than 300% of specified value | | | | | |
| | Leakage current | : Less than specified value | | | | | |
| Shelf Life | Test condition | | | | | | |
| | Duration time | : 1000 Hrs | | | | | |
| | Ambient temperature | : +105°C | | | | | |
| | Applied voltage | : None | | | | | |
| | After test requirement at +20°C | : Same limits as Endurance. | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | |
| Resistance to soldering heat | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 30 seconds. | | | | | | |
| | Leakage current | Less than specified value | | | | | |
| | Capacitance change | Within ±10% of initial value | | | | | |
| | tan δ | Less than specified value | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | ≥10K |
|-----------------------|--------|-----|------|------|------|
| 0.1 ≤ CAP ≤ 100 μF | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |
| 100 < CAP ≤ 1000 μF | 0.8 | 1.0 | 1.10 | 1.15 | 1.20 |

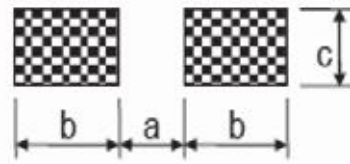
| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



SMD

Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x5.5 | 22 |
| 6.3 | 33 | 5x5.5 | 32 |
| 6.3 | 47 | 5x5.5 | 36 |
| 6.3 | 100 | 6.3x5.5 | 60 |
| 6.3 | 220 | 6.3x7.7 | 110 |
| 6.3 | 330 | 8x10.5 | 160 |
| 6.3 | 470 | 10x10.5 | 260 |
| 6.3 | 1000 | 10x10.5 | 340 |
| 10 | 22 | 5x5.5 | 28 |
| 10 | 33 | 5x5.5 | 34 |
| 10 | 47 | 6.3x5.5 | 48 |
| 10 | 100 | 6.3x7.7 | 79 |
| 10 | 220 | 8x10.5 | 140 |
| 10 | 330 | 8x10.5 | 210 |
| 10 | 330 | 10x10.5 | 240 |
| 10 | 470 | 8x10.5 | 250 |
| 10 | 470 | 10x10.5 | 280 |
| 10 | 1000 | 10x10.5 | 410 |
| 16 | 10 | 4x5.5 | 17 |
| 16 | 22 | 4x5.5 | 26 |
| 16 | 22 | 5x5.5 | 30 |
| 16 | 33 | 6.3x5.5 | 44 |
| 16 | 47 | 6.3x5.5 | 50 |
| 16 | 100 | 6.3x7.7 | 81 |
| 16 | 220 | 8x10.5 | 190 |
| 16 | 220 | 10x10.5 | 216 |
| 16 | 330 | 10x10.5 | 300 |
| 16 | 470 | 10x10.5 | 320 |
| 25 | 4.7 | 4x5.5 | 13 |
| 25 | 10 | 4x5.5 | 23 |
| 25 | 22 | 5x5.5 | 35 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 22 | 6.3x5.5 | 40 |
| 25 | 33 | 6.3x5.5 | 48 |
| 25 | 47 | 6.3x7.7 | 63 |
| 25 | 100 | 6.3x7.7 | 88 |
| 25 | 100 | 8x10.5 | 116 |
| 25 | 220 | 10x10.5 | 240 |
| 25 | 330 | 10x10.5 | 375 |
| 25 | 470 | 10x10.5 | 450 |
| 35 | 4.7 | 4x5.5 | 15 |
| 35 | 10 | 5x5.5 | 25 |
| 35 | 22 | 6.3x5.5 | 42 |
| 35 | 33 | 6.3x7.7 | 57 |
| 35 | 47 | 8x10.5 | 92 |
| 35 | 100 | 8x10.5 | 130 |
| 35 | 100 | 10x10.5 | 150 |
| 35 | 220 | 10x10.5 | 280 |
| 35 | 330 | 10x10.5 | 390 |
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 3 |
| 50 | 0.33 | 4x5.5 | 3 |
| 50 | 0.47 | 4x5.5 | 4 |
| 50 | 1 | 4x5.5 | 6 |
| 50 | 2.2 | 4x5.5 | 11 |
| 50 | 3.3 | 4x5.5 | 14 |
| 50 | 4.7 | 5x5.5 | 19 |
| 50 | 10 | 6.3x5.5 | 30 |
| 50 | 22 | 6.3x7.7 | 52 |
| 50 | 33 | 8x10.5 | 80 |
| 50 | 47 | 8x10.5 | 95 |
| 50 | 100 | 10x10.5 | 160 |

CV Series Chip type

Features

- ◆ Chip type ,Low impedance
- ◆ Chip type with load life of 7000 hours at +105°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic mounting machine using carrier tape
- ◆ Complied to the RoHS directive



Specifications

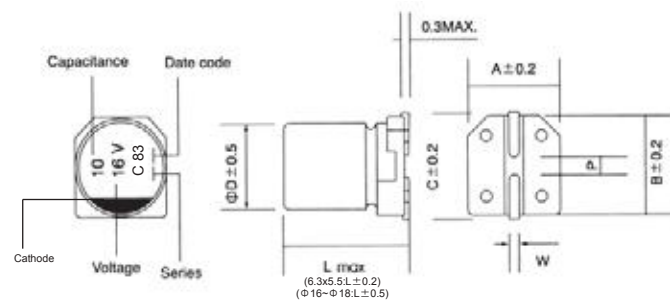
| Item | Performance Characteristics | | | | | | |
|--|---|-------------------------------------|----|----|----|----|----|
| Operating Temperature Range | -25 to +105°C | | | | | | |
| Rated Voltage Range | 6.3~50 VDC | | | | | | |
| Capacitance Range | 22 to 1500μF | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | D.F.(%)max. | 32 | 28 | 26 | 16 | 14 | 14 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max (at: 120Hz) | | | | | | |
| | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 |
| Endurance | Test condition | | | | | | |
| | Duration time | : 7000 Hrs | | | | | |
| | Ambient temperature | : +105°C | | | | | |
| | Applied voltage | : Rated DC working voltage | | | | | |
| | After test requirement at +20°C | | | | | | |
| | Capacitance change | : Within ±30% of initial value | | | | | |
| | Dissipation factor | : Less than 300% of specified value | | | | | |
| | Leakage current | : Less than specified value | | | | | |
| Shelf Life | Test condition | | | | | | |
| | Duration time | : 1000 Hrs | | | | | |
| | Ambient temperature | : +105°C | | | | | |
| | Applied voltage | : None | | | | | |
| | After test requirement at +20°C | : Same limits as Endurance. | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | |
| Resistance to soldering heat | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 30 seconds. | | | | | | |
| | Leakage current | Less than specified value | | | | | |
| | Capacitance change | Within ±10% of initial value | | | | | |
| | tan δ | Less than specified value | | | | | |

Multiplier for Ripple Current vs. Frequency

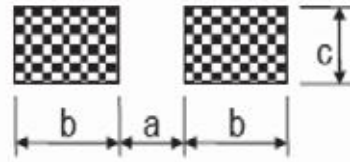
| CAP(μ F)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | 10K~100K |
|------------------------|--------|------|------|------|----------|
| 0.1 ≤ CAP ≤ 100 μ F | 0.53 | 0.67 | 0.8 | 0.87 | 1 |
| 100 < CAP ≤ 1000 μ F | 0.67 | 0.83 | 0.92 | 0.96 | 1 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|-------------|-------------|--------------|--|--------------------------------|
| 6.3 | 100 | 6.3x7.7 | 140 | 1.10 |
| 6.3 | 150 | 6.3x7.7 | 180 | 0.90 |
| 6.3 | 220 | 6.3x7.7 | 230 | 0.75 |
| 6.3 | 330 | 8x10.5 | 400 | 0.50 |
| 6.3 | 470 | 8x10.5 | 600 | 0.22 |
| 6.3 | 680 | 10x10.5 | 700 | 0.20 |
| 6.3 | 1000 | 12.5x14 | 1100 | 0.10 |
| 6.3 | 1500 | 16x17 | 1500 | 0.08 |
| 10 | 100 | 6.3x7.7 | 140 | 1.10 |
| 10 | 150 | 6.3x7.7 | 180 | 0.90 |
| 10 | 220 | 6.3x7.7 | 230 | 0.75 |
| 10 | 330 | 8x10.5 | 400 | 0.50 |
| 10 | 470 | 8x10.5 | 600 | 0.22 |
| 10 | 680 | 10x10.5 | 700 | 0.20 |
| 10 | 1000 | 12.5x14 | 1100 | 0.10 |
| 10 | 1500 | 16x17 | 1500 | 0.08 |
| 16 | 100 | 6.3x7.7 | 140 | 1.10 |
| 16 | 150 | 8x10.5 | 250 | 0.60 |
| 16 | 220 | 8x10.5 | 280 | 0.40 |
| 16 | 330 | 8x10.5 | 600 | 0.22 |
| 16 | 470 | 8x10.5 | 600 | 0.22 |
| 16 | 470 | 10x10.5 | 850 | 0.16 |
| 16 | 680 | 12.5x14 | 1100 | 0.10 |
| 16 | 1000 | 16x17 | 1500 | 0.08 |
| 25 | 22 | 6.3x7.7 | 95 | 1.50 |
| 25 | 33 | 6.3x7.7 | 120 | 1.30 |
| 25 | 47 | 6.3x7.7 | 140 | 1.10 |
| 25 | 100 | 8x10.5 | 280 | 0.70 |
| 25 | 150 | 8x10.5 | 380 | 0.60 |
| 25 | 220 | 8x10.5 | 600 | 0.22 |
| 25 | 330 | 8x10.5 | 650 | 0.20 |
| 25 | 390 | 10x10.5 | 750 | 0.19 |
| 25 | 470 | 10x10.5 | 850 | 0.16 |
| 25 | 680 | 12.5x14 | 1100 | 0.10 |
| 25 | 1000 | 16x17 | 1500 | 0.08 |
| 35 | 47 | 6.3x7.7 | 230 | 1.00 |
| 35 | 100 | 8x10.5 | 600 | 0.22 |
| 35 | 220 | 10x10.5 | 850 | 0.16 |
| 35 | 330 | 12.5x14 | 1100 | 0.10 |
| 35 | 470 | 16x17 | 1500 | 0.08 |
| 50 | 47 | 8x10.5 | 350 | 0.53 |
| 50 | 100 | 8x10.5 | 350 | 0.53 |
| 50 | 100 | 10x10.5 | 400 | 0.51 |
| 50 | 150 | 10x10.5 | 450 | 0.48 |
| 50 | 220 | 12.5x14 | 850 | 0.4 |
| 50 | 330 | 16x17 | 1100 | 0.3 |

NV Series

Features

- ◆ 85°C Non-polarized
- ◆ Reflow soldering is available
- ◆ Available for high density mounting
- ◆ RoHS Compliant



Specifications

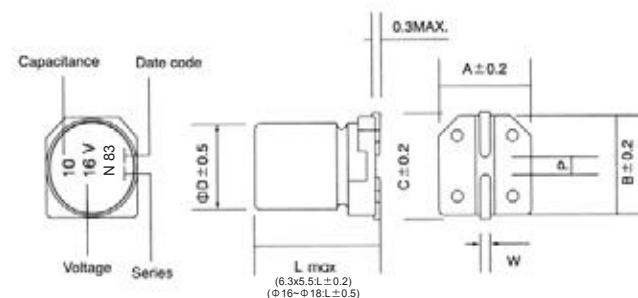
| Item | Performance Characteristics | | | | | | |
|--|---|---|----|----|----|----|----|
| Operating Temperature Range | -40~ +85°C | | | | | | |
| Rated Voltage Range | 6.3~50 VDC | | | | | | |
| Capacitance Range | 0.1 to 560 μF | | | | | | |
| Capacitance Tolerance | ±20%(120Hz, +20°C) | | | | | | |
| Leakage Current (+20°C, max.) | 0.05 CV or 10 (μA) After 2 minutes, whichever is greater measured with rated working voltage applied | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | D.F.(%)max | 24 | 20 | 17 | 17 | 15 | 15 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | |
| | Rated voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 |
| | Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 |
| Endurance | Test conditions | | | | | | |
| | Duration time | :2000 Hrs | | | | | |
| | Ambient temperature | :+85°C | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | |
| | After test requirement at +20°C: | | | | | | |
| | Capacitance change | :Within ±25% of the initial value | | | | | |
| | Dissipation factor | :Not more than 200% of specified value | | | | | |
| | Leakage current | :Not more than the specified value | | | | | |
| Shelf Life | Test conditions | | | | | | |
| | Duration time | :1000 Hrs | | | | | |
| | Ambient temperature | :+85°C | | | | | |
| | Applied voltage | :None | | | | | |
| | After test requirement at +20°C | :Same limits as Endurance. | | | | | |
| | Pre-treatment for measurements | :shall be conducted after application of DC working voltage for 30 minutes. | | | | | |
| Resistance to soldering heat | The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed under. | | | | | | |
| | Leakage current | Less than specified value | | | | | |
| | Capacitance change | Within ±10% of initial value | | | | | |
| | tan δ | Less than specified value | | | | | |

Multiplier for Ripple Current vs. Frequency

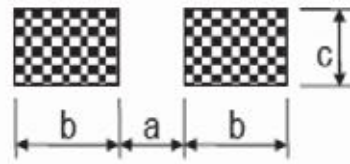
| Frequency(Hz) | 60(50) | 120 | 500 | 1K | ≥10K |
|---------------|--------|-----|------|------|------|
| Multiplier | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 6.3 | 10 | 4x5.5 | 15 |
| 6.3 | 22 | 4x5.5 | 28 |
| 6.3 | 22 | 5x5.5 | 32 |
| 6.3 | 33 | 5x5.5 | 37 |
| 6.3 | 47 | 6.3x5.5 | 45 |
| 6.3 | 100 | 6.3x7.7 | 65 |
| 6.3 | 100 | 8x6.5 | 70 |
| 6.3 | 220 | 8x10.5 | 120 |
| 6.3 | 330 | 8x10.5 | 160 |
| 6.3 | 470 | 10x10.5 | 190 |
| 6.3 | 560 | 10x10.5 | 220 |
| 10 | 10 | 4x5.5 | 17 |
| 10 | 22 | 5x5.5 | 33 |
| 10 | 22 | 6.3x5.5 | 37 |
| 10 | 33 | 6.3x5.5 | 41 |
| 10 | 47 | 6.3x5.5 | 50 |
| 10 | 100 | 6.3x7.7 | 75 |
| 10 | 100 | 8x6.5 | 80 |
| 10 | 220 | 8x10.5 | 150 |
| 10 | 330 | 10x10.5 | 180 |
| 16 | 3.3 | 4x5.5 | 12 |
| 16 | 4.7 | 4x5.5 | 12 |
| 16 | 10 | 4x5.5 | 23 |
| 16 | 10 | 5x5.5 | 23 |
| 16 | 22 | 5x5.5 | 37 |
| 16 | 22 | 6.3x5.5 | 37 |
| 16 | 33 | 6.3x5.5 | 49 |
| 16 | 47 | 6.3x7.7 | 51 |
| 16 | 47 | 8x6.5 | 55 |
| 16 | 100 | 8x10.5 | 100 |
| 16 | 220 | 10x10.5 | 170 |
| 25 | 3.3 | 4x5.5 | 12 |
| 25 | 3.3 | 5x5.5 | 12 |
| 25 | 4.7 | 4x5.5 | 16 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 25 | 4.7 | 5x5.5 | 16 |
| 25 | 10 | 5x5.5 | 27 |
| 25 | 10 | 6.3x5.5 | 27 |
| 25 | 22 | 6.3x5.5 | 40 |
| 25 | 33 | 6.3x7.7 | 51 |
| 25 | 33 | 8x6.5 | 55 |
| 25 | 47 | 6.3x7.7 | 56 |
| 25 | 47 | 8x6.5 | 60 |
| 25 | 100 | 8x10.5 | 130 |
| 35 | 2.2 | 4x5.5 | 8.4 |
| 35 | 3.3 | 4x5.5 | 16 |
| 35 | 3.3 | 5x5.5 | 16 |
| 35 | 4.7 | 4x5.5 | 18 |
| 35 | 4.7 | 5x5.5 | 18 |
| 35 | 10 | 6.3x5.5 | 29 |
| 35 | 22 | 6.3x5.5 | 45 |
| 35 | 33 | 8x10.5 | 58 |
| 35 | 47 | 8x10.5 | 64 |
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 2 |
| 50 | 0.33 | 4x5.5 | 2.8 |
| 50 | 0.47 | 4x5.5 | 4 |
| 50 | 1 | 4x5.5 | 8.4 |
| 50 | 2.2 | 4x5.5 | 13 |
| 50 | 2.2 | 5x5.5 | 13 |
| 50 | 3.3 | 4x5.5 | 17 |
| 50 | 3.3 | 5x5.5 | 17 |
| 50 | 4.7 | 5x5.5 | 20 |
| 50 | 4.7 | 6.3x5.5 | 20 |
| 50 | 10 | 6.3x5.5 | 32 |
| 50 | 22 | 8x10.5 | 60 |
| 50 | 33 | 10x10.5 | 75 |
| 50 | 47 | 10x10.5 | 100 |

KV Series

Features

- ◆ 85°C Low leakage current case diameter $\phi 4 \sim \phi 8$
- ◆ Reflow soldering is available
- ◆ Available for high density mounting
- ◆ RoHS Compliant



Specifications

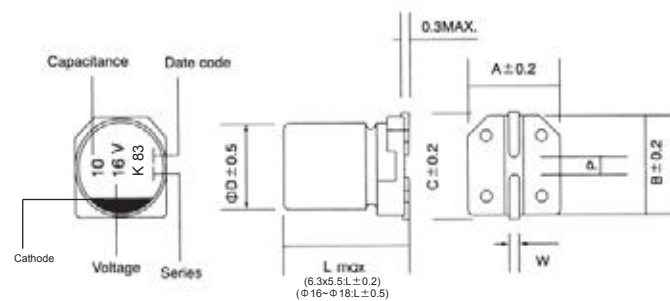
| Item | Performance Characteristics | | | | | | |
|--|---|---|----|----|----|----|----|
| Operating Temperature Range | -40~ +85°C | | | | | | |
| Rated Voltage Range | 6.3~50 VDC | | | | | | |
| Capacitance Range | 0.1 to 330 μ F | | | | | | |
| Capacitance Tolerance | $\pm 20\%$ (120Hz,+20°C) | | | | | | |
| Leakage Current (+20°C,max.) | I \leq 0.002 CV or 0.4 (μ A) After 2 minutes, whichever is greater measured with rated working voltage applied | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | D.F.(%)max | 26 | 22 | 18 | 16 | 14 | 12 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | |
| | Rated voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 |
| | Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 |
| Endurance | Test conditions | | | | | | |
| | Duration time | :1000 Hrs | | | | | |
| | Ambient temperature | :+85°C | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | |
| | After test requirement at +20°C: | | | | | | |
| | Capacitance change | :Within $\pm 25\%$ of the initial value | | | | | |
| Dissipation factor | :Not more than 200% of specified value | | | | | | |
| Leakage current | :Not more than the specified value | | | | | | |
| Shelf Life | Test conditions | | | | | | |
| | Duration time | :1000 Hrs | | | | | |
| | Ambient temperature | :+85°C | | | | | |
| | Applied voltage | :None | | | | | |
| | After test requirement at +20°C : Same limits as Endurance. | | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | |
| Resistance to soldering heat | The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed under. | | | | | | |
| | Leakage current | Less than specified value | | | | | |
| | Capacitance change | Within $\pm 10\%$ of initial value | | | | | |
| | tan δ | Less than specified value | | | | | |

Multiplier for Ripple Current vs. Frequency

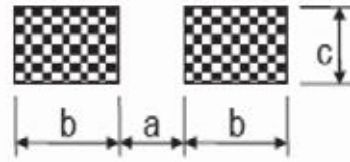
| CAP(μ F)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | $\geq 10K$ |
|-------------------------------|--------|-----|------|------|------------|
| $0.1 \leq CAP \leq 100 \mu F$ | 0.8 | 1.0 | 1.20 | 1.30 | 1.50 |
| $100 < CAP \leq 330 \mu F$ | 0.8 | 1.0 | 1.10 | 1.15 | 1.20 |

| ϕD | L | A | B | C | W | P |
|----------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 10 | 4x5.5 | 15 |
| 6.3 | 22 | 4x5.5 | 28 |
| 6.3 | 33 | 4x5.5 | 37 |
| 6.3 | 47 | 4x5.5 | 45 |
| 6.3 | 100 | 5x5.5 | 70 |
| 6.3 | 220 | 6.3x7.7 | 102 |
| 6.3 | 220 | 8x6.5 | 110 |
| 6.3 | 330 | 6.3x7.7 | 155 |
| 6.3 | 330 | 8x6.5 | 170 |
| 10 | 10 | 4x5.5 | 23 |
| 10 | 22 | 4x5.5 | 33 |
| 10 | 33 | 5x5.5 | 41 |
| 10 | 47 | 6.3x5.5 | 52 |
| 10 | 100 | 6.3x7.7 | 75 |
| 10 | 100 | 8x6.5 | 80 |
| 10 | 220 | 6.3x7.7 | 125 |
| 10 | 220 | 8x6.5 | 135 |
| 16 | 4.7 | 4x5.5 | 10 |
| 16 | 10 | 4x5.5 | 23 |
| 16 | 22 | 5x5.5 | 37 |
| 16 | 33 | 6.3x5.5 | 49 |
| 16 | 47 | 6.3x5.5 | 58 |
| 16 | 100 | 6.3x7.7 | 85 |
| 16 | 100 | 8x6.5 | 92 |
| 25 | 3.3 | 4x5.5 | 10 |
| 25 | 4.7 | 4x5.5 | 16 |
| 25 | 10 | 4x5.5 | 27 |
| 25 | 22 | 5x5.5 | 42 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 33 | 6.3x5.5 | 52 |
| 25 | 47 | 6.3x7.7 | 65 |
| 25 | 47 | 8x6.5 | 70 |
| 25 | 100 | 6.3x7.7 | 102 |
| 25 | 100 | 8x6.5 | 110 |
| 35 | 2.2 | 4x5.5 | 8 |
| 35 | 3.3 | 4x5.5 | 15 |
| 35 | 4.7 | 4x5.5 | 18 |
| 35 | 10 | 6.3x5.5 | 29 |
| 35 | 22 | 6.3x5.5 | 46 |
| 35 | 33 | 6.3x7.7 | 58 |
| 35 | 33 | 8x6.5 | 62 |
| 35 | 47 | 6.3x7.7 | 75 |
| 35 | 47 | 8x6.5 | 80 |
| 50 | 0.1 | 4x5.5 | 1 |
| 50 | 0.22 | 4x5.5 | 2 |
| 50 | 0.33 | 4x5.5 | 3 |
| 50 | 0.47 | 4x5.5 | 4 |
| 50 | 1 | 4x5.5 | 8 |
| 50 | 2.2 | 4x5.5 | 13 |
| 50 | 3.3 | 4x5.5 | 17 |
| 50 | 4.7 | 6.3x5.5 | 20 |
| 50 | 10 | 6.3x5.5 | 33 |
| 50 | 22 | 6.3x7.7 | 48 |
| 50 | 22 | 8x6.5 | 52 |
| 50 | 33 | 6.3x7.7 | 66 |
| 50 | 33 | 8x6.5 | 71 |

ZV Series

Features

- ◆ Low impedance 100 KHz
- ◆ Reflow soldering is available
- ◆ Available for high density mounting
- ◆ Endurance 2000~5000 hrs at 105°C
- ◆ RoHS Compliant



Specifications

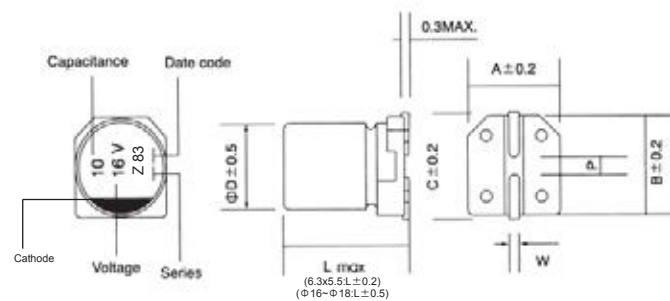
| Item | Performance Characteristics | | | | | | |
|--|---|-----------------------------------|----|----|----|----|----|
| Operating Temperature Range | -55~ +105°C | | | | | | |
| Rated Voltage Range | 6.3~50 VDC | | | | | | |
| Capacitance Range | 2.2 to 6800 μF | | | | | | |
| Capacitance Tolerance | ±20%(120Hz, +20°C) | | | | | | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | D.F.(%)max | 26 | 19 | 16 | 14 | 14 | 12 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | |
| | Rated voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 |
| | Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 |
| Endurance | Test conditions | | | | | | |
| | Duration time | :2000 Hrs | | | | | |
| | Ambient temperature | :+105°C | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | |
| | After test requirement at +105°C: | | | | | | |
| | Capacitance change | :Within ±25% of the initial value | | | | | |
| Dissipation factor | :Less than 200% of specified value | | | | | | |
| Leakage current | :Less than the initial specified value | | | | | | |
| Shelf Life | Test conditions | | | | | | |
| | Duration time | :1000 Hrs | | | | | |
| | Ambient temperature | :+105°C | | | | | |
| | Applied voltage | :None | | | | | |
| | After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | |
| Resistance to soldering heat | The capacitors shall be kept on the hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed under. | | | | | | |
| | Leakage current | Less than specified value | | | | | |
| | Capacitance change | Within ±10% of initial value | | | | | |
| | tan δ | Less than specified value | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | 10K | 50K-100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mAmps/105°C /100KHz) | Max ESR 20°C 100KHz(Ω) |
|----------|----------|-----------|--------------------------------------|------------------------|
| 25 | 470 | 10x10.5 | 570 | 0.18 |
| 25 | 1000 | 12.5x14 | 900 | 0.15 |
| 25 | 2200 | 16x17 | 1030 | 0.11 |
| 35 | 2.2 | 4x5.5 | 53 | 5 |
| 35 | 3.3 | 4x5.5 | 53 | 5 |
| 35 | 4.7 | 4x5.5 | 53 | 5 |
| 35 | 6.8 | 4x5.5 | 65 | 4 |
| 35 | 6.8 | 5x5.5 | 85 | 3 |
| 35 | 10 | 4x5.5 | 90 | 4 |
| 35 | 10 | 5x5.5 | 98 | 3 |
| 35 | 10 | 6.3x5.5 | 110 | 2 |
| 35 | 15 | 5x5.5 | 120 | 2 |
| 35 | 15 | 6.3x5.5 | 140 | 2 |
| 35 | 22 | 5x5.5 | 140 | 1 |
| 35 | 22 | 6.3x5.5 | 150 | 1 |
| 35 | 27 | 6.3x5.5 | 165 | 1 |
| 35 | 33 | 6.3x5.5 | 185 | 1 |
| 35 | 33 | 6.3x7.7 | 210 | 1 |
| 35 | 33 | 8x6.5 | 230 | 1 |
| 35 | 47 | 6.3x5.5 | 200 | 1 |
| 35 | 47 | 6.3x7.7 | 220 | 1 |
| 35 | 47 | 8x6.5 | 240 | 1 |
| 35 | 56 | 6.3x7.7 | 230 | 1 |
| 35 | 68 | 6.3x7.7 | 240 | 0.7 |
| 35 | 68 | 8x6.5 | 250 | 0.68 |
| 35 | 100 | 6.3x7.7 | 270 | 0.67 |
| 35 | 100 | 8x10.5 | 350 | 0.50 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mAmps/105°C /100KHz) | Max ESR 20°C 100KHz(Ω) |
|----------|----------|-----------|--------------------------------------|------------------------|
| 35 | 150 | 8x10.5 | 430 | 0.45 |
| 35 | 220 | 8x10.5 | 450 | 0.25 |
| 35 | 330 | 10x10.5 | 570 | 0.23 |
| 35 | 470 | 12.5x14 | 900 | 0.15 |
| 35 | 680 | 12.5x14 | 900 | 0.15 |
| 35 | 1500 | 16x17 | 1030 | 0.11 |
| 50 | 2.2 | 4x5.5 | 53 | 5.00 |
| 50 | 3.3 | 4x5.5 | 53 | 5.000 |
| 50 | 4.7 | 4x5.5 | 53 | 5.000 |
| 50 | 6.8 | 5x5.5 | 65 | 4.00 |
| 50 | 10 | 5x5.5 | 90 | 3.50 |
| 50 | 10 | 6.3x5.5 | 100 | 2.50 |
| 50 | 15 | 6.3x5.5 | 130 | 1.80 |
| 50 | 22 | 6.3x5.5 | 140 | 1.50 |
| 50 | 27 | 6.3x7.7 | 160 | 1.35 |
| 50 | 33 | 6.3x7.7 | 170 | 0.80 |
| 50 | 33 | 8x6.5 | 180 | 0.75 |
| 50 | 47 | 6.3x7.7 | 200 | 0.79 |
| 50 | 47 | 8x6.5 | 220 | 0.72 |
| 50 | 56 | 8x10.5 | 260 | 0.680 |
| 50 | 68 | 8x10.5 | 300 | 0.60 |
| 50 | 100 | 8x10.5 | 310 | 0.6 |
| 50 | 150 | 10x10.5 | 540 | 0.28 |
| 50 | 220 | 10x10.5 | 570 | 0.26 |
| 50 | 330 | 12.5x14 | 620 | 0.25 |
| 50 | 1000 | 16x17 | 820 | 0.20 |

DV Series Chip type

Features

- ◆ Chip type ,Low impedance
- ◆ Chip type with Endurance of 2000~5000 hours at +105°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic mounting machine using carrier tape
- ◆ Complied to the RoHS directive



Specifications

| Item | Performance Characteristics | | | | | | | | | |
|---|---|------------------------------|----|----|----|----|----|----|----|-----|
| Operating Temperature Range | -55~ +105°C | | | | | | | | | |
| Rated Voltage Range | 6.3~100 VDC | | | | | | | | | |
| Capacitance Range | 1 to 6800 μ F | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (μ A) After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
| | D.F.(%)max | 24 | 19 | 16 | 14 | 14 | 12 | 10 | 9 | 8 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | |
| | Rated voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
| | Z-25°C / Z+20°C | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 | 3 | 3 | 3 |
| Endurance | Test conditions | | | | | | | | | |
| | Duration time | :2000 Hrs (φ 12.5~16:5000H) | | | | | | | | |
| Ambient temperature | :+105°C | | | | | | | | | |
| Applied voltage | :Rated DC working voltage | | | | | | | | | |
| | After test requirement at +20°C : | | | | | | | | | |
| Capacitance change | :Within ±30% of initial value | | | | | | | | | |
| Dissipation factor | :Less than 300% of specified value | | | | | | | | | |
| Leakage current | :Less than specified value | | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | | |
| Ambient temperature | :+105°C | | | | | | | | | |
| Applied voltage | :None | | | | | | | | | |
| | After test requirement at +20°C : Same limits as Endurance. | | | | | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | |
| Resistance to soldering heat | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 30 seconds. | | | | | | | | | |
| | Leakage current | Less than specified value | | | | | | | | |
| | Capacitance change | Within ±10% of initial value | | | | | | | | |
| | tan δ | Less than specified value | | | | | | | | |

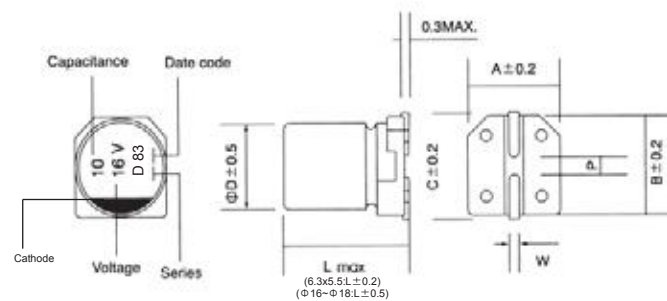
SMD

Multiplier for Ripple Current vs. Frequency

| CAP(μ F)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | 10K | 50K-100K |
|------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |

| φ D | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR 20°C 100KHz(Ω) |
|----------|----------|-----------|---------------------------------------|------------------------|
| 35 | 22 | 5x5.5 | 155 | 1.10 |
| 35 | 22 | 6.3x5.5 | 170 | 1.05 |
| 35 | 27 | 6.3x5.5 | 210 | 0.60 |
| 35 | 33 | 6.3x5.5 | 230 | 0.54 |
| 35 | 33 | 8x6.5 | 260 | 0.51 |
| 35 | 47 | 6.3x5.5 | 240 | 0.53 |
| 35 | 47 | 8x6.5 | 250 | 0.49 |
| 35 | 56 | 6.3x7.7 | 250 | 0.49 |
| 35 | 68 | 6.3x7.7 | 265 | 0.40 |
| 35 | 100 | 6.3x7.7 | 300 | 0.38 |
| 35 | 100 | 8x10.5 | 420 | 0.28 |
| 35 | 150 | 8x10.5 | 510 | 0.24 |
| 35 | 220 | 8x10.5 | 570 | 0.21 |
| 35 | 330 | 10x10.5 | 650 | 0.15 |
| 35 | 470 | 12.5x14 | 1100 | 0.08 |
| 35 | 680 | 12.5x14 | 1100 | 0.080 |
| 35 | 1500 | 16x17 | 1250 | 0.052 |
| 50 | 1 | 4x5.5 | 55 | 4.50 |
| 50 | 2.2 | 4x5.5 | 55 | 4.50 |
| 50 | 3.3 | 4x5.5 | 55 | 4.50 |
| 50 | 4.7 | 4x5.5 | 55 | 4.50 |
| 50 | 6.8 | 5x5.5 | 75 | 3.80 |
| 50 | 10 | 5x5.5 | 95 | 2.80 |
| 50 | 10 | 6.3x5.5 | 130 | 2.20 |
| 50 | 15 | 6.3x5.5 | 140 | 1.60 |
| 50 | 22 | 6.3x5.5 | 150 | 1.30 |
| 50 | 27 | 6.3x7.7 | 180 | 1.20 |
| 50 | 33 | 6.3x7.7 | 190 | 0.71 |
| 50 | 33 | 8x6.5 | 200 | 0.70 |
| 50 | 47 | 6.3x7.7 | 230 | 0.70 |
| 50 | 47 | 8x6.5 | 240 | 0.69 |
| 50 | 56 | 8x10.5 | 300 | 0.52 |
| 50 | 68 | 8x10.5 | 320 | 0.50 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR 20°C 100KHz(Ω) |
|----------|----------|-----------|---------------------------------------|------------------------|
| 50 | 100 | 8x10.5 | 350 | 0.46 |
| 50 | 150 | 10x10.5 | 600 | 0.25 |
| 50 | 220 | 10x10.5 | 650 | 0.23 |
| 50 | 330 | 12.5x14 | 800 | 0.210 |
| 50 | 1000 | 16x17 | 1000 | 0.078 |
| 63 | 4.7 | 5x5.5 | 45 | 2.80 |
| 63 | 10 | 6.3x5.5 | 80 | 1.60 |
| 63 | 22 | 6.3x7.7 | 150 | 1.10 |
| 63 | 33 | 8x10.5 | 230 | 0.80 |
| 63 | 47 | 8x10.5 | 260 | 0.55 |
| 63 | 68 | 10x10.5 | 380 | 0.40 |
| 63 | 100 | 10x10.5 | 400 | 0.28 |
| 63 | 100 | 12.5x14 | 520 | 0.26 |
| 63 | 150 | 12.5x14 | 780 | 0.20 |
| 63 | 220 | 12.5x14 | 810 | 0.18 |
| 63 | 470 | 16x17 | 1390 | 0.085 |
| 80 | 4.7 | 6.3x5.5 | 50 | 3.80 |
| 80 | 10 | 6.3x7.7 | 70 | 3.0 |
| 80 | 22 | 6.3x7.7 | 110 | 1.70 |
| 80 | 33 | 8x10.5 | 200 | 1.10 |
| 80 | 47 | 10x10.5 | 320 | 0.90 |
| 80 | 68 | 10x10.5 | 490 | 0.65 |
| 80 | 100 | 12.5x14 | 580 | 0.42 |
| 80 | 220 | 16x17 | 930 | 0.26 |
| 100 | 10 | 6.3x7.7 | 65 | 4.00 |
| 100 | 22 | 8x10.5 | 110 | 2.00 |
| 100 | 33 | 10x10.5 | 180 | 1.30 |
| 100 | 47 | 10x10.5 | 370 | 1.00 |
| 100 | 47 | 12.5x14 | 480 | 0.95 |
| 100 | 68 | 12.5x14 | 580 | 0.60 |
| 100 | 100 | 12.5x14 | 620 | 0.50 |
| 100 | 220 | 16x17 | 1050 | 0.28 |

RV Series Chip type

Features

- ◆ Chip type ,Low impedance
- ◆ Chip type with Endurance of 5000 hours at +105°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic mounting machine using carrier tape
- ◆ Complied to the RoHS directive



Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|---|--|----------------------------------|------------------------------|----|----|----|----|----|-----|---------|------|-----|
| Operating Temperature Range | -55 to +105°C | -40 to +105°C | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 100 VDC | 160~450 VDC | | | | | | | | | | |
| Capacitance Range | 1.0 to 6800µF | 2.2 to 68µF | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (µA) whichever is greater (2 minutes) | I ≤ 0.04 CV+100 µA (1 minute) | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working voltage(VDC) | | | | | | | | | | | |
| | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~250 | >250 | |
| Low Temperature Characteristics (Impedance ratio at 120Hz) | D.F.(%)max | | | | | | | | | | | |
| | 22 | 19 | 16 | 14 | 14 | 12 | 10 | 9 | 8 | 15 | 20 | |
| | Impedance ratio max | | | | | | | | | | | |
| | Rated voltage(VDC) | | | | | | | | | | | |
| | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~250 | 400 | 450 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 6 | 6 |
| Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 | 3 | 3 | 6 | 10 | 15 | |
| Endurance | Test condition | | | | | | | | | | | |
| | Duration time : 5000hours (2000 hours for φD ≤ 6.3) Ambient temperature : +105°C Applied voltage : Rated DC working voltage | | | | | | | | | | | |
| Shelf Life | After test requirement at +20°C | | | | | | | | | | | |
| | Capacitance change : Within ±30% of initial value Dissipation factor : Less than 300% of specified value Leakage current : Less than specified value | | | | | | | | | | | |
| Resistance to soldering heat | Test condition | | | | | | | | | | | |
| | Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | |
| | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them at 250°C for 30 seconds. | | | | | | | | | | | |
| | Leakage current | | Less than specified value | | | | | | | | | |
| | Capacitance change | | Within ±10% of initial value | | | | | | | | | |
| tan δ | | Less than specified value | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

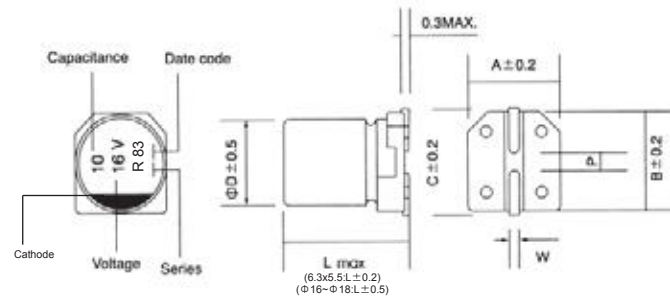
< 160V

| CAP(µF)\Frequency(Hz) | 60(50) | 120 | 500 | 1K | 10K | 50K-100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |

≥ 160V

| Frequency(Hz) | 60(50) | 120 | 400 | 1K | 10K | 50K-100K |
|---------------|--------|------|------|------|------|----------|
| Multiplier | 0.80 | 1.00 | 1.25 | 1.40 | 1.55 | 1.6 |

Diagram of Dimensions:(unit:mm)



| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

SMD

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /120Hz) | Max ESR 20°C 100KHz(Ω) |
|----------|----------|-----------|--|------------------------|
| 80 | 10 | 6.3x7.7 | 60 | 2.60 |
| 80 | 22 | 8x10.5 | 130 | 1.70 |
| 80 | 33 | 8x10.5 | 140 | 1.60 |
| 80 | 47 | 10x10.5 | 210 | 0.70 |
| 80 | 68 | 12.5x14 | 500 | 0.50 |
| 80 | 100 | 12.5x14 | 550 | 0.45 |
| 80 | 150 | 12.5x14 | 600 | 0.42 |
| 80 | 220 | 16x17 | 700 | 0.38 |
| 80 | 330 | 16x17 | 800 | 0.32 |
| 100 | 10 | 6.3x7.7 | 65 | 3.90 |
| 100 | 22 | 8x10.5 | 130 | 1.90 |
| 100 | 33 | 10x10.5 | 200 | 1.25 |
| 100 | 47 | 10x10.5 | 390 | 0.95 |
| 100 | 47 | 12.5x14 | 500 | 0.90 |
| 100 | 68 | 12.5x14 | 600 | 0.57 |
| 100 | 100 | 12.5x14 | 640 | 0.48 |
| 100 | 100 | 16x17 | 800 | 0.45 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) |
|----------|----------|-----------|--|
| 160 | 10 | 8x10.5 | 55 |
| 160 | 18 | 10x10.5 | 65 |
| 160 | 22 | 10x10.5 | 70 |
| 160 | 27 | 12.5x14 | 85 |
| 160 | 33 | 12.5x14 | 95 |
| 160 | 47 | 16x17 | 260 |
| 160 | 68 | 16x17 | 300 |
| 200 | 10 | 12.5x14 | 80 |
| 200 | 22 | 12.5x14 | 105 |
| 200 | 27 | 12.5x14 | 115 |
| 200 | 33 | 16x17 | 220 |
| 200 | 47 | 16x17 | 260 |
| 250 | 4.7 | 8x10.5 | 50 |
| 250 | 4.7 | 12.5x14 | 65 |
| 250 | 6.8 | 10x10.5 | 60 |
| 250 | 6.8 | 12.5x14 | 78 |
| 250 | 10 | 10x10.5 | 75 |
| 250 | 15 | 12.5x14 | 120 |
| 250 | 22 | 16x17 | 180 |
| 400 | 2.2 | 8x10.5 | 25 |
| 400 | 3.3 | 8x10.5 | 30 |
| 400 | 3.9 | 10x10.5 | 35 |
| 400 | 4.7 | 10x10.5 | 40 |
| 400 | 6.8 | 12.5x14 | 60 |
| 400 | 8.2 | 12.5x14 | 65 |
| 400 | 10 | 12.5x14 | 70 |
| 400 | 12 | 16x17 | 95 |
| 400 | 22 | 16x17 | 120 |
| 450 | 3.3 | 10x10.5 | 40 |
| 450 | 3.9 | 10x10.5 | 40 |
| 450 | 4.7 | 12.5x14 | 50 |
| 450 | 6.8 | 12.5x14 | 60 |
| 450 | 8.2 | 12.5x14 | 65 |
| 450 | 10 | 12.5x14 | 70 |
| 450 | 12 | 16x17 | 90 |
| 450 | 15 | 16x17 | 100 |

TV Series High Temperature 125°C

Features

- ◆ Chip type ,operating temperature range-40 to +125°C
- ◆ Designed for surface mounting on high density PC board
- ◆ Applicable to automatic insertion machine using carrier tape
- ◆ RoHS Compliant



Specifications

| Item | Performance Characteristics | | | | | | | | | | |
|--|--|---|----|----|----|----|-----|-----|-----|-----|-----|
| Operating Temperature Range | -40~+125°C | | | | | | | | | | |
| Rated Voltage Range | 10~100 VDC | 150~450 VDC | | | | | | | | | |
| Capacitance Range | 10 to 330 μF | 1 to 18 μF | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.03 CV or 3 (μA) whichever is greater (1 minutes) | I ≤ 0.04 CV+100 μA (1 minute) | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 10 16 25 35 50 160~200 250~400 450 | | | | | | | | | |
| | D.F.(%)max. | 32 24 21 18 18 20 25 30 | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | |
| | Working voltage(VDC) | 10 | 16 | 25 | 35 | 50 | 160 | 200 | 250 | 400 | 450 |
| | Z-25°C / Z+20°C | 12 | 8 | 6 | 4 | 4 | 8 | 8 | 8 | 12 | 15 |
| Endurance | Test condition | | | | | | | | | | |
| | Duration time | : 1000 Hrs (Φ8X6.5mm & 6.3X7.7mm) ; 2000Hrs (Φ8X10.5mm & 10X10.5mm) | | | | | | | | | |
| | Ambient temperature | :+125°C | | | | | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | | | | | |
| | After test requirement at +20°C | | | | | | | | | | |
| | Capacitance change | : Within ±30% of initial value | | | | | | | | | |
| | Dissipation factor | : Less than 300% of specified value | | | | | | | | | |
| | Leakage current | : Less than specified value | | | | | | | | | |
| Shelf Life | Test condition | | | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | | | |
| | Ambient temperature | :+125°C | | | | | | | | | |
| | Applied voltage | :None | | | | | | | | | |
| | After test requirement at +20°C | :Same limits as Endurance. | | | | | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | |
| Resistance to soldering heat | The following specifications shall be satisfied when the capacitors are restored to20°C after exposing them at 250°C for 30 seconds. | | | | | | | | | | |
| | Leakage current | Less than specified value | | | | | | | | | |
| | Capacitance change | Within ± 10% of initial value | | | | | | | | | |
| | tan δ | Less than specified value | | | | | | | | | |

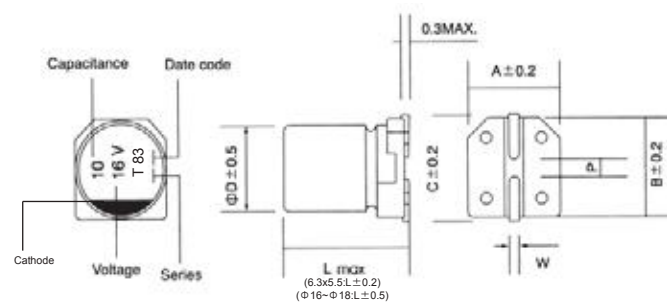
SMD

Multiplier for Ripple Current vs. Frequency

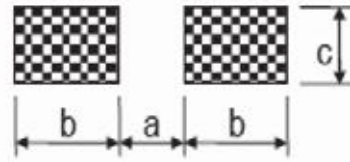
| Frequency(Hz) | 60(50) | 120 | 500 | 1K | ≥ 10K |
|---------------|--------|------|------|------|-------|
| 0.1~47 μF | 0.80 | 1.00 | 1.20 | 1.30 | 1.5 |
| 100~1000 μF | 0.80 | 1.00 | 1.10 | 1.15 | 1.2 |

| φD | L | A | B | C | W | P |
|------|------|------|------|------|---------|-----|
| 4 | 5.5 | 4.3 | 4.3 | 4.9 | 0.5~0.8 | 1.0 |
| 5 | 5.5 | 5.3 | 5.3 | 5.9 | 0.5~0.8 | 1.4 |
| 6.3 | 5.5 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 6.1 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 6.3 | 7.7 | 6.6 | 6.6 | 7.2 | 0.5~0.8 | 2.2 |
| 8 | 6.5 | 8.3 | 8.3 | 9.0 | 0.5~0.8 | 2.3 |
| 8 | 10.5 | 8.3 | 8.3 | 9.0 | 0.7~1.1 | 3.1 |
| 10 | 10.5 | 10.3 | 10.3 | 11.0 | 0.7~1.1 | 4.5 |
| 12.5 | 14 | 13.0 | 13.0 | 13.9 | 1.0~1.4 | 4.5 |
| 16 | 17 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 16 | 21.5 | 17.0 | 17.0 | 18.0 | 1.0~1.4 | 6.6 |
| 18 | 16.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |
| 18 | 21.5 | 19.0 | 19.0 | 20.0 | 1.0~1.4 | 6.6 |

Diagram of Dimensions:(unit:mm)



Recommended land pattern:(unit:mm)



| Φ DxL | a | b | c |
|------------------|-----|-----|-----|
| 4xall | 1 | 2.6 | 1.6 |
| 5xall | 1.4 | 3 | 1.6 |
| 6.3xall | 2.1 | 3.5 | 1.6 |
| 8xL(height ≤6.5) | 2.1 | 4.5 | 1.6 |
| 8xL(height >6.5) | 2.8 | 4.2 | 1.9 |
| 10xall | 4.3 | 4.4 | 1.9 |
| 12.5xall | 4.3 | 5.8 | 2.5 |
| 16xall | 6 | 6.5 | 3.5 |
| 18xall | 6 | 7.5 | 3.5 |

Case Size

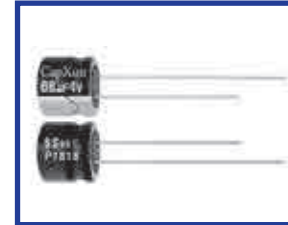
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/125°C /120Hz) |
|----------|----------|-----------|---|
| 10 | 100 | 6.3x7.7 | 53 |
| 10 | 100 | 8x6.5 | 58 |
| 10 | 220 | 8x10.5 | 90 |
| 10 | 330 | 10x10.5 | 112 |
| 16 | 100 | 8x10.5 | 66 |
| 16 | 220 | 10x10.5 | 102 |
| 25 | 47 | 6.3x7.7 | 45 |
| 25 | 47 | 8x6.5 | 48 |
| 25 | 100 | 8x10.5 | 74 |
| 25 | 220 | 10x10.5 | 116 |
| 35 | 33 | 6.3x7.7 | 40 |
| 35 | 33 | 8x6.5 | 44 |
| 35 | 47 | 8x10.5 | 52 |
| 35 | 100 | 10x10.5 | 80 |
| 50 | 10 | 6.3x7.7 | 22 |
| 50 | 10 | 8x6.5 | 24 |
| 50 | 22 | 6.3x7.7 | 35 |
| 50 | 22 | 8x6.5 | 38 |
| 50 | 33 | 8x10.5 | 46 |
| 50 | 47 | 10x10.5 | 58 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/125°C /120Hz) |
|----------|----------|-----------|---|
| 160 | 6.8 | 8x10.5 | 42 |
| 160 | 10 | 10x10.5 | 59 |
| 160 | 18 | 10x10.5 | 65 |
| 200 | 4.7 | 8x10.5 | 36 |
| 200 | 6.8 | 10x10.5 | 59 |
| 200 | 10 | 10x10.5 | 59 |
| 250 | 3.3 | 8x10.5 | 28 |
| 250 | 4.7 | 10x10.5 | 59 |
| 400 | 1 | 8x10.5 | 27 |
| 400 | 1.8 | 8x10.5 | 30 |
| 400 | 2.2 | 8x10.5 | 33 |
| 400 | 2.2 | 10x10.5 | 37 |
| 400 | 3.3 | 8x10.5 | 36 |
| 400 | 3.3 | 10x10.5 | 39 |
| 400 | 4.7 | 10x10.5 | 46 |
| 400 | 5.6 | 10x10.5 | 50 |
| 450 | 2.2 | 8x10.5 | 28 |
| 450 | 3.3 | 10x10.5 | 32 |
| 450 | 3.9 | 10x10.5 | 38 |

SS Series 5 mm 85°C

Features

- ◆ Design for space-saving and high density insertion.
- ◆ 4WV products are standardized for recent battery power source devices.
- ◆ Low price compared to Tantalum capacitors.
- ◆ Applications: VTR, car radio and commercial applications.
- ◆ RoHS Compliant



Specifications

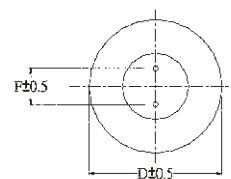
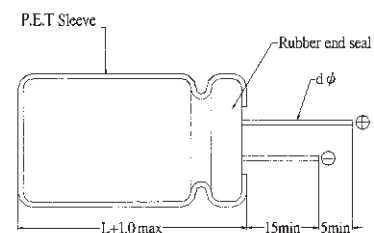
| Item | Performance Characteristics |
|--|--|
| Operating Temperature Range | -40 to +85°C |
| Rated Voltage Range | 4 to 50 VDC |
| Capacitance Range | 0.1 to 330 μF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) |
| Leakage Current(+20°C, max) | I ≤ 0.01 CV or 3 (μA) After 1 minute, whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) 4 6.3 10 16 25 35 50 |
| | D.F. (%)max. 35 24 20 16 14 12 10 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) 4 6.3 10 16 25 35 50 |
| | Z-25°C/Z+20°C 7 4 3 2 2 2 2 Z-40°C/Z+20°C 15 8 8 4 4 3 3 |
| Endurance | Test conditions |
| | Duration time :1000 Hrs |
| | Ambient temperature :+85°C |
| | Applied voltage :Rated DC working voltage |
| | After test requirement at +20°C |
| | Capacitance change :≤ ±20% of the initial measured value (4V : ≤ ±30%) |
| Dissipation factor :≤ 200% of the initial specified value | |
| Leakage current :≤ The initial specified value | |
| Shelf Life | Test conditions |
| | Duration time :1000 Hrs |
| | Ambient temperature :+85°C |
| | Applied voltage :None |
| After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(μF) | 50(60) | 120 | 1K | ≥10K |
|-------------------------|--------|-----|------|------|
| 0.1~68 μF | 0.8 | 1 | 1.30 | 1.5 |
| 100~330 μF | 0.8 | 1 | 1.15 | 1.2 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/85°C /120Hz) |
|----------|----------|-----------|--|
| 4 | 10 | 4x5 | 11 |
| 4 | 15 | 4x5 | 17 |
| 4 | 22 | 4x5 | 21 |
| 4 | 33 | 4x5 | 28 |
| 4 | 47 | 4x5 | 33 |
| 4 | 68 | 5x5 | 43 |
| 4 | 68 | 6.3x5 | 48 |
| 4 | 100 | 5x5 | 52 |
| 4 | 220 | 6.3x5 | 78 |
| 4 | 330 | 8x5 | 142 |
| 6.3 | 10 | 4x5 | 14 |
| 6.3 | 15 | 4x5 | 17 |
| 6.3 | 22 | 4x5 | 24 |
| 6.3 | 33 | 4x5 | 33 |
| 6.3 | 33 | 5x5 | 37 |
| 6.3 | 47 | 5x5 | 39 |
| 6.3 | 68 | 6.3x5 | 53 |
| 6.3 | 100 | 6.3x5 | 65 |
| 6.3 | 220 | 6.3x5 | 90 |
| 6.3 | 220 | 8x5 | 115 |
| 6.3 | 330 | 8x5 | 145 |
| 10 | 6.8 | 4x5 | 11 |
| 10 | 10 | 4x5 | 17 |
| 10 | 15 | 4x5 | 21 |
| 10 | 22 | 4x5 | 30 |
| 10 | 22 | 5x5 | 33 |
| 10 | 33 | 5x5 | 39 |
| 10 | 47 | 5x5 | 42 |
| 10 | 47 | 6.3x5 | 46 |
| 10 | 68 | 6.3x5 | 56 |
| 10 | 100 | 6.3x5 | 76 |
| 10 | 220 | 8x5 | 138 |
| 16 | 4.7 | 4x5 | 11 |
| 16 | 6.8 | 4x5 | 13 |
| 16 | 10 | 4x5 | 20 |
| 16 | 15 | 5x5 | 26 |
| 16 | 22 | 4x5 | 33 |
| 16 | 22 | 5x5 | 35 |
| 16 | 33 | 5x5 | 42 |
| 16 | 33 | 6.3x5 | 46 |
| 16 | 47 | 6.3x5 | 58 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/85°C /120Hz) |
|----------|----------|-----------|--|
| 16 | 68 | 6.3x5 | 65 |
| 16 | 100 | 6.3x5 | 86 |
| 16 | 100 | 8x5 | 92 |
| 25 | 3.3 | 4x5 | 10 |
| 25 | 4.7 | 4x5 | 15 |
| 25 | 6.8 | 4x5 | 17 |
| 25 | 10 | 4x5 | 27 |
| 25 | 10 | 5x5 | 28 |
| 25 | 15 | 5x5 | 30 |
| 25 | 15 | 6.3x5 | 33 |
| 25 | 22 | 6.3x5 | 44 |
| 25 | 33 | 6.3x5 | 52 |
| 25 | 47 | 6.3x5 | 62 |
| 25 | 68 | 8x5 | 90 |
| 25 | 100 | 8x5 | 108 |
| 35 | 2.2 | 4x5 | 8 |
| 35 | 3.3 | 4x5 | 11 |
| 35 | 4.7 | 4x5 | 18 |
| 35 | 6.8 | 5x5 | 20 |
| 35 | 10 | 5x5 | 29 |
| 35 | 15 | 6.3x5 | 33 |
| 35 | 22 | 6.3x5 | 46 |
| 35 | 33 | 8x5 | 63 |
| 35 | 47 | 8x5 | 83 |
| 50 | 0.1 | 4x5 | 2 |
| 50 | 0.15 | 4x5 | 2 |
| 50 | 0.22 | 4x5 | 3 |
| 50 | 0.33 | 4x5 | 3 |
| 50 | 0.47 | 4x5 | 4 |
| 50 | 0.68 | 4x5 | 5 |
| 50 | 1 | 4x5 | 6 |
| 50 | 1.5 | 4x5 | 7 |
| 50 | 2.2 | 4x5 | 9 |
| 50 | 3.3 | 4x5 | 14 |
| 50 | 4.7 | 5x5 | 20 |
| 50 | 6.8 | 6.3x5 | 25 |
| 50 | 10 | 6.3x5 | 30 |
| 50 | 15 | 6.3x5 | 37 |
| 50 | 22 | 6.3x5 | 48 |
| 50 | 22 | 8x5 | 52 |
| 50 | 33 | 8x5 | 70 |

ST Series 5 mm 105°C

Features

- ◆ 5.0±1 mm max height
- ◆ Endurance 105°C, 1000 hrs assured
- ◆ RoHS Compliant



Specifications

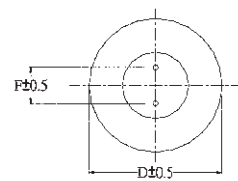
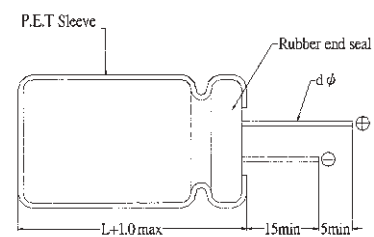
| Item | Performance Characteristics |
|--|--|
| Operating Temperature Range | -40 to +105°C |
| Rated Voltage Range | 4 to 50 VDC |
| Capacitance Range | 0.1 to 220 μF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) |
| Leakage Current(+20°C, max) | I ≤ 0.01 CV or 3 (μA) After 2 minute, whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) |
| | D.F. (%)max. |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) |
| | Z-25°C/Z+20°C |
| Endurance | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| | After test requirement at +20°C |
| | Capacitance change |
| Shelf Life | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| | After test requirement at +20°C |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(μF) | 50(60) | 120 | 1K | ≥10K |
|-------------------------|--------|-----|------|------|
| 0.1~47 μF | 0.8 | 1 | 1.30 | 1.5 |
| 100~220 μF | 0.8 | 1 | 1.15 | 1.2 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 4 | 10 | 4x5 | 10 |
| 4 | 15 | 4x5 | 13 |
| 4 | 22 | 4x5 | 22 |
| 4 | 33 | 5x5 | 30 |
| 4 | 47 | 5x5 | 36 |
| 4 | 68 | 6.3x5 | 52 |
| 4 | 100 | 6.3x5 | 60 |
| 4 | 220 | 6.3x5 | 80 |
| 6.3 | 10 | 4x5 | 12 |
| 6.3 | 15 | 4x5 | 15 |
| 6.3 | 22 | 4x5 | 22 |
| 6.3 | 33 | 5x5 | 30 |
| 6.3 | 47 | 5x5 | 36 |
| 6.3 | 68 | 6.3x5 | 52 |
| 6.3 | 100 | 6.3x5 | 60 |
| 6.3 | 220 | 6.3x5 | 80 |
| 10 | 6.8 | 4x5 | 11 |
| 10 | 10 | 4x5 | 15 |
| 10 | 15 | 4x5 | 18 |
| 10 | 22 | 5x5 | 27 |
| 10 | 33 | 5x5 | 35 |
| 10 | 47 | 6.3x5 | 48 |
| 10 | 68 | 6.3x5 | 53 |
| 10 | 100 | 8x5 | 65 |
| 10 | 220 | 8x5 | 83 |
| 16 | 4.7 | 4x5 | 9 |
| 16 | 6.8 | 4x5 | 13 |
| 16 | 10 | 4x5 | 18 |
| 16 | 15 | 5x5 | 23 |
| 16 | 22 | 5x5 | 30 |
| 16 | 33 | 6.3x5 | 45 |
| 16 | 47 | 6.3x5 | 50 |
| 16 | 68 | 8x5 | 55 |
| 16 | 100 | 8x5 | 68 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 3.3 | 4x5 | 9 |
| 25 | 4.7 | 4x5 | 13 |
| 25 | 6.8 | 4x5 | 15 |
| 25 | 10 | 5x5 | 23 |
| 25 | 15 | 6.3x5 | 32 |
| 25 | 22 | 6.3x5 | 39 |
| 25 | 33 | 6.3x5 | 48 |
| 25 | 47 | 6.3x5 | 50 |
| 25 | 47 | 8x5 | 55 |
| 35 | 2.2 | 4x5 | 8 |
| 35 | 3.3 | 4x5 | 11 |
| 35 | 4.7 | 4x5 | 15 |
| 35 | 6.8 | 5x5 | 19 |
| 35 | 10 | 5x5 | 25 |
| 35 | 15 | 6.3x5 | 32 |
| 35 | 22 | 6.3x5 | 48 |
| 35 | 33 | 8x5 | 50 |
| 50 | 0.1 | 4x5 | 2 |
| 50 | 0.15 | 4x5 | 2 |
| 50 | 0.22 | 4x5 | 3 |
| 50 | 0.33 | 4x5 | 3 |
| 50 | 0.47 | 4x5 | 4 |
| 50 | 0.68 | 4x5 | 5 |
| 50 | 1 | 4x5 | 6 |
| 50 | 1.5 | 4x5 | 7 |
| 50 | 2.2 | 4x5 | 11 |
| 50 | 3.3 | 4x5 | 14 |
| 50 | 4.7 | 5x5 | 19 |
| 50 | 6.8 | 5x5 | 22 |
| 50 | 6.8 | 6.3x5 | 25 |
| 50 | 10 | 6.3x5 | 30 |
| 50 | 15 | 8x5 | 35 |
| 50 | 22 | 8x5 | 50 |

SA Series 5 mm, Low Leakage Current 85°C



Features

- ◆ Low leakage current, height 5 mm
- ◆ RoHS Compliant

Specifications

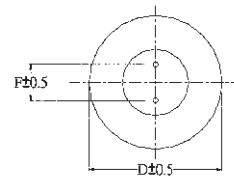
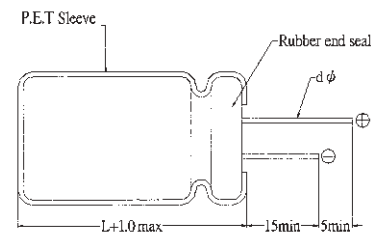
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---------------------|-----|-----|----|----|----|----|----|--------------------|----|-----|----|----|----|----|----|---------------|----|----|---|---|---|---|---|
| Operating Temperature Range | -40 to +85°C | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 4 to 50 VDC | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 100 μF | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current(+20°C, max) | I ≤ 0.002 CV or 0.4 (μA) After 2 minute, whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | <table border="1"> <tr> <td>Rated Voltage(VDC)</td> <td>4</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>D.F. (%)max.</td> <td>35</td> <td>24</td> <td>20</td> <td>16</td> <td>14</td> <td>12</td> <td>10</td> </tr> </table> | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F. (%)max. | 35 | 24 | 20 | 16 | 14 | 12 | 10 | | | | | | | | |
| | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | | |
| D.F. (%)max. | 35 | 24 | 20 | 16 | 14 | 12 | 10 | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | <table border="1"> <tr> <td colspan="8">Impedance ratio max</td> </tr> <tr> <td>Rated Voltage(VDC)</td> <td>4</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-40°C/Z+20°C</td> <td>15</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table> | Impedance ratio max | | | | | | | | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-40°C/Z+20°C | 15 | 10 | 8 | 6 | 4 | 3 | 3 |
| | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | | | |
| Z-40°C/Z+20°C | 15 | 10 | 8 | 6 | 4 | 3 | 3 | | | | | | | | | | | | | | | | | | |
| Endurance | Test conditions Duration time :1000 Hrs Ambient temperature :+85°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :≤ ±20% of the initial measured value (4V : ≤ ±30%) Dissipation factor :≤ 200% of the initial specified value Leakage current :≤ The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | |
| | Test conditions Duration time :1000 Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test conditions Duration time :1000 Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(μF) | 50(60) | 120 | 1K | ≥10K |
|-------------------------|--------|-----|------|------|
| 0.1~47 μF | 0.8 | 1 | 1.30 | 1.5 |
| 100 μF | 0.8 | 1 | 1.15 | 1.2 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 4 | 33 | 5x5 | 28 |
| 4 | 47 | 5x5 | 33 |
| 4 | 100 | 6.3x5 | 56 |
| 6.3 | 22 | 4x5 | 28 |
| 6.3 | 33 | 5x5 | 37 |
| 6.3 | 47 | 5x5 | 45 |
| 6.3 | 100 | 6.3x5 | 70 |
| 10 | 22 | 4x5 | 32 |
| 10 | 33 | 5x5 | 41 |
| 10 | 47 | 6.3x5 | 52 |
| 16 | 10 | 4x5 | 25 |
| 16 | 22 | 5x5 | 37 |
| 16 | 33 | 6.3x5 | 49 |
| 16 | 47 | 6.3x5 | 58 |
| 25 | 4.7 | 4x5 | 16 |
| 25 | 10 | 5x5 | 27 |
| 25 | 22 | 6.3x5 | 42 |
| 25 | 33 | 6.3x5 | 52 |
| 35 | 4.7 | 4x5 | 18 |
| 35 | 10 | 5x5 | 29 |
| 35 | 22 | 6.3x5 | 46 |
| 50 | 0.1 | 4x5 | 1 |
| 50 | 0.22 | 4x5 | 2 |
| 50 | 0.33 | 4x5 | 3 |
| 50 | 0.47 | 4x5 | 4 |
| 50 | 1 | 4x5 | 8 |
| 50 | 2.2 | 4x5 | 13 |
| 50 | 3.3 | 5x5 | 17 |
| 50 | 4.7 | 5x5 | 20 |
| 50 | 10 | 6.3x5 | 33 |
| 50 | 22 | 8x5 | 60 |

SP Series 5 mm, Non-polar 85°C



Features

- ◆ Non-polarized with 5 mm for crossover networks of height-pitched, mean and low pitched sounds in high-fidelity sound systems.
- ◆ The series offers excellent frequency characteristics and minimal capacitance deviation with frequency.
- ◆ RoHS Compliant

Specifications

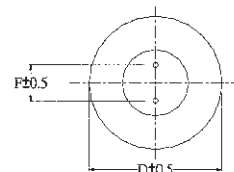
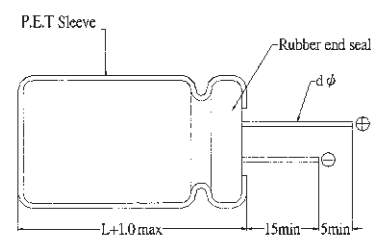
| Item | Performance Characteristics |
|--|---|
| Operating Temperature Range | -40 to +85°C |
| Rated Voltage Range | 6.3 to 50 VDC |
| Capacitance Range | 0.1 to 47 μF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) |
| Leakage Current(+20°C, max) | I ≤ 0.05 CV or 10 (μA) After 2 minute, whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) |
| | D.F. (%)max. |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) |
| | Z-25°C / Z+20°C |
| | Z-40°C / Z+20°C |
| Endurance | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| | After test requirement at +20°C |
| | Capacitance change |
| | Dissipation factor |
| Leakage current | |
| Shelf Life | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(μF) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.80 | 1.00 | 1.16 | 1.25 | 1.35 | 1.38 |

Diagram of Dimensions:(unit:mm)



| | | | |
|-----|---------|---------|---------|
| D φ | 4 | 5 | 6.3 |
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 |
| d φ | 0.45 | | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 10 | 4x5 | 15 |
| 6.3 | 22 | 5x5 | 27 |
| 6.3 | 33 | 6.3x5 | 35 |
| 6.3 | 47 | 6.3x5 | 44 |
| 10 | 10 | 4x5 | 16 |
| 10 | 10 | 5x5 | 18 |
| 10 | 22 | 6.3x5 | 32 |
| 10 | 33 | 6.3x5 | 40 |
| 16 | 3.3 | 4x5 | 10 |
| 16 | 4.7 | 4x5 | 12 |
| 16 | 10 | 5x5 | 23 |
| 16 | 22 | 6.3x5 | 36 |
| 16 | 33 | 6.3x5 | 47 |
| 25 | 3.3 | 5x5 | 13 |
| 25 | 4.7 | 5x5 | 15 |
| 25 | 10 | 6.3x5 | 25 |
| 35 | 2.2 | 4x5 | 9 |
| 35 | 3.3 | 5x5 | 14 |
| 35 | 4.7 | 5x5 | 16 |
| 35 | 10 | 6.3x5 | 28 |
| 50 | 0.1 | 4x5 | 1 |
| 50 | 0.22 | 4x5 | 2 |
| 50 | 0.33 | 4x5 | 3 |
| 50 | 0.47 | 4x5 | 4 |
| 50 | 1 | 4x5 | 8 |
| 50 | 2.2 | 5x5 | 13 |
| 50 | 3.3 | 5x5 | 15 |
| 50 | 4.7 | 6.3x5 | 18 |

SM Series 7 mm 85°C Standard



Features

- ◆ Design for space-saving and high density insertion.
- ◆ Applications: VTR, car radio, car stereos, charger, etc.
- ◆ RoHS Compliant

Specifications

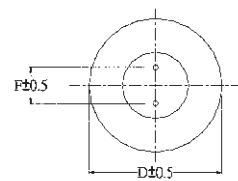
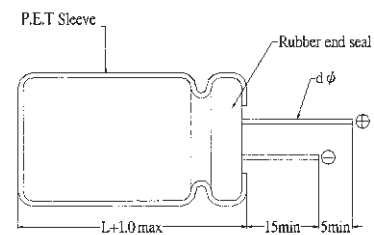
| Item | Performance Characteristics |
|--|--|
| Operating Temperature Range | -40 to +85°C |
| Rated Voltage Range | 4 to 63 VDC |
| Capacitance Range | 0.1 to 470 μF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) |
| Leakage Current(+20°C, max) | I ≤ 0.01 CV or 3 (μA) After 1 minute, whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) |
| | D.F. (%)max. |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) |
| | Z-25°C / Z+20°C |
| Endurance | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| | After test requirement at +20°C |
| | Capacitance change |
| Shelf Life | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| | After test requirement at +20°C |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(μF) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.80 | 1.00 | 1.16 | 1.25 | 1.35 | 1.38 |

Diagram of Dimensions:(unit:mm)



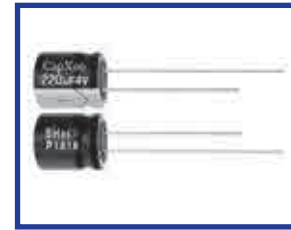
| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 4 | 33 | 4x7 | 33 |
| 4 | 47 | 4x7 | 35 |
| 4 | 68 | 4x7 | 42 |
| 4 | 100 | 4x7 | 55 |
| 4 | 100 | 5x7 | 61 |
| 4 | 150 | 5x7 | 72 |
| 4 | 220 | 6.3x7 | 110 |
| 4 | 330 | 6.3x7 | 120 |
| 4 | 330 | 8x7 | 165 |
| 4 | 470 | 8x7 | 235 |
| 6.3 | 15 | 4x7 | 28 |
| 6.3 | 22 | 4x7 | 35 |
| 6.3 | 33 | 4x7 | 40 |
| 6.3 | 33 | 5x7 | 42 |
| 6.3 | 47 | 4x7 | 46 |
| 6.3 | 47 | 5x7 | 48 |
| 6.3 | 68 | 5x7 | 50 |
| 6.3 | 100 | 5x7 | 75 |
| 6.3 | 100 | 6.3x7 | 80 |
| 6.3 | 150 | 6.3x7 | 82 |
| 6.3 | 150 | 8x7 | 85 |
| 6.3 | 220 | 6.3x7 | 120 |
| 6.3 | 220 | 8x7 | 133 |
| 6.3 | 330 | 8x7 | 160 |
| 10 | 15 | 4x7 | 32 |
| 10 | 22 | 4x7 | 36 |
| 10 | 22 | 5x7 | 38 |
| 10 | 33 | 4x7 | 43 |
| 10 | 33 | 5x7 | 45 |
| 10 | 47 | 4x7 | 50 |
| 10 | 47 | 5x7 | 58 |
| 10 | 68 | 5x7 | 60 |
| 10 | 100 | 5x7 | 82 |
| 10 | 100 | 6.3x7 | 90 |
| 10 | 150 | 6.3x7 | 95 |
| 10 | 220 | 6.3x7 | 136 |
| 10 | 220 | 8x7 | 140 |
| 10 | 330 | 8x7 | 182 |
| 16 | 4.7 | 4x7 | 15 |
| 16 | 6.8 | 4x7 | 20 |
| 16 | 10 | 4x7 | 28 |
| 16 | 15 | 4x7 | 35 |
| 16 | 22 | 4x7 | 40 |
| 16 | 22 | 5x7 | 42 |
| 16 | 33 | 4x7 | 45 |
| 16 | 33 | 5x7 | 55 |
| 16 | 47 | 5x7 | 65 |
| 16 | 47 | 6.3x7 | 68 |
| 16 | 68 | 6.3x7 | 70 |
| 16 | 100 | 6.3x7 | 98 |
| 16 | 100 | 8x7 | 105 |
| 16 | 150 | 8x7 | 111 |
| 16 | 220 | 8x7 | 152 |
| 25 | 4.7 | 4x7 | 20 |
| 25 | 6.8 | 4x7 | 22 |
| 25 | 10 | 4x7 | 30 |
| 25 | 15 | 5x7 | 37 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 22 | 4x7 | 46 |
| 25 | 22 | 5x7 | 50 |
| 25 | 33 | 5x7 | 52 |
| 25 | 33 | 6.3x7 | 58 |
| 25 | 47 | 6.3x7 | 71 |
| 25 | 68 | 6.3x7 | 79 |
| 25 | 100 | 8x7 | 113 |
| 35 | 3.3 | 4x7 | 18 |
| 35 | 4.7 | 4x7 | 22 |
| 35 | 6.8 | 5x7 | 25 |
| 35 | 10 | 4x7 | 31 |
| 35 | 10 | 5x7 | 33 |
| 35 | 15 | 5x7 | 37 |
| 35 | 22 | 5x7 | 47 |
| 35 | 22 | 6.3x7 | 55 |
| 35 | 33 | 6.3x7 | 65 |
| 35 | 33 | 8x7 | 68 |
| 35 | 47 | 8x7 | 85 |
| 35 | 68 | 8x7 | 88 |
| 35 | 100 | 8x7 | 119 |
| 50 | 0.1 | 4x7 | 1 |
| 50 | 0.15 | 4x7 | 2 |
| 50 | 0.22 | 4x7 | 3 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 0.68 | 4x7 | 8 |
| 50 | 1 | 4x7 | 10 |
| 50 | 1.5 | 4x7 | 13 |
| 50 | 2.2 | 4x7 | 17 |
| 50 | 3.3 | 4x7 | 23 |
| 50 | 4.7 | 4x7 | 24 |
| 50 | 4.7 | 5x7 | 26 |
| 50 | 6.8 | 5x7 | 28 |
| 50 | 10 | 5x7 | 35 |
| 50 | 10 | 6.3x7 | 38 |
| 50 | 15 | 6.3x7 | 42 |
| 50 | 22 | 6.3x7 | 59 |
| 50 | 22 | 8x7 | 63 |
| 50 | 33 | 8x7 | 75 |
| 50 | 47 | 8x7 | 88 |
| 63 | 0.1 | 4x7 | 1 |
| 63 | 0.15 | 4x7 | 2 |
| 63 | 0.22 | 4x7 | 3 |
| 63 | 0.33 | 4x7 | 4 |
| 63 | 0.47 | 4x7 | 6 |
| 63 | 0.68 | 4x7 | 8 |
| 63 | 1 | 4x7 | 12 |
| 63 | 1.5 | 4x7 | 14 |
| 63 | 2.2 | 4x7 | 18 |
| 63 | 3.3 | 5x7 | 25 |
| 63 | 4.7 | 5x7 | 30 |
| 63 | 4.7 | 6.3x7 | 33 |
| 63 | 6.8 | 6.3x7 | 31 |
| 63 | 10 | 6.3x7 | 48 |
| 63 | 15 | 8x7 | 45 |
| 63 | 22 | 8x7 | 65 |

SH Series 7 mm 85°C Long Life



Features

- ◆ Long life 2000 hrs.
- ◆ Design for space-saving and high density insertion.
- ◆ Applications: VTR, car radio, car stereos, charger, etc.
- ◆ RoHS Compliant

Specifications

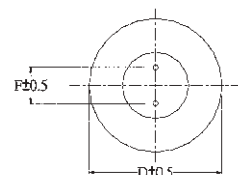
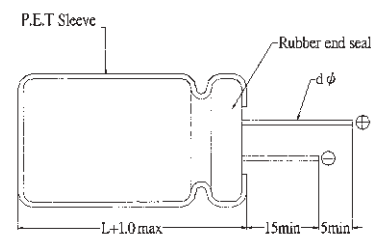
| Item | Performance Characteristics |
|--|---|
| Operating Temperature Range | -40 to +85°C |
| Rated Voltage Range | 4 to 63 VDC |
| Capacitance Range | 0.1 to 470 µF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) |
| Leakage Current(+20°C, max) | I ≤ 0.01 CV or 3 (µA) After 1 minute, whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) 4 6.3 10 16 25 35 50 63 |
| | D.F. (%)max. 25 22 20 16 14 12 10 9 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) 4 6.3 10 16 25 35 50 63 |
| | Z-25°C / Z+20°C 7 4 3 2 2 2 2 2 |
| Z-40°C / Z+20°C | 15 8 6 4 4 3 3 3 |
| | Endurance |
| Shelf Life | Test conditions Duration time :1000 Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(µF) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.80 | 1.00 | 1.16 | 1.25 | 1.35 | 1.38 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 4 | 22 | 4x7 | 23 |
| 4 | 33 | 4x7 | 26 |
| 4 | 47 | 4x7 | 35 |
| 4 | 68 | 5x7 | 55 |
| 4 | 100 | 5x7 | 58 |
| 4 | 220 | 6.3x7 | 65 |
| 4 | 330 | 6.3x7 | 90 |
| 4 | 470 | 8x7 | 120 |
| 6.3 | 22 | 4x7 | 31 |
| 6.3 | 33 | 4x7 | 32 |
| 6.3 | 33 | 5x7 | 35 |
| 6.3 | 47 | 4x7 | 40 |
| 6.3 | 47 | 5x7 | 47 |
| 6.3 | 68 | 5x7 | 55 |
| 6.3 | 100 | 5x7 | 65 |
| 6.3 | 100 | 6.3x7 | 75 |
| 6.3 | 220 | 6.3x7 | 70 |
| 6.3 | 220 | 8x7 | 90 |
| 6.3 | 330 | 8x7 | 120 |
| 10 | 15 | 4x7 | 28 |
| 10 | 22 | 4x7 | 35 |
| 10 | 33 | 4x7 | 40 |
| 10 | 33 | 5x7 | 45 |
| 10 | 47 | 4x7 | 47 |
| 10 | 47 | 5x7 | 51 |
| 10 | 68 | 5x7 | 60 |
| 10 | 68 | 6.3x7 | 68 |
| 10 | 100 | 5x7 | 80 |
| 10 | 100 | 6.3x7 | 90 |
| 10 | 220 | 6.3x7 | 105 |
| 10 | 220 | 8x7 | 125 |
| 16 | 6.8 | 4x7 | 20 |
| 16 | 10 | 4x7 | 30 |
| 16 | 15 | 4x7 | 32 |
| 16 | 22 | 4x7 | 37 |
| 16 | 22 | 5x7 | 42 |
| 16 | 33 | 4x7 | 45 |
| 16 | 33 | 5x7 | 50 |
| 16 | 47 | 5x7 | 61 |
| 16 | 47 | 6.3x7 | 67 |
| 16 | 68 | 6.3x7 | 72 |
| 16 | 100 | 6.3x7 | 95 |
| 16 | 100 | 8x7 | 105 |
| 25 | 4.7 | 4x7 | 17 |
| 25 | 6.8 | 4x7 | 21 |
| 25 | 10 | 4x7 | 30 |
| 25 | 10 | 5x7 | 33 |
| 25 | 15 | 5x7 | 38 |
| 25 | 22 | 5x7 | 45 |
| 25 | 22 | 6.3x7 | 48 |
| 25 | 33 | 5x7 | 52 |
| 25 | 33 | 6.3x7 | 60 |
| 25 | 47 | 6.3x7 | 68 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 47 | 8x7 | 72 |
| 25 | 68 | 6.3x7 | 75 |
| 25 | 100 | 8x7 | 115 |
| 35 | 4.7 | 4x7 | 22 |
| 35 | 6.8 | 4x7 | 24 |
| 35 | 6.8 | 5x7 | 28 |
| 35 | 10 | 4x7 | 30 |
| 35 | 10 | 5x7 | 35 |
| 35 | 15 | 5x7 | 38 |
| 35 | 15 | 6.3x7 | 45 |
| 35 | 22 | 5x7 | 50 |
| 35 | 22 | 6.3x7 | 58 |
| 35 | 33 | 6.3x7 | 54 |
| 35 | 33 | 8x7 | 68 |
| 35 | 47 | 8x7 | 80 |
| 35 | 68 | 8x7 | 85 |
| 50 | 0.1 | 4x7 | 2 |
| 50 | 0.15 | 4x7 | 2 |
| 50 | 0.22 | 4x7 | 3 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 0.68 | 4x7 | 7 |
| 50 | 1 | 4x7 | 10 |
| 50 | 1.5 | 4x7 | 13 |
| 50 | 2.2 | 4x7 | 19 |
| 50 | 3.3 | 4x7 | 24 |
| 50 | 4.7 | 4x7 | 27 |
| 50 | 4.7 | 5x7 | 29 |
| 50 | 6.8 | 5x7 | 32 |
| 50 | 6.8 | 6.3x7 | 33 |
| 50 | 10 | 5x7 | 35 |
| 50 | 10 | 6.3x7 | 38 |
| 50 | 15 | 6.3x7 | 52 |
| 50 | 22 | 6.3x7 | 60 |
| 50 | 22 | 8x7 | 63 |
| 50 | 33 | 8x7 | 78 |
| 63 | 0.1 | 4x7 | 2 |
| 63 | 0.15 | 4x7 | 2 |
| 63 | 0.22 | 4x7 | 3 |
| 63 | 0.33 | 4x7 | 4 |
| 63 | 0.47 | 4x7 | 6 |
| 63 | 0.68 | 4x7 | 7 |
| 63 | 1 | 4x7 | 12 |
| 63 | 1.5 | 4x7 | 14 |
| 63 | 2.2 | 4x7 | 19 |
| 63 | 3.3 | 5x7 | 25 |
| 63 | 4.7 | 5x7 | 29 |
| 63 | 4.7 | 6.3x7 | 33 |
| 63 | 6.8 | 6.3x7 | 35 |
| 63 | 10 | 6.3x7 | 40 |
| 63 | 15 | 8x7 | 55 |
| 63 | 22 | 8x7 | 65 |

SK Series 7 mm Standard 105°C



Features

- ◆ Design for space-saving and high density insertion.
- ◆ Applications: VTR, car radio, car stereos. charger, etc.
- ◆ RoHS Compliant

Specifications

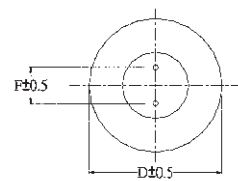
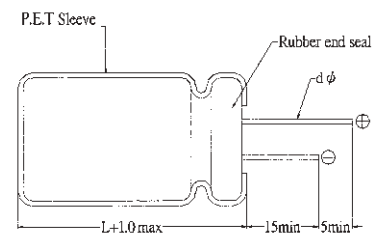
| Item | Performance Characteristics | | | | | | | | |
|---|--|--|-----|----|----|----|----|----|----|
| Operating Temperature Range | -40 to +105°C | | | | | | | | |
| Rated Voltage Range | 4 to 63 VDC | | | | | | | | |
| Capacitance Range | 0.1 to 470 µF | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | | | | | | |
| Leakage Current(+20°C, max) | I ≤ 0.01 CV or 3 (µA) After 1 minute, whichever is greater measured with rated working voltage applied. | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 |
| | D.F. (%)max. | 25 | 22 | 20 | 16 | 14 | 12 | 10 | 9 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | |
| | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 |
| | Z-25°C / Z+20°C | 7 | 4 | 3 | 2 | 2 | 2 | 2 | 2 |
| | Z-40°C / Z+20°C | 15 | 8 | 6 | 4 | 4 | 3 | 3 | 3 |
| Endurance | Test conditions | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | |
| | Ambient temperature | :+105°C | | | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | | | |
| | After test requirement at +20°C | | | | | | | | |
| | Capacitance change | : ≤ ±20% of the initial measured value (4V : ≤ ±30%) | | | | | | | |
| | Dissipation factor | : ≤ 200% of the initial specified value | | | | | | | |
| Leakage current | : ≤ The initial specified value | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | |
| | Ambient temperature | :+105°C | | | | | | | |
| | Applied voltage | :None | | | | | | | |
| After test requirement at +20°C : Same limits as Endurance. | | | | | | | | | |
| Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(µF) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.80 | 1.00 | 1.16 | 1.25 | 1.35 | 1.38 |

Diagram of Dimensions:(unit:mm)



| Dφ | 4 | 5 | 6.3 | 8 |
|----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| dφ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 4 | 22 | 4x7 | 23 |
| 4 | 33 | 4x7 | 26 |
| 4 | 47 | 4x7 | 35 |
| 4 | 68 | 5x7 | 55 |
| 4 | 100 | 5x7 | 58 |
| 4 | 220 | 6.3x7 | 65 |
| 4 | 330 | 6.3x7 | 90 |
| 4 | 470 | 8x7 | 120 |
| 6.3 | 22 | 4x7 | 31 |
| 6.3 | 33 | 4x7 | 32 |
| 6.3 | 33 | 5x7 | 35 |
| 6.3 | 47 | 4x7 | 40 |
| 6.3 | 47 | 5x7 | 47 |
| 6.3 | 68 | 5x7 | 55 |
| 6.3 | 100 | 5x7 | 65 |
| 6.3 | 100 | 6.3x7 | 75 |
| 6.3 | 220 | 6.3x7 | 90 |
| 6.3 | 220 | 8x7 | 120 |
| 6.3 | 330 | 8x7 | 120 |
| 10 | 15 | 4x7 | 28 |
| 10 | 22 | 4x7 | 35 |
| 10 | 33 | 4x7 | 40 |
| 10 | 33 | 5x7 | 45 |
| 10 | 47 | 4x7 | 47 |
| 10 | 47 | 5x7 | 51 |
| 10 | 68 | 5x7 | 60 |
| 10 | 68 | 6.3x7 | 68 |
| 10 | 100 | 5x7 | 80 |
| 10 | 100 | 6.3x7 | 90 |
| 10 | 220 | 6.3x7 | 105 |
| 10 | 220 | 8x7 | 150 |
| 16 | 6.8 | 4x7 | 20 |
| 16 | 10 | 4x7 | 30 |
| 16 | 15 | 4x7 | 32 |
| 16 | 22 | 4x7 | 37 |
| 16 | 22 | 5x7 | 42 |
| 16 | 33 | 4x7 | 45 |
| 16 | 33 | 5x7 | 50 |
| 16 | 47 | 5x7 | 61 |
| 16 | 47 | 6.3x7 | 67 |
| 16 | 68 | 6.3x7 | 72 |
| 16 | 100 | 6.3x7 | 95 |
| 16 | 100 | 8x7 | 105 |
| 25 | 4.7 | 4x7 | 17 |
| 25 | 6.8 | 4x7 | 21 |
| 25 | 10 | 4x7 | 30 |
| 25 | 10 | 5x7 | 33 |
| 25 | 15 | 5x7 | 38 |
| 25 | 22 | 5x7 | 45 |
| 25 | 22 | 6.3x7 | 48 |
| 25 | 33 | 5x7 | 52 |
| 25 | 33 | 6.3x7 | 60 |
| 25 | 47 | 6.3x7 | 68 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 47 | 8x7 | 72 |
| 25 | 68 | 6.3x7 | 75 |
| 25 | 100 | 8x7 | 115 |
| 35 | 4.7 | 4x7 | 22 |
| 35 | 6.8 | 4x7 | 24 |
| 35 | 6.8 | 5x7 | 28 |
| 35 | 10 | 4x7 | 30 |
| 35 | 10 | 5x7 | 35 |
| 35 | 15 | 5x7 | 38 |
| 35 | 15 | 6.3x7 | 45 |
| 35 | 22 | 5x7 | 50 |
| 35 | 22 | 6.3x7 | 58 |
| 35 | 33 | 6.3x7 | 54 |
| 35 | 33 | 8x7 | 68 |
| 35 | 47 | 8x7 | 80 |
| 35 | 68 | 8x7 | 85 |
| 50 | 0.1 | 4x7 | 2 |
| 50 | 0.15 | 4x7 | 2 |
| 50 | 0.22 | 4x7 | 3 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 0.68 | 4x7 | 7 |
| 50 | 1 | 4x7 | 10 |
| 50 | 1.5 | 4x7 | 13 |
| 50 | 2.2 | 4x7 | 19 |
| 50 | 3.3 | 4x7 | 24 |
| 50 | 4.7 | 4x7 | 27 |
| 50 | 4.7 | 5x7 | 29 |
| 50 | 6.8 | 5x7 | 32 |
| 50 | 6.8 | 6.3x7 | 33 |
| 50 | 10 | 5x7 | 35 |
| 50 | 10 | 6.3x7 | 38 |
| 50 | 15 | 6.3x7 | 52 |
| 50 | 22 | 6.3x7 | 60 |
| 50 | 22 | 8x7 | 63 |
| 50 | 33 | 8x7 | 78 |
| 63 | 0.1 | 4x7 | 2 |
| 63 | 0.15 | 4x7 | 2 |
| 63 | 0.22 | 4x7 | 3 |
| 63 | 0.33 | 4x7 | 4 |
| 63 | 0.47 | 4x7 | 6 |
| 63 | 0.68 | 4x7 | 7 |
| 63 | 1 | 4x7 | 12 |
| 63 | 1.5 | 4x7 | 14 |
| 63 | 2.2 | 4x7 | 19 |
| 63 | 3.3 | 5x7 | 25 |
| 63 | 4.7 | 5x7 | 29 |
| 63 | 4.7 | 6.3x7 | 33 |
| 63 | 6.8 | 6.3x7 | 35 |
| 63 | 10 | 6.3x7 | 40 |
| 63 | 15 | 8x7 | 55 |
| 63 | 22 | 8x7 | 65 |

SJ Series 7 mm 105°C Long Life



Features

- ◆ Design for space-saving and high density insertion.
- ◆ Applications: VTR, car radio, car stereos, charger, etc.
- ◆ RoHS Compliant

Specifications

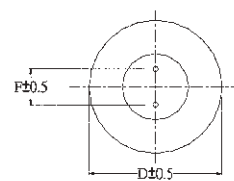
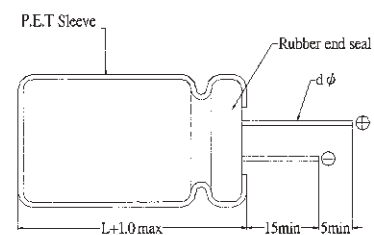
| Item | Performance Characteristics |
|--|--|
| Operating Temperature Range | -40 to +105°C |
| Rated Voltage Range | 6.3 to 63 VDC |
| Capacitance Range | 0.1 to 220 µF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) |
| Leakage Current(+20°C, max) | I ≤ 0.01 CV or 3 (µA) After 1 minute, whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Rated Voltage(VDC) |
| | D.F. (%)max. |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) |
| | Z-25°C / Z+20°C |
| Endurance | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |
| | After test requirement at +20°C |
| | Capacitance change |
| Shelf Life | Test conditions |
| | Duration time |
| | Ambient temperature |
| | Applied voltage |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(µF) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 220 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

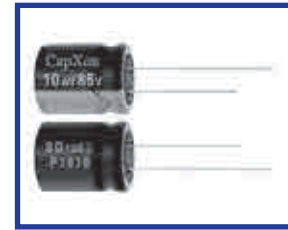
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x7 | 28 |
| 6.3 | 33 | 4x7 | 32 |
| 6.3 | 33 | 5x7 | 35 |
| 6.3 | 47 | 5x7 | 47 |
| 6.3 | 68 | 5x7 | 50 |
| 6.3 | 100 | 6.3x7 | 75 |
| 6.3 | 220 | 8x7 | 92 |
| 10 | 15 | 4x7 | 26 |
| 10 | 22 | 4x7 | 32 |
| 10 | 33 | 5x7 | 48 |
| 10 | 47 | 5x7 | 51 |
| 10 | 68 | 6.3x7 | 68 |
| 10 | 100 | 6.3x7 | 80 |
| 10 | 100 | 8x7 | 95 |
| 10 | 220 | 8x7 | 130 |
| 16 | 6.8 | 4x7 | 19 |
| 16 | 10 | 4x7 | 28 |
| 16 | 15 | 4x7 | 30 |
| 16 | 22 | 4x7 | 35 |
| 16 | 22 | 5x7 | 42 |
| 16 | 33 | 5x7 | 50 |
| 16 | 47 | 6.3x7 | 67 |
| 16 | 68 | 6.3x7 | 70 |
| 16 | 68 | 8x7 | 78 |
| 16 | 100 | 8x7 | 110 |
| 25 | 4.7 | 4x7 | 17 |
| 25 | 6.8 | 4x7 | 19 |
| 25 | 10 | 4x7 | 28 |
| 25 | 10 | 5x7 | 33 |
| 25 | 15 | 5x7 | 35 |
| 25 | 22 | 5x7 | 43 |
| 25 | 22 | 6.3x7 | 45 |
| 25 | 33 | 6.3x7 | 62 |
| 25 | 47 | 8x7 | 75 |
| 25 | 68 | 8x7 | 80 |
| 25 | 100 | 8x7 | 115 |
| 35 | 4.7 | 4x7 | 22 |
| 35 | 6.8 | 4x7 | 24 |
| 35 | 6.8 | 5x7 | 28 |
| 35 | 10 | 5x7 | 35 |
| 35 | 15 | 5x7 | 38 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 35 | 15 | 6.3x7 | 45 |
| 35 | 22 | 6.3x7 | 60 |
| 35 | 33 | 6.3x7 | 50 |
| 35 | 33 | 8x7 | 68 |
| 35 | 47 | 8x7 | 80 |
| 35 | 68 | 8x7 | 85 |
| 50 | 0.1 | 4x7 | 2 |
| 50 | 0.15 | 4x7 | 2 |
| 50 | 0.22 | 4x7 | 3 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 0.68 | 4x7 | 7 |
| 50 | 1 | 4x7 | 10 |
| 50 | 1.5 | 4x7 | 13 |
| 50 | 2.2 | 4x7 | 20 |
| 50 | 3.3 | 4x7 | 26 |
| 50 | 4.7 | 4x7 | 27 |
| 50 | 4.7 | 5x7 | 29 |
| 50 | 6.8 | 5x7 | 32 |
| 50 | 6.8 | 6.3x7 | 33 |
| 50 | 10 | 6.3x7 | 38 |
| 50 | 15 | 6.3x7 | 52 |
| 50 | 22 | 8x7 | 63 |
| 50 | 33 | 8x7 | 78 |
| 63 | 0.1 | 4x7 | 2 |
| 63 | 0.15 | 4x7 | 2 |
| 63 | 0.22 | 4x7 | 3 |
| 63 | 0.33 | 4x7 | 4 |
| 63 | 0.47 | 4x7 | 6 |
| 63 | 0.68 | 4x7 | 7 |
| 63 | 1 | 4x7 | 12 |
| 63 | 1.5 | 4x7 | 14 |
| 63 | 2.2 | 4x7 | 20 |
| 63 | 3.3 | 5x7 | 28 |
| 63 | 4.7 | 5x7 | 29 |
| 63 | 4.7 | 6.3x7 | 33 |
| 63 | 6.8 | 6.3x7 | 35 |
| 63 | 10 | 6.3x7 | 40 |
| 63 | 15 | 8x7 | 55 |
| 63 | 22 | 8x7 | 65 |

SG Series 7~9mm Long life

Features

- ◆ Operating temperature -40~105°C.
- ◆ 105°C 4000Hours assured.
- ◆ 7~9mm Height



Specifications

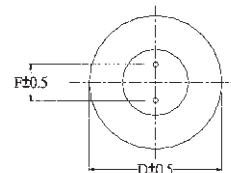
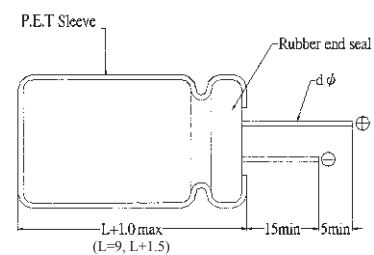
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------------------|-----|----|----|----|----|----|-----------------|----|----|----|----|----|----|-----------------|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 50 VDC | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 470 µF | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | $I \leq 0.01 \text{ CV or } 3 (\mu\text{A})$ After 2 minute with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>D.F.(%)max.</td> <td>24</td> <td>20</td> <td>17</td> <td>15</td> <td>13</td> <td>12</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F.(%)max. | 24 | 20 | 17 | 15 | 13 | 12 | | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | |
| D.F.(%)max. | 24 | 20 | 17 | 15 | 13 | 12 | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 | | | | | | | | | | | | | | | | |
| Endurance | Test condition Duration time :4000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change : within ±30% of the initial measured value Dissipation factor : ≤300% of the initial specified value Leakage current : ≤The initial specified value | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 1K | 50-100K |
|-----------------------|--------|------|------|---------|
| Multiplier | 0.65 | 1.00 | 1.35 | 1.5 |

Diagram of Dimensions:(unit:mm)



| Dφ | 4 | 5 | 6.3 | 8 | 10 |
|----|------|------|------|------|-----|
| F | 1.5 | 2.0 | 2.5 | 3.5 | 5.0 |
| dφ | 0.45 | 0.50 | 0.50 | 0.50 | 0.6 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x7 | 35 |
| 6.3 | 33 | 5x7 | 43 |
| 6.3 | 47 | 5x7 | 50 |
| 6.3 | 100 | 6.3x7 | 76 |
| 6.3 | 220 | 8x7 | 131 |
| 6.3 | 330 | 8x9 | 145 |
| 6.3 | 470 | 8x9 | 145 |
| 10 | 22 | 5x7 | 42 |
| 10 | 33 | 5x7 | 50 |
| 10 | 47 | 6.3x7 | 60 |
| 10 | 100 | 8x7 | 96 |
| 10 | 220 | 8x9 | 145 |
| 10 | 330 | 8x9 | 145 |
| 10 | 470 | 8x9 | 145 |
| 10 | 470 | 10x9 | 165 |
| 16 | 10 | 4x7 | 29 |
| 16 | 10 | 5x7 | 29 |
| 16 | 22 | 5x7 | 46 |
| 16 | 33 | 6.3x7 | 58 |
| 16 | 47 | 6.3x7 | 70 |
| 16 | 100 | 6.3x7 | 95 |
| 16 | 100 | 8x7 | 110 |
| 16 | 220 | 8x9 | 145 |
| 16 | 330 | 8x9 | 145 |
| 16 | 330 | 10x9 | 165 |
| 16 | 470 | 10x9 | 165 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 10 | 5x7 | 36 |
| 25 | 22 | 6.3x7 | 52 |
| 25 | 33 | 6.3x7 | 65 |
| 25 | 47 | 6.3x7 | 70 |
| 25 | 47 | 8x7 | 80 |
| 25 | 100 | 8x7 | 100 |
| 25 | 100 | 8x9 | 145 |
| 25 | 150 | 8x9 | 145 |
| 25 | 220 | 10x9 | 165 |
| 35 | 10 | 4x7 | 26 |
| 35 | 22 | 6.3x7 | 60 |
| 35 | 33 | 8x7 | 75 |
| 35 | 47 | 8x9 | 89 |
| 35 | 100 | 10x9 | 165 |
| 50 | 0.1 | 4x7 | 2 |
| 50 | 0.22 | 4x7 | 3 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 1 | 4x7 | 12 |
| 50 | 2.2 | 4x7 | 21 |
| 50 | 3.3 | 4x7 | 26 |
| 50 | 4.7 | 5x7 | 31 |
| 50 | 10 | 6.3x7 | 46 |
| 50 | 22 | 8x7 | 67 |
| 50 | 33 | 8x9 | 89 |
| 50 | 47 | 8x9 | 89 |
| 50 | 100 | 10x9 | 165 |

SL Series 7 mm, Low Leakage Current 85°C



Features

- ◆ Low leakage current, height 7 mm
- ◆ RoHS Compliant

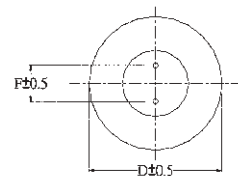
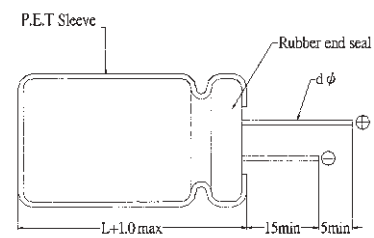
Specifications

| Item | Performance Characteristics | | | | | | |
|---|---|--|----|----|----|----|----|
| Operating Temperature Range | -40 to +85°C | | | | | | |
| Rated Voltage Range | 6.3 to 50 VDC | | | | | | |
| Capacitance Range | 0.1 to 220 μ F | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.002 CV or 0.4 (μ A) After 2 minutes, whichever is greater measured with rated working voltage applied. | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | D.F.(%)max. | 22 | 20 | 16 | 14 | 12 | 10 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 |
| | Z-25°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 |
| Endurance | Test condition | | | | | | |
| | Duration time | :1000Hrs | | | | | |
| | Ambient temperature | :+85°C | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | |
| | After test requirement at +20°C | | | | | | |
| | Capacitance change | : with ±20% of the initial measured value(4V:±30%) | | | | | |
| Shelf Life | Test condition | | | | | | |
| | Duration time | :1000Hrs | | | | | |
| | Ambient temperature | :+85°C | | | | | |
| | Applied voltage | :None | | | | | |
| After test requirement at +20°C: | Same limits as Endurance. | | | | | | |
| Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP ≤ 10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP ≤ 220 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Radial

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x7 | 31 |
| 6.3 | 33 | 5x7 | 40 |
| 6.3 | 47 | 5x7 | 48 |
| 6.3 | 100 | 6.3x7 | 70 |
| 6.3 | 220 | 8x7 | 110 |
| 10 | 22 | 5x7 | 35 |
| 10 | 33 | 5x7 | 44 |
| 10 | 47 | 6.3x7 | 55 |
| 10 | 100 | 8x7 | 90 |
| 16 | 10 | 4x7 | 25 |
| 16 | 22 | 5x7 | 40 |
| 16 | 33 | 6.3x7 | 53 |
| 16 | 47 | 6.3x7 | 60 |
| 16 | 100 | 8x7 | 95 |
| 25 | 10 | 5x7 | 30 |
| 25 | 22 | 6.3x7 | 48 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 33 | 6.3x7 | 59 |
| 25 | 47 | 8x7 | 73 |
| 35 | 4.7 | 4x7 | 21 |
| 35 | 10 | 5x7 | 33 |
| 35 | 22 | 6.3x7 | 52 |
| 35 | 33 | 8x7 | 65 |
| 50 | 0.1 | 4x7 | 1 |
| 50 | 0.22 | 4x7 | 2 |
| 50 | 0.33 | 4x7 | 3 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 1 | 4x7 | 8 |
| 50 | 2.2 | 4x7 | 16 |
| 50 | 3.3 | 4x7 | 21 |
| 50 | 4.7 | 5x7 | 25 |
| 50 | 10 | 6.3x7 | 40 |
| 50 | 22 | 8x7 | 58 |

SD Series 7 mm, Low Leakage Current 105°C



Features

- ◆ 105°C Low leakage current, height 7 mm
- ◆ RoHS Compliant

Specifications

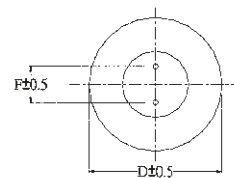
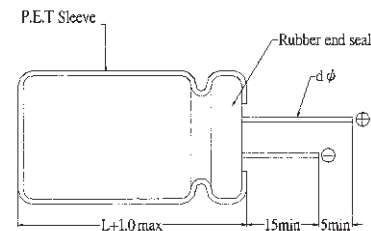
| Item | Performance Characteristics | | | | | | | | | |
|--|---|-----------|-----|----|----|----|----|----|----|--|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | |
| Rated Voltage Range | 4 to 63 VDC | | | | | | | | | |
| Capacitance Range | 0.1 to 100 µF | | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | | | | | | | |
| Leakage Current(+20°C, max) | I ≤ 0.002 CV or 0.4 (µA) After 2 minute, whichever is greater measured with rated working voltage applied. | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | |
| | D.F. (%)max. | 25 | 22 | 20 | 16 | 14 | 12 | 10 | 10 | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | |
| | Rated Voltage(VDC) | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | |
| | Z-25°C / Z+20°C | 6 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | |
| | Z-40°C / Z+20°C | 12 | 10 | 6 | 6 | 4 | 4 | 4 | 3 | |
| Endurance | Test conditions | | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | | |
| Ambient temperature | :+105°C | | | | | | | | | |
| Applied voltage | :Rated DC working voltage | | | | | | | | | |
| After test requirement at +20°C | | | | | | | | | | |
| Capacitance change | : ≤ ±20% of the initial measured value (4V : ≤ ±30%) | | | | | | | | | |
| Dissipation factor | : ≤ 200% of the initial specified value | | | | | | | | | |
| Leakage current | : ≤ The initial specified value | | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | | |
| Ambient temperature | :+105°C | | | | | | | | | |
| Applied voltage | :None | | | | | | | | | |
| After test requirement at +20°C : Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(µF) | 50(60) | 120 | 400 | 1K | ≥10K |
|-------------------------|--------|------|------|------|------|
| 0.1~10 | 0.65 | 1.00 | 1.20 | 1.30 | 1.5 |
| 10~100 | 0.80 | 1.00 | 1.10 | 1.15 | 1.2 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 4 | 33 | 4x7 | 33 |
| 4 | 47 | 4x7 | 39 |
| 4 | 100 | 6.3x7 | 59 |
| 6.3 | 33 | 4x7 | 41 |
| 6.3 | 47 | 5x7 | 49 |
| 6.3 | 100 | 6.3x7 | 75 |
| 10 | 22 | 4x7 | 36 |
| 10 | 33 | 5x7 | 44 |
| 10 | 47 | 6.3x7 | 54 |
| 10 | 100 | 8x7 | 90 |
| 16 | 10 | 4x7 | 27 |
| 16 | 22 | 4x7 | 40 |
| 16 | 33 | 5x7 | 50 |
| 16 | 47 | 6.3x7 | 62 |
| 25 | 4.7 | 4x7 | 19 |
| 25 | 10 | 5x7 | 29 |
| 25 | 22 | 6.3x7 | 44 |
| 25 | 33 | 6.3x7 | 55 |
| 25 | 47 | 8x7 | 74 |
| 35 | 3.3 | 4x7 | 18 |
| 35 | 4.7 | 5x7 | 21 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 35 | 10 | 5x7 | 32 |
| 35 | 22 | 6.3x7 | 49 |
| 35 | 33 | 8x7 | 67 |
| 50 | 0.1 | 4x7 | 3 |
| 50 | 0.22 | 4x7 | 5 |
| 50 | 0.33 | 4x7 | 6 |
| 50 | 0.47 | 4x7 | 7 |
| 50 | 1 | 4x7 | 10 |
| 50 | 2.2 | 4x7 | 16 |
| 50 | 3.3 | 4x7 | 20 |
| 50 | 4.7 | 6.3x7 | 24 |
| 50 | 10 | 8x7 | 40 |
| 63 | 0.1 | 4x7 | 3 |
| 63 | 0.22 | 4x7 | 5 |
| 63 | 0.33 | 4x7 | 6 |
| 63 | 0.47 | 4x7 | 7 |
| 63 | 1 | 4x7 | 10 |
| 63 | 2.2 | 5x7 | 19 |
| 63 | 3.3 | 6.3x7 | 29 |
| 63 | 4.7 | 6.3x7 | 36 |

SN Series 7 mm Non-polar 85°C



Features

- ◆ Non-polarized with 7 mm height for crossover networks of high-pitched, mean and low-pitched sounds in high-fidelity sound systems.
- ◆ The series offers excellent frequency characteristics and minimal capacitance deviation with frequency.
- ◆ RoHS Compliant

Specifications

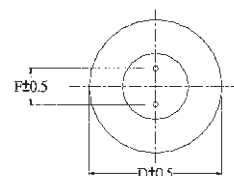
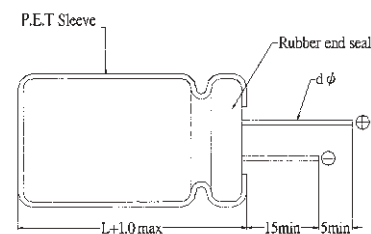
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------|-----|----|----|----|----|----|-----------------|----|----|----|----|----|----|-----------------|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +85°C | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 50 VDC | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 220 µF | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.05 CV or 10 (µA) After 2 minutes, whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>D.F.(%)max.</td> <td>22</td> <td>20</td> <td>16</td> <td>16</td> <td>14</td> <td>12</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F.(%)max. | 22 | 20 | 16 | 16 | 14 | 12 | | | | | | | |
| Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | |
| D.F.(%)max. | 22 | 20 | 16 | 16 | 14 | 12 | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max <table border="1"> <tr> <td>Rated Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table> | Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 |
| Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 | | | | | | | | | | | | | | | | |
| Endurance | Test condition Duration time :1000Hrs Ambient temperature :+85°C Applied voltage :Rated DC working voltage to each polarity for 500Hrs After test requirement at +20°C Capacitance change : with ±20% of the initial measured value Dissipation factor : ≤200% of the initial specified value Leakage current : ≤The initial specified value | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition Duration time :1000Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP ≤ 10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP ≤ 220 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 10 | 4x7 | 23 |
| 6.3 | 22 | 5x7 | 30 |
| 6.3 | 33 | 5x7 | 40 |
| 6.3 | 47 | 6.3x7 | 56 |
| 6.3 | 100 | 8x7 | 92 |
| 6.3 | 220 | 8x7 | 135 |
| 10 | 10 | 4x7 | 24 |
| 10 | 22 | 5x7 | 38 |
| 10 | 33 | 6.3x7 | 55 |
| 10 | 47 | 6.3x7 | 65 |
| 10 | 100 | 8x7 | 105 |
| 16 | 4.7 | 4x7 | 18 |
| 16 | 10 | 4x7 | 25 |
| 16 | 10 | 5x7 | 30 |
| 16 | 22 | 6.3x7 | 51 |
| 16 | 33 | 6.3x7 | 60 |
| 16 | 47 | 6.3x7 | 73 |
| 16 | 100 | 8x7 | 120 |
| 25 | 3.3 | 4x7 | 14 |
| 25 | 4.7 | 4x7 | 18 |
| 25 | 4.7 | 5x7 | 21 |
| 25 | 10 | 6.3x7 | 35 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 22 | 6.3x7 | 53 |
| 25 | 33 | 8x7 | 70 |
| 25 | 47 | 8x7 | 80 |
| 35 | 2.2 | 4x7 | 13 |
| 35 | 3.3 | 4x7 | 15 |
| 35 | 3.3 | 5x7 | 16 |
| 35 | 4.7 | 5x7 | 22 |
| 35 | 10 | 6.3x7 | 37 |
| 35 | 22 | 8x7 | 58 |
| 35 | 33 | 8x7 | 73 |
| 50 | 0.1 | 4x7 | 1 |
| 50 | 0.22 | 4x7 | 2 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 1 | 4x7 | 10 |
| 50 | 2.2 | 4x7 | 14 |
| 50 | 2.2 | 5x7 | 16 |
| 50 | 3.3 | 4x7 | 18 |
| 50 | 3.3 | 5x7 | 20 |
| 50 | 4.7 | 6.3x7 | 27 |
| 50 | 10 | 8x7 | 44 |
| 50 | 22 | 8x7 | 60 |

SB Series 7 mm Non-polar 105°C



Features

- ◆ Non-polarized with 7mm height for crossover network of high-pitched, mean and low-pitched sounds in high-frequency sound systems.
- ◆ The series offers excellent frequency characteristics and minimal capacitance deviation with frequency.
- ◆ RoHS Compliant

Specifications

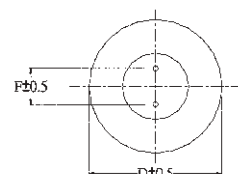
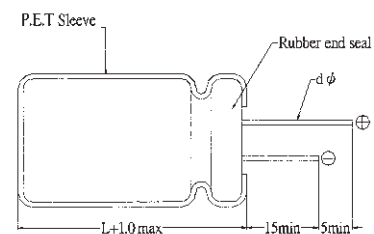
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------|-----|----|----|----|----|----|-----------------|----|----|----|----|----|----|-----------------|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 50 VDC | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 100 μ F | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤0.05 CV or 10 (μ A) After 2 minutes,whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>D.F.(%)max.</td> <td>24</td> <td>20</td> <td>16</td> <td>16</td> <td>14</td> <td>12</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F.(%)max. | 24 | 20 | 16 | 16 | 14 | 12 | | | | | | | |
| Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | |
| D.F.(%)max. | 24 | 20 | 16 | 16 | 14 | 12 | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max <table border="1"> <tr> <td>Rated Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table> | Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 |
| Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 | | | | | | | | | | | | | | | | |
| Endurance | Test condition Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage to each polarity for 500Hrs After test requirement at +20°C Capacitance change : with ±20% of the initial measured value Dissipation factor : ≤200% of the initial specified value Leakage current : ≤The initial specified value | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(μ F)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|------------------------|--------|-----|------|------|------|----------|
| CAP ≤10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP ≤220 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 10 | 4x7 | 23 |
| 6.3 | 22 | 5x7 | 30 |
| 6.3 | 33 | 5x7 | 40 |
| 6.3 | 47 | 6.3x7 | 56 |
| 6.3 | 100 | 8x7 | 92 |
| 10 | 10 | 4x7 | 24 |
| 10 | 22 | 5x7 | 38 |
| 10 | 33 | 6.3x7 | 52 |
| 10 | 47 | 8x7 | 65 |
| 10 | 100 | 8x7 | 105 |
| 16 | 4.7 | 4x7 | 18 |
| 16 | 10 | 5x7 | 30 |
| 16 | 22 | 6.3x7 | 51 |
| 16 | 33 | 6.3x7 | 58 |
| 16 | 47 | 8x7 | 73 |
| 16 | 100 | 8x7 | 120 |
| 25 | 3.3 | 4x7 | 14 |
| 25 | 4.7 | 5x7 | 19 |
| 25 | 10 | 6.3x7 | 35 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 22 | 6.3x7 | 53 |
| 25 | 33 | 8x7 | 70 |
| 25 | 47 | 8x7 | 80 |
| 35 | 2.2 | 4x7 | 13 |
| 35 | 3.3 | 5x7 | 18 |
| 35 | 4.7 | 5x7 | 22 |
| 35 | 10 | 6.3x7 | 37 |
| 35 | 22 | 8x7 | 58 |
| 35 | 33 | 8x7 | 70 |
| 50 | 0.1 | 4x7 | 1 |
| 50 | 0.22 | 4x7 | 2 |
| 50 | 0.33 | 4x7 | 4 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 1 | 4x7 | 10 |
| 50 | 2.2 | 5x7 | 16 |
| 50 | 3.3 | 5x7 | 20 |
| 50 | 4.7 | 6.3x7 | 27 |
| 50 | 10 | 8x7 | 44 |

SZ Series 7-9 mm Low Impedance



Features

- ◆ Operating temperature range -55 to +105°C
- ◆ 105°C, 1000 hours assured
- ◆ RoHS Compliant

Specifications

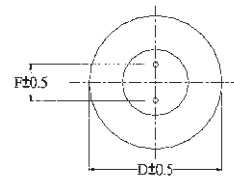
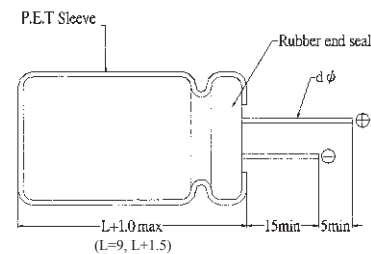
| Item | Performance Characteristics |
|---|--|
| Operating Temperature Range | -55 to +105°C |
| Rated Voltage Range | 6.3 to 35 VDC |
| Capacitance Range | 6.8 to 330 μF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (μA) After 2 minutes,whichever is greater measured with rated working voltage applied. |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 6.3 10 16 25 35 |
| | D.F.(%)max. 18 16 14 12 12 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) 6.3 10 16 25 35 |
| | Z-25°C / Z+20°C 2 2 2 2 2 |
| Z-55°C / Z+20°C 3 3 3 3 3 | |
| Endurance | Test condition |
| | Duration time :1000Hrs |
| | Ambient temperature :+105°C |
| | Applied voltage :Rated DC working voltage |
| | After test requirement at +20°C |
| | Capacitance change : with ±20% of the initial measured value |
| Dissipation factor : ≤200% of the initial specified value | |
| Leakage current : ≤The initial specified value | |
| Shelf Life | Test condition |
| | Duration time :1000Hrs |
| | Ambient temperature :+105°C |
| | Applied voltage :None |
| | After test requirement at +20°C:Same limits as Endurance. |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.91 | 1 |
| 10 < CAP ≤ 220 | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1 |
| 100 < CAP | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1 |

Diagram of Dimensions:(unit:mm)



| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 6.3 | 33 | 5x7 | 110 | 1.70 |
| 6.3 | 47 | 5x7 | 110 | 1.70 |
| 6.3 | 68 | 6.3x7 | 160 | 0.80 |
| 6.3 | 100 | 6.3x7 | 160 | 0.80 |
| 6.3 | 120 | 6.3x7 | 165 | 0.70 |
| 6.3 | 150 | 6.3x7 | 178 | 0.60 |
| 6.3 | 180 | 8x7 | 190 | 0.58 |
| 6.3 | 220 | 8x7 | 200 | 0.50 |
| 6.3 | 330 | 8x7 | 350 | 0.35 |
| 6.3 | 470 | 8x9 | 400 | 0.30 |
| 10 | 22 | 4x7 | 70 | 3.30 |
| 10 | 33 | 5x7 | 110 | 1.70 |
| 10 | 47 | 5x7 | 160 | 0.80 |
| 10 | 68 | 6.3x7 | 160 | 0.80 |
| 10 | 100 | 6.3x7 | 200 | 0.50 |
| 10 | 120 | 6.3x7 | 205 | 0.48 |
| 10 | 150 | 8x7 | 230 | 0.45 |
| 10 | 180 | 8x7 | 250 | 0.45 |
| 10 | 220 | 8x7 | 280 | 0.35 |
| 10 | 330 | 8x9 | 320 | 0.30 |
| 10 | 470 | 10x9 | 430 | 0.22 |
| 16 | 22 | 5x7 | 115 | 1.70 |
| 16 | 33 | 6.3x7 | 160 | 0.80 |
| 16 | 47 | 6.3x7 | 160 | 0.80 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 16 | 68 | 8x7 | 200 | 0.50 |
| 16 | 100 | 8x7 | 200 | 0.45 |
| 16 | 120 | 8x7 | 350 | 0.35 |
| 16 | 150 | 8x7 | 370 | 0.32 |
| 16 | 180 | 8x7 | 400 | 0.30 |
| 16 | 220 | 8x7 | 430 | 0.26 |
| 16 | 330 | 8x9 | 500 | 0.22 |
| 25 | 10 | 4x7 | 70 | 3.00 |
| 25 | 22 | 5x7 | 110 | 1.70 |
| 25 | 33 | 6.3x7 | 160 | 0.80 |
| 25 | 47 | 8x7 | 200 | 0.50 |
| 25 | 68 | 8x7 | 200 | 0.50 |
| 25 | 100 | 8x7 | 250 | 0.35 |
| 25 | 150 | 8x7 | 340 | 0.40 |
| 25 | 180 | 8x9 | 450 | 0.25 |
| 25 | 220 | 8x9 | 600 | 0.22 |
| 25 | 330 | 10x9 | 750 | 0.15 |
| 35 | 6.8 | 4x7 | 70 | 3.30 |
| 35 | 10 | 5x7 | 110 | 1.70 |
| 35 | 22 | 6.3x7 | 160 | 0.80 |
| 35 | 33 | 8x7 | 200 | 0.50 |
| 35 | 47 | 8x7 | 245 | 0.45 |
| 35 | 68 | 8x7 | 280 | 0.42 |

SY Series 7mm Low Impedance Long Life



Features

- ◆ Operating temperature -55~105°C.
- ◆ 105°C 2000Hours assured.
- ◆ RoHS Compliant

Specifications

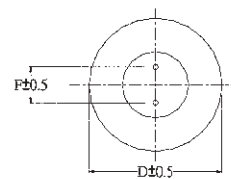
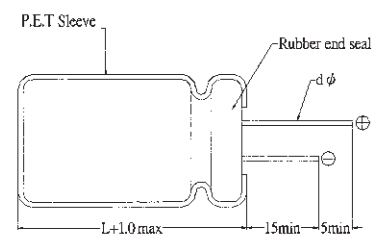
| Item | Performance Characteristics |
|---|--|
| Operating Temperature Range | -55 to +105°C |
| Rated Voltage Range | 6.3 to 50 VDC |
| Capacitance Range | 1~330 μF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | I ≤ 0.01CV or 3(μA) After 2 minutes with rated working voltage applied. |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 6.3 10 16 25 35 50 |
| | D.F.(%)max. 18 16 14 12 12 10 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated Voltage(VDC) 6.3 10 16 25 35 50 |
| | Z-25°C / Z+20°C 2 2 2 2 2 2 |
| | Z-55°C / Z+20°C 3 3 3 3 3 3 |
| Endurance | Test condition Duration time :2000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change : with ±20% of the initial measured value Dissipation factor : ≤200% of the initial specified value Leakage current : ≤The initial specified value |
| | Shelf Life |
| | Test condition Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------|--------|------|------|------|------|----------|
| 1 ≤ CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1 |
| 10 < CAP ≤ 220 | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1 |
| 100 < CAP | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1 |

Diagram of Dimensions:(unit:mm)



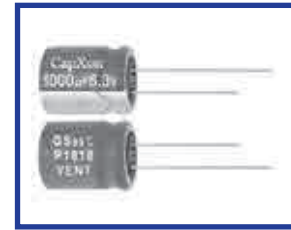
| D φ | 4 | 5 | 6.3 | 8 |
|-----|---------|---------|---------|---------|
| F | 1.5±0.5 | 2.0±0.5 | 2.5±0.5 | 3.5±0.5 |
| d φ | 0.45 | | 0.5 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|----------------------------|
| 6.3 | 33 | 5x7 | 90 | 1.95 |
| 6.3 | 47 | 6.3x7 | 99 | 1.87 |
| 6.3 | 68 | 6.3x7 | 125 | 1.00 |
| 6.3 | 100 | 6.3x7 | 144 | 0.82 |
| 6.3 | 120 | 6.3x7 | 148 | 0.77 |
| 6.3 | 150 | 6.3x7 | 160 | 0.66 |
| 6.3 | 180 | 8x7 | 171 | 0.64 |
| 6.3 | 220 | 8x7 | 180 | 0.55 |
| 6.3 | 330 | 8x7 | 315 | 0.39 |
| 10 | 22 | 4x7 | 63 | 3.63 |
| 10 | 33 | 5x7 | 95 | 1.90 |
| 10 | 47 | 5x7 | 120 | 1.30 |
| 10 | 68 | 6.3x7 | 144 | 0.88 |
| 10 | 100 | 6.3x7 | 180 | 0.55 |
| 10 | 120 | 6.3x7 | 185 | 0.52 |
| 10 | 150 | 8x7 | 207 | 0.50 |
| 10 | 180 | 8x7 | 225 | 0.49 |
| 10 | 220 | 8x7 | 252 | 0.40 |
| 16 | 10 | 4x7 | 60 | 3.50 |
| 16 | 15 | 4x7 | 75 | 3.00 |
| 16 | 22 | 5x7 | 90 | 2.00 |
| 16 | 33 | 6.3x7 | 120 | 1.40 |
| 16 | 47 | 6.3x7 | 140 | 0.90 |
| 16 | 68 | 8x7 | 160 | 0.65 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|----------------------------|
| 16 | 100 | 8x7 | 180 | 0.49 |
| 16 | 120 | 8x7 | 315 | 0.93 |
| 16 | 150 | 8x7 | 333 | 0.95 |
| 16 | 180 | 8x7 | 360 | 0.33 |
| 16 | 220 | 8x7 | 387 | 0.29 |
| 25 | 10 | 4x7 | 60 | 3.50 |
| 25 | 22 | 5x7 | 99 | 1.87 |
| 25 | 33 | 6.3x7 | 144 | 0.88 |
| 25 | 47 | 8x7 | 160 | 0.70 |
| 25 | 68 | 8x7 | 180 | 0.55 |
| 25 | 100 | 8x7 | 225 | 0.39 |
| 25 | 150 | 8x7 | 306 | 0.35 |
| 35 | 6.8 | 4x7 | 63 | 3.63 |
| 35 | 10 | 5x7 | 99 | 3.20 |
| 35 | 22 | 6.3x7 | 140 | 0.90 |
| 35 | 33 | 8x7 | 180 | 0.55 |
| 35 | 47 | 8x7 | 220 | 0.50 |
| 50 | 1 | 4x7 | 60 | 3.50 |
| 50 | 2.2 | 4x7 | 60 | 3.50 |
| 50 | 3.3 | 4x7 | 60 | 3.50 |
| 50 | 4.7 | 4x7 | 60 | 3.50 |
| 50 | 6.8 | 5x7 | 80 | 2.20 |
| 50 | 10 | 6.3x7 | 135 | 0.92 |

GS Series General Purpose 85°C



Features

- ◆ Wide CV value range.
- ◆ Endurance 2000 hrs at 85°C.
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

Specifications

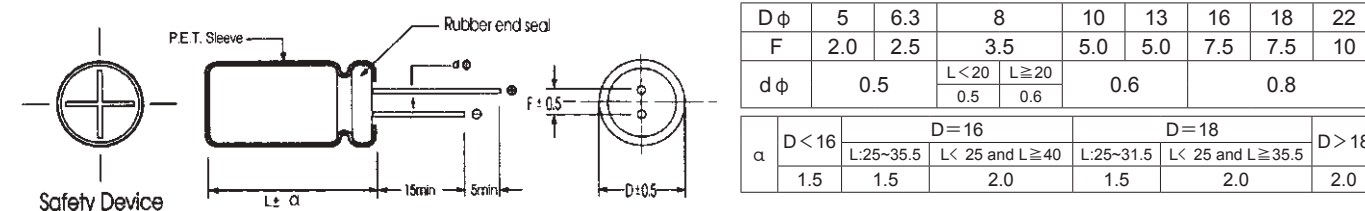
| Item | Performance Characteristics | |
|--|--|---------------------------|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 450 VDC |
| Capacitance Range | 0.1 to 33000 µF | 0.47 to 560 µF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (µA) | I ≤ 0.03 CV (µA) |
| | After 1 minute whichever is greater measures with rated working voltage applied. | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | D.F. (%)max. | 22 19 16 14 12 10 9 8 |
| | Working Voltage(VDC) | 160 200 250 350 400 450 |
| | D.F. (%)max. | 12 12 12 15 15 17 |
| | For capacitance > 1000 µF, add 2% per another 1000 µF. | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | |
| | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | Z-25°C/Z+20°C | 4 3 2 2 2 2 2 2 |
| | Z-40°C/Z+20°C | 8 6 4 3 3 3 3 3 |
| | Working Voltage(VDC) | 160 200 250 350 400 450 |
| | Z-25°C/Z+20°C | 2 2 3 5 15 15 |
| | For Capacitance > 1000 µF, add 0.5 per another 1000 µF for -25°C/+20°C add 1 per another 1000 µF for -40°C/+20°C | |
| Endurance | Test conditions Duration time :2000Hrs Ambient temperature :+85°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :≤ ±20% of the initial measured value Dissipation factor :≤ 200% of the initial specified value Leakage Current :≤ The initial specified value | |
| Shelf Life | Test conditions Duration time :1000Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP ≤ 10 | 0.8 | 1 | 1.3 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.8 | 1 | 1.16 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.8 | 1 | 1.11 | 1.17 | 1.25 | 1.28 |

Diagram of Dimensions:(unit:mm)



| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 350 | 120 | 18x35.5 | 550 |
| 350 | 150 | 18x40 | 570 |
| 400 | 0.47 | 6.3x11 | 12 |
| 400 | 0.47 | 8x11.5 | 12 |
| 400 | 1 | 6.3x11 | 20 |
| 400 | 1 | 8x11.5 | 22 |
| 400 | 2.2 | 8x11.5 | 32 |
| 400 | 2.2 | 10x12.5 | 35 |
| 400 | 3.3 | 8x11.5 | 45 |
| 400 | 3.3 | 10x12.5 | 53 |
| 400 | 4.7 | 8x11.5 | 55 |
| 400 | 4.7 | 10x12.5 | 66 |
| 400 | 4.7 | 10x16 | 70 |
| 400 | 10 | 10x16 | 100 |
| 400 | 10 | 10x20 | 115 |
| 400 | 10 | 13x20 | 120 |
| 400 | 22 | 13x20 | 190 |
| 400 | 22 | 13x25 | 200 |
| 400 | 33 | 13x25 | 230 |
| 400 | 33 | 16x25 | 250 |
| 400 | 47 | 16x25 | 270 |
| 400 | 47 | 16x31.5 | 290 |
| 400 | 68 | 16x35.5 | 410 |
| 400 | 68 | 18x25 | 380 |
| 400 | 68 | 18x31.5 | 420 |
| 400 | 100 | 18x31.5 | 440 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 400 | 100 | 18x35.5 | 450 |
| 400 | 120 | 18x40 | 520 |
| 450 | 0.47 | 6.3x11 | 12 |
| 450 | 1 | 8x11.5 | 22 |
| 450 | 2.2 | 8x11.5 | 32 |
| 450 | 2.2 | 10x12.5 | 35 |
| 450 | 3.3 | 8x11.5 | 35 |
| 450 | 3.3 | 10x12.5 | 37 |
| 450 | 3.3 | 10x16 | 40 |
| 450 | 4.7 | 10x12.5 | 50 |
| 450 | 4.7 | 10x16 | 56 |
| 450 | 10 | 10x20 | 90 |
| 450 | 10 | 13x20 | 105 |
| 450 | 10 | 13x25 | 110 |
| 450 | 22 | 13x20 | 140 |
| 450 | 22 | 13x25 | 150 |
| 450 | 22 | 16x25 | 165 |
| 450 | 33 | 16x25 | 190 |
| 450 | 33 | 16x31.5 | 210 |
| 450 | 47 | 16x31.5 | 260 |
| 450 | 47 | 16x35.5 | 280 |
| 450 | 68 | 18x31.5 | 370 |
| 450 | 68 | 18x35.5 | 390 |
| 450 | 100 | 18x40 | 420 |
| 450 | 120 | 18x45 | 510 |

GW Series 9-25 mm height Low Profile 85°C



Features

- ◆ Miniaturized low profile.
- ◆ Height 9mm-25mm max.
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

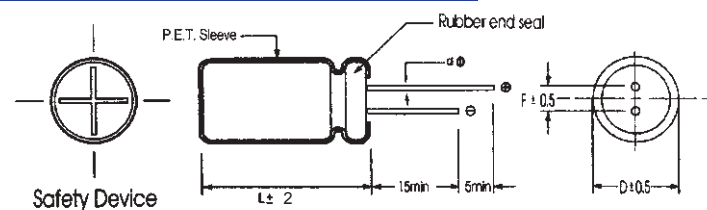
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|----------------------|-----|-----|-----|-----|-----|-----|----|-----|--------------|----|----|----|----|----|----|----|----|----------------------|-----|-----|-----|-----|-----|-----|--------------|----|----|----|----|----|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 450 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 2.2 to 10000 µF | 2.2 to 220 µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (µA) After 2 minutes whichever is greater measured with rated working voltage applied. | I ≤ 0.04 CV+100 (µA) After 2 minutes with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>D.F. (%)max.</td> <td>24</td> <td>22</td> <td>20</td> <td>14</td> <td>12</td> <td>12</td> <td>10</td> <td>10</td> </tr> </table> <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>160</td> <td>200</td> <td>250</td> <td>350</td> <td>400</td> <td>450</td> </tr> <tr> <td>D.F. (%)max.</td> <td>15</td> <td>15</td> <td>15</td> <td>20</td> <td>20</td> <td>20</td> </tr> </table> <p>For capacitance > 1000 µF, add 2% per another 1000 µF.</p> | | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | D.F. (%)max. | 24 | 22 | 20 | 14 | 12 | 12 | 10 | 10 | Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 450 | D.F. (%)max. | 15 | 15 | 15 | 20 | 20 |
| Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. (%)max. | 24 | 22 | 20 | 14 | 12 | 12 | 10 | 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. (%)max. | 15 | 15 | 15 | 20 | 20 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | | | | | |
| | Z-25°C/Z+20°C | 6 | 4 | 4 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | |
| | Z-40°C/Z+20°C | 12 | 10 | 8 | 6 | 4 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 450 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Z-25°C/Z+20°C | 2 | 2 | 3 | 5 | 5 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | For Capacitance > 1000 µF, add 0.5 per another 1000 µF for -25°C/+20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | add 1 per another 1000 µF for -40°C/+20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test conditions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Duration time | :2000Hrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ambient temperature | :+85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Applied voltage | :Rated DC working voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| After test requirement at +20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance change | : ≤ ±20% of the initial measured value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation factor | : ≤ 200% of the initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage current | : ≤ The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Duration time | :1000Hrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ambient temperature | :+85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Applied voltage | :None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| After test requirement at +20°C | :Same limits as Endurance. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(µF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | ≥10K |
|-----------------------|--------|------|------|------|------|
| 2.2~47 | 0.80 | 1.00 | 1.20 | 1.30 | 1.50 |
| 100~1000 | 0.80 | 1.00 | 1.10 | 1.15 | 1.20 |
| 2200~10000 | 0.80 | 1.00 | 1.05 | 1.10 | 1.15 |

Diagram of Dimensions:(unit:mm)



| Dφ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|----|-----|-----|-----|-----|-----|-----|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| dφ | 0.5 | | 0.6 | | 0.8 | | |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 200 | 4.7 | 8x9 | 55 |
| 200 | 6.8 | 8x9 | 78 |
| 200 | 10 | 10x9 | 92 |
| 200 | 22 | 13x16 | 150 |
| 200 | 33 | 13x16 | 190 |
| 200 | 33 | 16x16 | 200 |
| 200 | 47 | 16x16 | 320 |
| 200 | 68 | 16x16 | 360 |
| 200 | 68 | 18x16 | 390 |
| 200 | 100 | 16x20 | 575 |
| 250 | 4.7 | 8x9 | 60 |
| 250 | 4.7 | 10x9 | 52 |
| 250 | 6.8 | 10x9 | 82 |
| 250 | 10 | 10x9 | 98 |
| 250 | 10 | 10x16 | 120 |
| 250 | 22 | 13x16 | 165 |
| 250 | 22 | 16x16 | 210 |
| 250 | 33 | 16x16 | 230 |
| 250 | 33 | 18x16 | 260 |
| 250 | 47 | 16x20 | 340 |
| 250 | 47 | 18x16 | 380 |
| 250 | 68 | 16x20 | 420 |
| 250 | 100 | 18x20 | 610 |
| 350 | 3.3 | 8x9 | 45 |
| 350 | 4.7 | 10x9 | 78 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 350 | 6.8 | 10x16 | 105 |
| 350 | 10 | 13x16 | 145 |
| 350 | 22 | 16x16 | 190 |
| 350 | 33 | 16x20 | 270 |
| 350 | 33 | 18x16 | 335 |
| 350 | 47 | 18x20 | 360 |
| 400 | 2.2 | 8x9 | 38 |
| 400 | 3.3 | 10x9 | 50 |
| 400 | 4.7 | 10x9 | 90 |
| 400 | 6.8 | 13x16 | 125 |
| 400 | 10 | 13x16 | 160 |
| 400 | 10 | 16x16 | 190 |
| 400 | 22 | 16x20 | 230 |
| 400 | 22 | 18x16 | 225 |
| 400 | 33 | 18x20 | 300 |
| 400 | 47 | 18x20 | 385 |
| 450 | 1.5 | 8x9 | 30 |
| 450 | 2.2 | 10x9 | 46 |
| 450 | 3.3 | 10x9 | 55 |
| 450 | 4.7 | 10x12.5 | 105 |
| 450 | 6.8 | 13x16 | 135 |
| 450 | 10 | 16x16 | 200 |
| 450 | 22 | 16x20 | 250 |
| 450 | 33 | 18x20 | 320 |

KM Series Standard 105°C



Features

- ◆ Used in communication equipments, switching power supply, etc.
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

Specifications

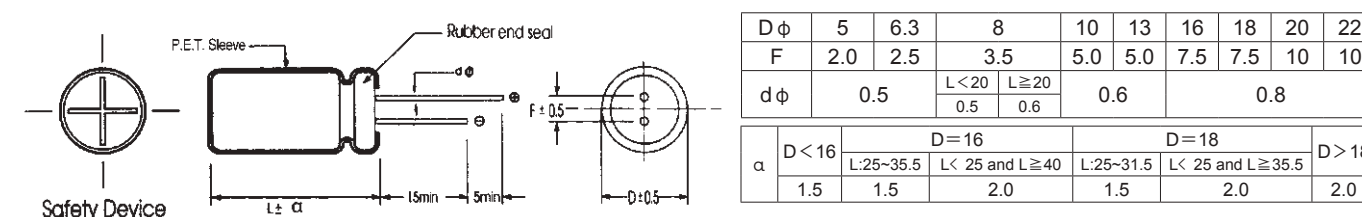
| Item | Performance Characteristics | |
|---|---|--|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 500 VDC |
| Capacitance Range | 0.1 to 22000 µF | 0.47 to 560 µF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (µA) | I ≤ 0.03 CV (µA) |
| | After 1 minute whichever is greater measured with rated working voltage applied. | After 1 minute with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | D.F. (%)max. | 22 17 16 14 12 10 9 8 |
| | Working Voltage(VDC) | 160 200 250 350 400 420 450 500 |
| | D.F. (%)max. | 12 12 12 15 15 17 17 22 |
| For capacitance > 1000 µF, add 2% per another 1000 µF. | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | |
| | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | Z-25°C / Z+20°C | 4 3 2 2 2 2 2 2 |
| | Z-40°C / Z+20°C | 8 6 4 3 3 3 3 3 |
| | Working Voltage(VDC) | 160 200 250 350 400 420 450 500 |
| | Z-25°C / Z+20°C | 2 2 3 5 6 6 6 6 |
| For Capacitance > 1000 µF, add 0.5 per another 1000 µF for -25°C / +20°C add 1 per another 1000 µF for -40°C / +20°C | | |
| Endurance | Test conditions | |
| | Duration time | :2000Hrs |
| | Ambient temperature | :+105°C |
| | Applied voltage | :Rated DC working voltage |
| | After test requirement at +20°C | |
| | Capacitance change | :≤ ±20% of the initial measured value |
| | Dissipation factor | :≤ 200% of the initial specified value |
| Leakage current | :≤ The initial specified value | |
| Shelf Life | Test conditions | |
| | Duration time | :1000Hrs |
| | Ambient temperature | :+105°C |
| | Applied voltage | :None |
| | After test requirement at +20°C: | Same limits as Endurance. |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.80 | 1.00 | 1.16 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.80 | 1.00 | 1.11 | 1.17 | 1.25 | 1.28 |

Diagram of Dimensions:(unit:mm)



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 33 | 5x11 | 54 |
| 6.3 | 47 | 5x11 | 65 |
| 6.3 | 68 | 5x11 | 75 |
| 6.3 | 100 | 5x11 | 96 |
| 6.3 | 120 | 5x11 | 110 |
| 6.3 | 150 | 5x11 | 120 |
| 6.3 | 150 | 6.3x11 | 130 |
| 6.3 | 180 | 6.3x11 | 140 |
| 6.3 | 220 | 6.3x11 | 160 |
| 6.3 | 330 | 6.3x11 | 195 |
| 6.3 | 470 | 6.3x11 | 220 |
| 6.3 | 470 | 8x11.5 | 270 |
| 6.3 | 560 | 8x11.5 | 310 |
| 6.3 | 680 | 8x11.5 | 360 |
| 6.3 | 820 | 8x11.5 | 390 |
| 6.3 | 1000 | 10x12.5 | 430 |
| 6.3 | 1200 | 10x12.5 | 550 |
| 6.3 | 1500 | 10x16 | 625 |
| 6.3 | 1800 | 10x16 | 710 |
| 6.3 | 2200 | 10x16 | 750 |
| 6.3 | 2200 | 10x20 | 775 |
| 6.3 | 2700 | 10x20 | 850 |
| 6.3 | 3300 | 13x20 | 960 |
| 6.3 | 3900 | 13x20 | 1000 |
| 6.3 | 4700 | 13x20 | 1150 |
| 6.3 | 5600 | 13x25 | 1300 |
| 6.3 | 6800 | 13x25 | 1480 |
| 6.3 | 8200 | 16x25 | 1520 |
| 6.3 | 10000 | 16x25 | 1680 |
| 6.3 | 12000 | 16x31.5 | 1750 |
| 6.3 | 15000 | 16x35.5 | 2075 |
| 6.3 | 18000 | 18x31.5 | 2150 |
| 6.3 | 22000 | 18x40 | 2300 |
| 10 | 22 | 5x11 | 45 |
| 10 | 33 | 5x11 | 60 |
| 10 | 47 | 5x11 | 70 |
| 10 | 68 | 5x11 | 80 |
| 10 | 100 | 5x11 | 105 |
| 10 | 120 | 5x11 | 110 |
| 10 | 120 | 6.3x11 | 120 |
| 10 | 150 | 5x11 | 120 |
| 10 | 150 | 6.3x11 | 145 |
| 10 | 180 | 6.3x11 | 160 |
| 10 | 220 | 6.3x11 | 175 |
| 10 | 330 | 6.3x11 | 205 |
| 10 | 330 | 8x11.5 | 255 |
| 10 | 470 | 6.3x11 | 235 |
| 10 | 470 | 8x11.5 | 290 |
| 10 | 560 | 8x11.5 | 330 |
| 10 | 560 | 10x12.5 | 340 |
| 10 | 680 | 8x11.5 | 365 |
| 10 | 680 | 8x16 | 410 |
| 10 | 820 | 10x12.5 | 480 |
| 10 | 1000 | 10x12.5 | 520 |
| 10 | 1200 | 10x16 | 630 |
| 10 | 1500 | 8x20 | 715 |
| 10 | 1500 | 10x16 | 770 |
| 10 | 1800 | 10x20 | 820 |
| 10 | 2200 | 10x20 | 860 |
| 10 | 2700 | 10x25 | 880 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 10 | 2700 | 13x20 | 920 |
| 10 | 3300 | 13x20 | 1100 |
| 10 | 3900 | 13x20 | 1280 |
| 10 | 4700 | 13x25 | 1350 |
| 10 | 5600 | 16x25 | 1490 |
| 10 | 6800 | 16x25 | 1670 |
| 10 | 8200 | 16x31.5 | 1840 |
| 10 | 10000 | 16x35.5 | 1900 |
| 10 | 12000 | 16x35.5 | 2050 |
| 10 | 15000 | 18x35.5 | 2180 |
| 10 | 18000 | 18x35.5 | 2205 |
| 16 | 10 | 5x11 | 35 |
| 16 | 22 | 5x11 | 54 |
| 16 | 33 | 5x11 | 64 |
| 16 | 47 | 5x11 | 100 |
| 16 | 68 | 5x11 | 105 |
| 16 | 100 | 5x11 | 115 |
| 16 | 100 | 6.3x11 | 130 |
| 16 | 120 | 6.3x11 | 155 |
| 16 | 150 | 6.3x11 | 170 |
| 16 | 180 | 6.3x11 | 190 |
| 16 | 220 | 6.3x11 | 215 |
| 16 | 330 | 6.3x11 | 225 |
| 16 | 330 | 8x11.5 | 265 |
| 16 | 470 | 8x11.5 | 370 |
| 16 | 470 | 8x16 | 400 |
| 16 | 560 | 10x12.5 | 410 |
| 16 | 680 | 8x16 | 470 |
| 16 | 680 | 10x12.5 | 480 |
| 16 | 820 | 10x16 | 550 |
| 16 | 1000 | 10x12.5 | 540 |
| 16 | 1000 | 10x16 | 600 |
| 16 | 1200 | 10x20 | 700 |
| 16 | 1500 | 10x20 | 820 |
| 16 | 1800 | 13x20 | 920 |
| 16 | 2200 | 13x20 | 1000 |
| 16 | 2700 | 13x20 | 1080 |
| 16 | 3300 | 13x25 | 1200 |
| 16 | 3900 | 16x25 | 1490 |
| 16 | 4700 | 16x25 | 1600 |
| 16 | 5600 | 16x31.5 | 1720 |
| 16 | 6800 | 16x31.5 | 1900 |
| 16 | 8200 | 16x35.5 | 2020 |
| 16 | 10000 | 18x35.5 | 2060 |
| 16 | 12000 | 18x35.5 | 2150 |
| 25 | 4.7 | 5x11 | 26 |
| 25 | 6.8 | 5x11 | 32 |
| 25 | 10 | 5x11 | 38 |
| 25 | 22 | 5x11 | 58 |
| 25 | 33 | 5x11 | 69 |
| 25 | 47 | 5x11 | 105 |
| 25 | 68 | 6.3x11 | 120 |
| 25 | 100 | 6.3x11 | 145 |
| 25 | 120 | 6.3x11 | 175 |
| 25 | 150 | 6.3x11 | 180 |
| 25 | 150 | 8x11.5 | 200 |
| 25 | 180 | 8x11.5 | 210 |
| 25 | 220 | 8x11.5 | 235 |
| 25 | 330 | 8x11.5 | 310 |
| 25 | 330 | 10x12.5 | 335 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 25 | 470 | 8x11.5 | 410 |
| 25 | 470 | 10x12.5 | 440 |
| 25 | 560 | 10x16 | 460 |
| 25 | 680 | 10x16 | 520 |
| 25 | 820 | 10x20 | 640 |
| 25 | 1000 | 10x20 | 710 |
| 25 | 1200 | 13x20 | 810 |
| 25 | 1500 | 13x20 | 900 |
| 25 | 1800 | 13x25 | 1050 |
| 25 | 2200 | 13x25 | 1200 |
| 25 | 2700 | 16x25 | 1320 |
| 25 | 3300 | 16x25 | 1460 |
| 25 | 3900 | 16x31.5 | 1670 |
| 25 | 4700 | 16x35.5 | 1780 |
| 25 | 5600 | 16x35.5 | 1890 |
| 25 | 6800 | 18x35.5 | 2050 |
| 25 | 8200 | 18x35.5 | 2090 |
| 35 | 4.7 | 5x11 | 28 |
| 35 | 6.8 | 5x11 | 36 |
| 35 | 10 | 5x11 | 46 |
| 35 | 22 | 5x11 | 61 |
| 35 | 33 | 5x11 | 75 |
| 35 | 47 | 5x11 | 110 |
| 35 | 68 | 6.3x11 | 140 |
| 35 | 100 | 6.3x11 | 160 |
| 35 | 100 | 8x11.5 | 175 |
| 35 | 120 | 8x11.5 | 185 |
| 35 | 150 | 8x11.5 | 215 |
| 35 | 180 | 8x11.5 | 225 |
| 35 | 180 | 10x12.5 | 265 |
| 35 | 220 | 8x11.5 | 255 |
| 35 | 220 | 10x12.5 | 300 |
| 35 | 330 | 10x12.5 | 400 |
| 35 | 470 | 10x16 | 520 |
| 35 | 560 | 10x20 | 540 |
| 35 | 680 | 10x20 | 560 |
| 35 | 680 | 13x20 | 650 |
| 35 | 820 | 13x20 | 760 |
| 35 | 1000 | 13x20 | 830 |
| 35 | 1200 | 13x20 | 900 |
| 35 | 1200 | 13x25 | 930 |
| 35 | 1500 | 13x25 | 960 |
| 35 | 1800 | 16x25 | 1150 |
| 35 | 2200 | 16x25 | 1290 |
| 35 | 2200 | 16x31.5 | 1350 |
| 35 | 2700 | 16x31.5 | 1480 |
| 35 | 3300 | 16x35.5 | 1650 |
| 35 | 3900 | 18x31.5 | 1820 |
| 35 | 4700 | 18x35.5 | 1900 |
| 35 | 5600 | 18x35.5 | 2000 |
| 50 | 0.1 | 5x11 | 1 |
| 50 | 0.22 | 5x11 | 3 |
| 50 | 0.33 | 5x11 | 4 |
| 50 | 0.47 | 5x11 | 7 |
| 50 | 1 | 5x11 | 13 |
| 50 | 2.2 | 5x11 | 20 |
| 50 | 3.3 | 5x11 | 26 |
| 50 | 4.7 | 5x11 | 32 |
| 50 | 6.8 | 5x11 | 40 |
| 50 | 10 | 5x11 | 48 |
| 50 | 22 | 5x11 | 60 |
| 50 | 22 | 6.3x11 | 70 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 50 | 33 | 5x11 | 75 |
| 50 | 33 | 6.3x11 | 90 |
| 50 | 47 | 6.3x11 | 115 |
| 50 | 68 | 6.3x11 | 130 |
| 50 | 68 | 8x11.5 | 155 |
| 50 | 100 | 8x11.5 | 200 |
| 50 | 120 | 8x16 | 220 |
| 50 | 120 | 10x12.5 | 225 |
| 50 | 150 | 10x12.5 | 245 |
| 50 | 180 | 10x12.5 | 260 |
| 50 | 180 | 10x16 | 280 |
| 50 | 220 | 10x12.5 | 345 |
| 50 | 220 | 10x16 | 360 |
| 50 | 330 | 10x16 | 450 |
| 50 | 330 | 10x20 | 470 |
| 50 | 470 | 10x20 | 600 |
| 50 | 470 | 13x20 | 650 |
| 50 | 560 | 13x20 | 660 |
| 50 | 680 | 13x20 | 700 |
| 50 | 680 | 13x25 | 770 |
| 50 | 820 | 13x25 | 850 |
| 50 | 1000 | 13x25 | 890 |
| 50 | 1000 | 16x25 | 1000 |
| 50 | 1200 | 16x25 | 1150 |
| 50 | 1500 | 16x31.5 | 1300 |
| 50 | 1800 | 16x35.5 | 1480 |
| 50 | 2200 | 16x35.5 | 1530 |
| 50 | 2700 | 18x35.5 | 1590 |
| 50 | 3300 | 18x35.5 | 1750 |
| 63 | 0.1 | 5x11 | 1 |
| 63 | 0.22 | 5x11 | 3 |
| 63 | 0.33 | 5x11 | 5 |
| 63 | 0.47 | 5x11 | 7 |
| 63 | 1 | 5x11 | 13 |
| 63 | 2.2 | 5x11 | 20 |
| 63 | 3.3 | 5x11 | 28 |
| 63 | 4.7 | 5x11 | 32 |
| 63 | 6.8 | 5x11 | 40 |
| 63 | 10 | 5x11 | 42 |
| 63 | 10 | 6.3x11 | 48 |
| 63 | 22 | 6.3x11 | 82 |
| 63 | 33 | 6.3x11 | 100 |
| 63 | 47 | 6.3x11 | 125 |
| 63 | 47 | 8x11.5 | 140 |
| 63 | 68 | 8x11.5 | 155 |
| 63 | 68 | 10x12.5 | 185 |
| 63 | 100 | 10x12.5 | 230 |
| 63 | 120 | 10x16 | 255 |
| 63 | 150 | 10x16 | 270 |
| 63 | 180 | 10x16 | 310 |
| 63 | 220 | 10x16 | 375 |
| 63 | 220 | 10x20 | 400 |
| 63 | 330 | 13x20 | 580 |
| 63 | 470 | 13x20 | 690 |
| 63 | 560 | 13x25 | 770 |
| 63 | 680 | 16x25 | 880 |
| 63 | 820 | 16x25 | 920 |
| 63 | 1000 | 16x31.5 | 1185 |
| 63 | 1200 | 16x35.5 | 1200 |
| 63 | 1500 | 18x31.5 | 1350 |
| 100 | 0.1 | 5x11 | 2 |
| 100 | 0.22 | 5x11 | 3 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 100 | 0.33 | 5x11 | 5 |
| 100 | 0.47 | 5x11 | 10 |
| 100 | 1 | 5x11 | 15 |
| 100 | 2.2 | 5x11 | 21 |
| 100 | 3.3 | 5x11 | 30 |
| 100 | 4.7 | 5x11 | 35 |
| 100 | 6.8 | 6.3x11 | 47 |
| 100 | 10 | 6.3x11 | 56 |
| 100 | 10 | 8x11.5 | 60 |
| 100 | 22 | 6.3x11 | 75 |
| 100 | 22 | 8x11.5 | 90 |
| 100 | 33 | 8x11.5 | 140 |
| 100 | 33 | 10x12.5 | 155 |
| 100 | 47 | 8x16 | 165 |
| 100 | 47 | 10x12.5 | 170 |
| 100 | 68 | 10x16 | 240 |
| 100 | 100 | 10x20 | 280 |
| 100 | 120 | 10x20 | 295 |
| 100 | 150 | 13x20 | 340 |
| 100 | 150 | 13x25 | 360 |
| 100 | 180 | 13x20 | 410 |
| 100 | 180 | 13x25 | 480 |
| 100 | 220 | 13x25 | 520 |
| 100 | 330 | 16x25 | 690 |
| 100 | 470 | 16x25 | 820 |
| 100 | 470 | 16x31.5 | 860 |
| 100 | 560 | 16x35.5 | 900 |
| 100 | 680 | 16x35.5 | 920 |
| 100 | 680 | 18x31.5 | 950 |
| 100 | 820 | 18x35.5 | 1020 |
| 100 | 1000 | 18x40 | 1200 |
| 160 | 0.47 | 5x11 | 11 |
| 160 | 1 | 5x11 | 17 |
| 160 | 1 | 6.3x11 | 19 |
| 160 | 2.2 | 6.3x11 | 25 |
| 160 | 3.3 | 6.3x11 | 32 |
| 160 | 4.7 | 6.3x11 | 38 |
| 160 | 4.7 | 8x11.5 | 42 |
| 160 | 6.8 | 8x11.5 | 56 |
| 160 | 10 | 8x11.5 | 63 |
| 160 | 10 | 10x12.5 | 75 |
| 160 | 22 | 10x12.5 | 95 |
| 160 | 22 | 10x16 | 105 |
| 160 | 22 | 10x20 | 120 |
| 160 | 33 | 10x16 | 155 |
| 160 | 33 | 10x20 | 170 |
| 160 | 47 | 10x20 | 180 |
| 160 | 47 | 13x20 | 210 |
| 160 | 68 | 13x20 | 260 |
| 160 | 68 | 13x25 | 280 |
| 160 | 100 | 13x25 | 310 |
| 160 | 100 | 16x25 | 330 |
| 160 | 120 | 13x25 | 320 |
| 160 | 120 | 16x25 | 350 |
| 160 | 150 | 16x25 | 470 |
| 160 | 180 | 16x25 | 550 |
| 160 | 220 | 16x31.5 | 560 |
| 160 | 220 | 16x35.5 | 580 |
| 160 | 330 | 18x31.5 | 660 |
| 160 | 330 | 18x35.5 | 700 |
| 160 | 470 | 18x35.5 | 810 |
| 160 | 470 | 18x40 | 860 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 200 | 0.47 | 5x11 | 12 |
| 200 | 1 | 6.3x11 | 17 |
| 200 | 2.2 | 6.3x11 | 25 |
| 200 | 3.3 | 6.3x11 | 33 |
| 200 | 3.3 | 8x11.5 | 35 |
| 200 | 4.7 | 6.3x11 | 42 |
| 200 | 4.7 | 8x11.5 | 50 |
| 200 | 6.8 | 8x11.5 | 60 |
| 200 | 6.8 | 10x12.5 | 63 |
| 200 | 10 | 8x11.5 | 78 |
| 200 | 10 | 10x12.5 | 85 |
| 200 | 22 | 10x16 | 125 |
| 200 | 22 | 10x20 | 130 |
| 200 | 33 | 10x16 | 160 |
| 200 | 33 | 10x20 | 180 |
| 200 | 33 | 13x20 | 190 |
| 200 | 47 | 13x20 | 220 |
| 200 | 68 | 13x20 | 270 |
| 200 | 68 | 13x25 | 300 |
| 200 | 100 | 13x25 | 320 |
| 200 | 100 | 16x25 | 345 |
| 200 | 120 | 16x25 | 360 |
| 200 | 120 | 16x31.5 | 390 |
| 200 | 150 | 16x25 | 440 |
| 200 | 150 | 16x31.5 | 480 |
| 200 | 180 | 16x31.5 | 550 |
| 200 | 180 | 16x35.5 | 560 |
| 200 | 220 | 16x35.5 | 670 |
| 200 | 220 | 18x31.5 | 690 |
| 200 | 330 | 18x35.5 | 750 |
| 200 | 330 | 18x40 | 810 |
| 200 | 470 | 18x40 | 840 |
| 200 | 470 | 22x40 | 925 |
| 200 | 560 | 18x50 | 940 |
| 250 | 0.47 | 5x11 | 8 |
| 250 | 1 | 6.3x11 | 16 |
| 250 | 2.2 | 6.3x11 | 20 |
| 250 | 2.2 | 8x11.5 | 25 |
| 250 | 3.3 | 8x11.5 | 33 |
| 250 | 4.7 | 8x11.5 | 46 |
| 250 | 4.7 | 10x12.5 | 50 |
| 250 | 6.8 | 8x11.5 | 60 |
| 250 | 6.8 | 10x12.5 | 70 |
| 250 | 10 | 8x11.5 | 68 |
| 250 | 10 | 10x12.5 | 80 |
| 250 | 22 | 10x16 | 110 |
| 250 | 22 | 10x20 | 125 |
| 250 | 22 | 13x20 | 150 |
| 250 | 33 | 13x20 | 190 |
| 250 | 47 | 13x20 | 230 |
| 250 | 47 | 13x25 | 240 |
| 250 | 56 | 13x20 | 255 |
| 250 | 56 | 13x25 | 280 |
| 250 | 68 | 13x25 | 310 |
| 250 | 68 | 16x25 | 355 |
| 250 | 82 | 16x25 | 370 |
| 250 | 100 | 16x25 | 375 |
| 250 | 100 | 16x31.5 | 395 |
| 250 | 120 | 16x31.5 | 420 |
| 250 | 120 | 16x35.5 | 430 |
| 250 | 150 | 16x35.5 | 460 |
| 250 | 150 | 18x31.5 | 460 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 250 | 180 | 18x31.5 | 465 |
| 250 | 180 | 18x35.5 | 470 |
| 250 | 220 | 18x35.5 | 650 |
| 250 | 220 | 18x40 | 700 |
| 250 | 330 | 18x45 | 720 |
| 250 | 330 | 22x40 | 780 |
| 350 | 0.47 | 6.3x11 | 13 |
| 350 | 1 | 6.3x11 | 16 |
| 350 | 2.2 | 8x11.5 | 31 |
| 350 | 3.3 | 8x11.5 | 34 |
| 350 | 3.3 | 10x12.5 | 38 |
| 350 | 4.7 | 8x11.5 | 47 |
| 350 | 4.7 | 10x12.5 | 52 |
| 350 | 6.8 | 10x12.5 | 79 |
| 350 | 10 | 10x16 | 87 |
| 350 | 10 | 10x20 | 92 |
| 350 | 22 | 13x20 | 160 |
| 350 | 22 | 13x25 | 170 |
| 350 | 33 | 13x20 | 180 |
| 350 | 33 | 13x25 | 200 |
| 350 | 47 | 16x25 | 245 |
| 350 | 47 | 16x31.5 | 260 |
| 350 | 56 | 16x25 | 330 |
| 350 | 68 | 16x31.5 | 370 |
| 350 | 82 | 16x35.5 | 385 |
| 350 | 100 | 18x31.5 | 390 |
| 350 | 120 | 16x40 | 400 |
| 350 | 120 | 18x35.5 | 400 |
| 350 | 150 | 18x40 | 420 |
| 350 | 180 | 18x40 | 430 |
| 350 | 220 | 22x40 | 500 |
| 400 | 0.47 | 6.3x11 | 14 |
| 400 | 1 | 6.3x11 | 17 |
| 400 | 2.2 | 6.3x15 | 34 |
| 400 | 2.2 | 8x11.5 | 35 |
| 400 | 2.2 | 10x12.5 | 40 |
| 400 | 3.3 | 6.3x15 | 35 |
| 400 | 3.3 | 8x11.5 | 36 |
| 400 | 3.3 | 8x16 | 40 |
| 400 | 3.3 | 10x12.5 | 41 |
| 400 | 4.7 | 8x11.5 | 48 |
| 400 | 4.7 | 8x16 | 54 |
| 400 | 4.7 | 10x12.5 | 55 |
| 400 | 4.7 | 10x16 | 65 |
| 400 | 6.8 | 8x14 | 75 |
| 400 | 6.8 | 8x15 | 77 |
| 400 | 6.8 | 8x16 | 80 |
| 400 | 6.8 | 10x12.5 | 82 |
| 400 | 6.8 | 10x16 | 90 |
| 400 | 10 | 10x14 | 104 |
| 400 | 10 | 10x15 | 107 |
| 400 | 10 | 10x16 | 110 |
| 400 | 10 | 10x20 | 125 |
| 400 | 22 | 10x25 | 162 |
| 400 | 22 | 13x20 | 170 |
| 400 | 22 | 13x25 | 190 |
| 400 | 33 | 13x20 | 235 |
| 400 | 33 | 13x25 | 260 |
| 400 | 33 | 16x25 | 290 |
| 400 | 47 | 16x25 | 300 |
| 400 | 47 | 16x31.5 | 360 |
| 400 | 47 | 18x25 | 320 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 400 | 56 | 16x25 | 360 |
| 400 | 56 | 16x31.5 | 400 |
| 400 | 68 | 16x25 | 410 |
| 400 | 68 | 16x31.5 | 450 |
| 400 | 68 | 16x35.5 | 480 |
| 400 | 68 | 18x25 | 440 |
| 400 | 68 | 18x31.5 | 500 |
| 400 | 82 | 16x31.5 | 480 |
| 400 | 82 | 18x25 | 470 |
| 400 | 82 | 18x31.5 | 520 |
| 400 | 100 | 16x31.5 | 490 |
| 400 | 100 | 16x35.5 | 520 |
| 400 | 100 | 18x31.5 | 530 |
| 400 | 100 | 18x35.5 | 550 |
| 400 | 120 | 18x31.5 | 550 |
| 400 | 120 | 18x35.5 | 580 |
| 400 | 150 | 18x35.5 | 610 |
| 400 | 150 | 18x40 | 650 |
| 400 | 150 | 22x30 | 640 |
| 400 | 180 | 18x45 | 700 |
| 420 | 0.47 | 6.3x11 | 14 |
| 420 | 1 | 8x11.5 | 20 |
| 420 | 2.2 | 8x11.5 | 35 |
| 420 | 3.3 | 10x12.5 | 42 |
| 420 | 4.7 | 10x12.5 | 58 |
| 420 | 4.7 | 10x16 | 61 |
| 420 | 6.8 | 10x16 | 84 |
| 420 | 10 | 10x20 | 112 |
| 420 | 22 | 13x25 | 185 |
| 420 | 33 | 16x25 | 230 |
| 420 | 47 | 16x25 | 280 |
| 420 | 47 | 16x31.5 | 310 |
| 420 | 56 | 16x35.5 | 390 |
| 420 | 68 | 18x31.5 | 470 |
| 420 | 82 | 18x31.5 | 475 |
| 420 | 82 | 18x35.5 | 500 |
| 420 | 100 | 16x35.5 | 525 |
| 420 | 100 | 18x31.5 | 535 |
| 420 | 100 | 18x35.5 | 555 |
| 420 | 120 | 18x31.5 | 560 |
| 420 | 120 | 18x35.5 | 590 |
| 420 | 120 | 18x40 | 630 |
| 420 | 150 | 18x35.5 | 615 |
| 420 | 150 | 18x40 | 660 |
| 420 | 180 | 18x45 | 680 |
| 420 | 180 | 20x40 | 685 |
| 450 | 0.47 | 6.3x11 | 14 |
| 450 | 1 | 8x11.5 | 20 |
| 450 | 2.2 | 8x11.5 | 30 |
| 450 | 2.2 | 10x12.5 | 35 |
| 450 | 3.3 | 8x11.5 | 32 |
| 450 | 3.3 | 10x12.5 | 38 |
| 450 | 3.3 | 10x16 | 42 |
| 450 | 4.7 | 8x16 | 44 |
| 450 | 4.7 | 10x16 | 50 |
| 450 | 4.7 | 10x12.5 | 45 |
| 450 | 4.7 | 10x16 | 50 |
| 450 | 6.8 | 10x12.5 | 58 |
| 450 | 6.8 | 10x16 | 65 |
| 450 | 6.8 | 10x20 | 72 |
| 450 | 10 | 10x16 | 80 |
| 450 | 10 | 10x20 | 92 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/85°C /120Hz) |
|----------|----------|-----------|--|
| 450 | 10 | 13x20 | 98 |
| 450 | 22 | 13x20 | 165 |
| 450 | 22 | 16x25 | 200 |
| 450 | 22 | 13x25 | 180 |
| 450 | 33 | 13x25 | 185 |
| 450 | 33 | 16x25 | 210 |
| 450 | 33 | 16x31.5 | 230 |
| 450 | 47 | 16x25 | 305 |
| 450 | 47 | 16x31.5 | 340 |
| 450 | 47 | 16x35.5 | 380 |
| 450 | 47 | 18x25 | 350 |
| 450 | 47 | 18x31.5 | 360 |
| 450 | 56 | 16x31.5 | 370 |
| 450 | 56 | 16x35.5 | 400 |
| 450 | 56 | 18x25 | 370 |
| 450 | 68 | 16x31.5 | 425 |
| 450 | 68 | 16x35.5 | 450 |
| 450 | 68 | 18x25 | 410 |
| 450 | 68 | 18x31.5 | 460 |
| 450 | 68 | 18x35.5 | 470 |
| 450 | 82 | 18x31.5 | 465 |
| 450 | 82 | 18x35.5 | 480 |
| 450 | 100 | 18x31.5 | 500 |
| 450 | 100 | 18x35.5 | 525 |
| 450 | 100 | 18x40 | 560 |
| 450 | 120 | 18x40 | 580 |
| 450 | 120 | 20x35 | 580 |
| 450 | 120 | 22x40 | 650 |
| 450 | 150 | 18x45 | 690 |
| 450 | 150 | 20x40 | 695 |
| 450 | 150 | 22x35 | 695 |
| 450 | 150 | 22x40 | 720 |
| 500 | 1 | 8x11.5 | 20 |
| 500 | 1 | 8x16 | 23 |
| 500 | 1 | 10x12.5 | 24 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/85°C /120Hz) |
|----------|----------|-----------|--|
| 500 | 2.2 | 8x16 | 32 |
| 500 | 2.2 | 10x12.5 | 33 |
| 500 | 2.2 | 10x16 | 36 |
| 500 | 3.3 | 10x12.5 | 38 |
| 500 | 3.3 | 10x16 | 42 |
| 500 | 3.3 | 10x20 | 49 |
| 500 | 4.7 | 10x16 | 50 |
| 500 | 4.7 | 10x20 | 58 |
| 500 | 6.8 | 10x16 | 63 |
| 500 | 6.8 | 10x20 | 70 |
| 500 | 6.8 | 13x20 | 80 |
| 500 | 10 | 10x20 | 90 |
| 500 | 10 | 13x20 | 98 |
| 500 | 10 | 13x25 | 115 |
| 500 | 22 | 13x25 | 160 |
| 500 | 22 | 16x25 | 180 |
| 500 | 33 | 16x31.5 | 230 |
| 500 | 33 | 18x25 | 220 |
| 500 | 47 | 18x25 | 330 |
| 500 | 47 | 18x31.5 | 360 |
| 500 | 47 | 16x35.5 | 360 |
| 500 | 56 | 16x35.5 | 390 |
| 500 | 56 | 16x40 | 420 |
| 500 | 56 | 18x31.5 | 400 |
| 500 | 68 | 16x45 | 480 |
| 500 | 68 | 18x35.5 | 460 |
| 500 | 68 | 18x40 | 490 |
| 500 | 82 | 16x45 | 490 |
| 500 | 82 | 18x35.5 | 470 |
| 500 | 82 | 18x40 | 500 |
| 500 | 100 | 18x40 | 550 |
| 500 | 100 | 18x45 | 570 |
| 500 | 100 | 20x40 | 580 |
| 500 | 120 | 20x45 | 600 |
| 500 | 150 | 22x45 | 750 |

KW Series 9-25 mm Low Profile 105°C



Features

- ◆ Used space-saving equipment, low profile.
- ◆ Endurance 2000 hrs at 105°C.
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

Specifications

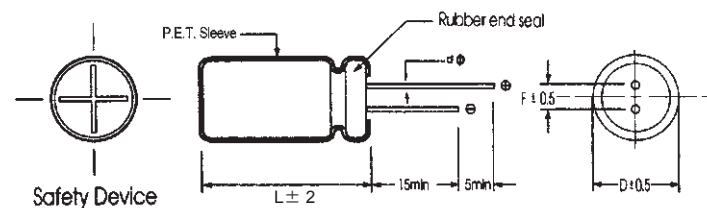
| Item | Performance Characteristics | |
|---|---|---|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 450 VDC |
| Capacitance Range | 2.2 to 10000 µF | 1.5 to 150 µF |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (µA) After 2 minutes whichever is greater measures with rated working voltage applied. | I ≤ 0.04 CV + 100 (µA) After 2 minutes with rated working voltage applied. |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | D.F. (%)max. | 24 22 20 16 14 12 10 10 |
| | Working Voltage(VDC) | 160 200 250 350 400 450 |
| | D.F. (%)max. | 15 15 15 15 20 20 |
| For capacitance > 1000 µF, add 2% per another 1000 µF. | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | |
| | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | Z-25°C / Z+20°C | 4 3 2 2 2 2 2 2 |
| | Z-40°C / Z+20°C | 8 6 4 4 3 3 3 3 |
| Working Voltage(VDC) | 160 200 250 350 400 450 | |
| Z-25°C / Z+20°C | 3 3 3 6 6 6 | |
| For Capacitance > 1000 µF, add 0.5 per another 1000 µF for -25°C / +20°C add 1 per another 1000 µF for -40°C / +20°C | | |
| Endurance | Test conditions Duration time :2000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :≤ ±20% of the initial measured value Dissipation factor :≤ 200% of the initial specified value Leakage current :≤ The initial specified value | |
| Shelf Life | Test conditions Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF) / Frequency(Hz) | 50(60) | 120 | 400 | 1K | ≥10K |
|-------------------------|--------|------|------|------|------|
| 0.47 < CAP ≤ 100 | 0.80 | 1.00 | 1.20 | 1.30 | 1.50 |
| 100 < CAP ≤ 1000 | 0.80 | 1.00 | 1.10 | 1.15 | 1.20 |
| 2200 < CAP ≤ 10000 | 0.80 | 1.00 | 1.05 | 1.10 | 1.15 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| d φ | 0.5 | | 0.6 | | 0.8 | | |

Case Size

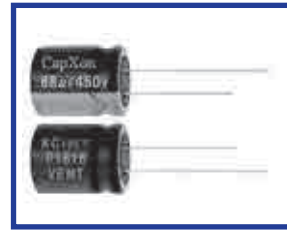
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 100 | 5x9 | 120 |
| 6.3 | 150 | 5x9 | 135 |
| 6.3 | 220 | 6.3x9 | 165 |
| 6.3 | 330 | 6.3x9 | 185 |
| 6.3 | 470 | 8x9 | 260 |
| 6.3 | 680 | 10x9 | 310 |
| 6.3 | 1000 | 10x9 | 370 |
| 6.3 | 2200 | 13x16 | 620 |
| 6.3 | 3300 | 16x16 | 860 |
| 6.3 | 4700 | 16x16 | 1010 |
| 6.3 | 6800 | 16x16 | 1210 |
| 6.3 | 10000 | 18x20 | 1450 |
| 10 | 68 | 5x9 | 115 |
| 10 | 100 | 5x9 | 135 |
| 10 | 150 | 6.3x9 | 150 |
| 10 | 220 | 6.3x9 | 165 |
| 10 | 330 | 8x9 | 205 |
| 10 | 470 | 8x9 | 275 |
| 10 | 470 | 10x9 | 280 |
| 10 | 680 | 10x9 | 360 |
| 10 | 1000 | 10x9 | 450 |
| 10 | 2200 | 13x16 | 690 |
| 10 | 3300 | 16x16 | 950 |
| 10 | 4700 | 16x20 | 1150 |
| 10 | 6800 | 18x20 | 1350 |
| 10 | 10000 | 18x25 | 1700 |
| 16 | 47 | 5x9 | 105 |
| 16 | 68 | 6.3x9 | 125 |
| 16 | 100 | 6.3x9 | 150 |
| 16 | 150 | 6.3x9 | 160 |
| 16 | 220 | 8x9 | 200 |
| 16 | 330 | 8x9 | 250 |
| 16 | 470 | 10x9 | 310 |
| 16 | 680 | 13x13 | 390 |
| 16 | 1000 | 13x13 | 520 |
| 16 | 2200 | 16x16 | 850 |
| 16 | 3300 | 16x20 | 1180 |
| 16 | 4700 | 18x20 | 1480 |
| 16 | 6800 | 18x25 | 1600 |
| 25 | 47 | 5x9 | 110 |
| 25 | 68 | 6.3x9 | 130 |
| 25 | 100 | 6.3x9 | 160 |
| 25 | 150 | 8x9 | 185 |
| 25 | 220 | 8x9 | 230 |
| 25 | 330 | 10x9 | 310 |
| 25 | 470 | 10x12.5 | 370 |
| 25 | 680 | 13x16 | 520 |
| 25 | 1000 | 13x16 | 600 |
| 25 | 2200 | 16x20 | 950 |
| 25 | 2200 | 18x16 | 940 |
| 25 | 3300 | 18x20 | 1250 |
| 25 | 4700 | 18x25 | 1470 |
| 35 | 33 | 5x9 | 90 |
| 35 | 47 | 6.3x9 | 120 |
| 35 | 68 | 8x9 | 145 |
| 35 | 100 | 8x9 | 180 |
| 35 | 150 | 8x9 | 210 |
| 35 | 220 | 10x9 | 255 |
| 35 | 330 | 10x12.5 | 360 |
| 35 | 470 | 13x13 | 410 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/105°C /120Hz) |
|----------|----------|-----------|---|
| 35 | 470 | 13x16 | 430 |
| 35 | 680 | 13x16 | 580 |
| 35 | 1000 | 16x16 | 750 |
| 35 | 2200 | 18x20 | 1200 |
| 35 | 3300 | 18x25 | 1450 |
| 50 | 2.2 | 5x9 | 19 |
| 50 | 3.3 | 5x9 | 25 |
| 50 | 4.7 | 5x9 | 40 |
| 50 | 6.8 | 5x9 | 48 |
| 50 | 10 | 5x9 | 54 |
| 50 | 22 | 5x9 | 75 |
| 50 | 33 | 6.3x9 | 115 |
| 50 | 47 | 6.3x9 | 130 |
| 50 | 68 | 8x9 | 169 |
| 50 | 100 | 10x9 | 200 |
| 50 | 150 | 10x9 | 250 |
| 50 | 220 | 10x12.5 | 290 |
| 50 | 330 | 13x13 | 375 |
| 50 | 330 | 13x16 | 400 |
| 50 | 470 | 16x16 | 550 |
| 50 | 680 | 16x16 | 700 |
| 50 | 1000 | 16x20 | 850 |
| 50 | 2200 | 18x25 | 1300 |
| 63 | 2.2 | 5x9 | 20 |
| 63 | 3.3 | 5x9 | 26 |
| 63 | 4.7 | 5x9 | 41 |
| 63 | 6.8 | 5x9 | 49 |
| 63 | 10 | 5x9 | 55 |
| 63 | 22 | 6.3x9 | 107 |
| 63 | 33 | 6.3x9 | 114 |
| 63 | 47 | 8x9 | 136 |
| 63 | 68 | 10x9 | 170 |
| 63 | 100 | 10x9 | 173 |
| 63 | 150 | 10x16 | 245 |
| 63 | 220 | 13x13 | 317 |
| 63 | 330 | 13x16 | 382 |
| 63 | 470 | 16x16 | 490 |
| 63 | 680 | 16x20 | 730 |
| 63 | 1000 | 16x25 | 1050 |
| 100 | 2.2 | 5x9 | 20 |
| 100 | 3.3 | 5x9 | 27 |
| 100 | 4.7 | 5x9 | 42 |
| 100 | 6.8 | 6.3x9 | 56 |
| 100 | 10 | 8x9 | 72 |
| 100 | 22 | 8x9 | 114 |
| 100 | 33 | 10x9 | 141 |
| 100 | 47 | 10x16 | 197 |
| 100 | 68 | 10x16 | 200 |
| 100 | 100 | 13x13 | 247 |
| 100 | 150 | 13x16 | 295 |
| 100 | 150 | 16x16 | 346 |
| 100 | 220 | 16x16 | 373 |
| 100 | 330 | 16x20 | 500 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) |
|----------|----------|-----------|--|
| 160 | 4.7 | 8x9 | 50 |
| 160 | 6.8 | 8x9 | 55 |
| 160 | 10 | 10x9 | 80 |
| 160 | 22 | 13x16 | 120 |
| 160 | 33 | 13x16 | 175 |
| 160 | 47 | 16x16 | 225 |
| 160 | 68 | 16x20 | 305 |
| 160 | 100 | 16x20 | 380 |
| 160 | 150 | 18x20 | 530 |
| 200 | 4.7 | 8x9 | 50 |
| 200 | 6.8 | 8x9 | 58 |
| 200 | 10 | 10x9 | 78 |
| 200 | 22 | 13x16 | 145 |
| 200 | 33 | 16x16 | 200 |
| 200 | 47 | 16x16 | 240 |
| 200 | 68 | 16x20 | 360 |
| 200 | 100 | 18x20 | 410 |
| 250 | 4.7 | 8x9 | 50 |
| 250 | 6.8 | 10x9 | 65 |
| 250 | 10 | 13x16 | 82 |
| 250 | 22 | 13x16 | 165 |
| 250 | 22 | 16x16 | 180 |
| 250 | 33 | 16x16 | 225 |
| 250 | 47 | 18x16 | 350 |
| 250 | 68 | 18x20 | 390 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) |
|----------|----------|-----------|--|
| 350 | 3.3 | 8x9 | 35 |
| 350 | 4.7 | 10x9 | 50 |
| 350 | 6.8 | 13x16 | 80 |
| 350 | 10 | 13x16 | 95 |
| 350 | 22 | 16x16 | 180 |
| 350 | 33 | 16x20 | 225 |
| 350 | 47 | 18x20 | 300 |
| 400 | 2.2 | 8x9 | 35 |
| 400 | 3.3 | 10x9 | 40 |
| 400 | 4.7 | 13x16 | 50 |
| 400 | 6.8 | 13x16 | 80 |
| 400 | 10 | 13x16 | 100 |
| 400 | 10 | 16x16 | 105 |
| 400 | 22 | 16x20 | 185 |
| 400 | 33 | 16x20 | 230 |
| 400 | 47 | 18x20 | 309 |
| 450 | 1.5 | 8x9 | 18 |
| 450 | 2.2 | 10x9 | 25 |
| 450 | 3.3 | 10x9 | 30 |
| 450 | 4.7 | 13x16 | 48 |
| 450 | 6.8 | 13x16 | 68 |
| 450 | 10 | 16x16 | 100 |
| 450 | 22 | 16x20 | 170 |

KC 105°C 3000 hours, Ultra Miniaturize



Features

- ◆ Endurance 3000 hours 105°C
- ◆ ROHS compliant

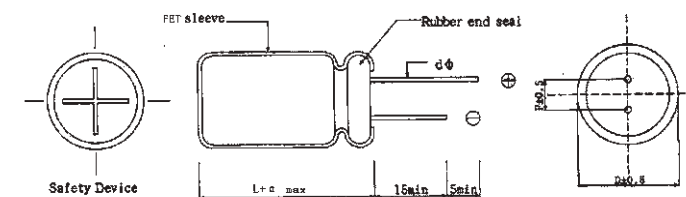
Specifications

| Item | Performance Characteristics | | | |
|---|--|-------------------|----------|-----------------|
| Operating Temperature Range | -25 to +105°C | | | |
| Rated Voltage Range | 400 to 450 VDC | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | |
| Leakage Current (+20°C, max.) | $I \leq 3 \sqrt{CV} (\mu A)$ After 5 minute with rated working voltage applied. C:rated Capacitance (μF) · V:working voltage(V) | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Less than the value under table | | | |
| | <table border="1"> <tr> <td>Cap(μF) / W.V.(V)</td> <td>400~450V</td> </tr> <tr> <td>tan δ</td> <td>20%</td> </tr> </table> | Cap(μF) / W.V.(V) | 400~450V | tan δ |
| Cap(μF) / W.V.(V) | 400~450V | | | |
| tan δ | 20% | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | |
| | <table border="1"> <tr> <td>Rated voltage(V)</td> <td>400~450</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>8</td> </tr> </table> | Rated voltage(V) | 400~450 | Z-25°C / Z+20°C |
| Rated voltage(V) | 400~450 | | | |
| Z-25°C / Z+20°C | 8 | | | |
| Endurance | Test conditions Duration time :3000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :Within ±20% of the initial measured value Dissipation factor :Not more than 200% of the initial specified value Leakage current :Not more than The initial specified value | | | |
| Shelf Life | Test conditions Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | |

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K | |
|---------------|----------|-----|-----|------|------|----------|------|
| Coefficient | 400~450V | 0.8 | 1 | 1.30 | 1.45 | 1.5 | 1.65 |

Diagram of Dimensions:(unit:mm)



| | | |
|-----|-------|-------|
| ϕ D | 10~13 | 16~18 |
| F | 5.0 | 7.5 |
| ϕ d | 0.6 | 0.8 |
| α | 2.0 | |

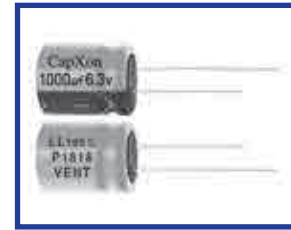
Radial

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) |
|----------|----------|-----------|--|
| 400 | 82 | 16x25 | 600 |
| 400 | 100 | 16x31.5 | 710 |
| 400 | 120 | 16x35.5 | 800 |
| 400 | 150 | 16x40 | 920 |
| 400 | 150 | 18x31.5 | 890 |
| 400 | 180 | 16x50 | 1080 |
| 400 | 180 | 18x40 | 1060 |
| 400 | 220 | 18x45 | 1200 |
| 420 | 100 | 16x31.5 | 690 |
| 420 | 120 | 16x35.5 | 780 |
| 420 | 120 | 18x31.5 | 800 |
| 420 | 150 | 16x45 | 940 |
| 420 | 150 | 18x35.5 | 920 |
| 420 | 180 | 16x50 | 1050 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) |
|----------|----------|-----------|--|
| 420 | 180 | 18x40 | 1040 |
| 420 | 220 | 18x50 | 1220 |
| 450 | 82 | 16x31.5 | 640 |
| 450 | 100 | 16x35.5 | 730 |
| 450 | 120 | 16x40 | 820 |
| 450 | 120 | 18x31.5 | 800 |
| 450 | 150 | 16x50 | 980 |
| 450 | 150 | 18x40 | 970 |
| 450 | 180 | 18x45 | 1090 |
| 450 | 180 | 18x45 | 1090 |
| 450 | 220 | 18x50 | 1220 |

LL Series Low Leakage Current



Features

- ◆ Extremely low and stable leakage current characteristics.
- ◆ Close capacitance tolerance $\pm 20\%$ ($\pm 10\%$ on requested)
- ◆ RoHS Compliant

Specifications

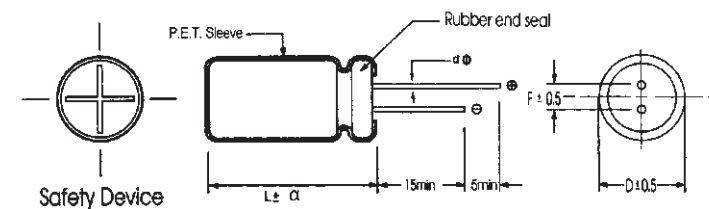
| Item | Performance Characteristics | | | | | | | | | | | | | | | | |
|--|--|--------------------|-----|----|----|----|----|----|----|-----------------|----|----|----|----|---|---|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 63 VDC | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 2200 μ F | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | | | | | | | | | | | |
| Leakage Current(+20°C, max) | $I \leq 0.002 CV$ or $0.4 (\mu A)$ After 3 minutes(90sec. $\leq 10 \mu F$) whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C , 120Hz) | <table border="1"> <tr> <td>Rated Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> </tr> <tr> <td>D.F. (%)max.</td> <td>20</td> <td>17</td> <td>13</td> <td>10</td> <td>9</td> <td>8</td> <td>8</td> </tr> </table> | Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | D.F. (%)max. | 20 | 17 | 13 | 10 | 9 | 8 | 8 |
| Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | | | | | | | | | | |
| D.F. (%)max. | 20 | 17 | 13 | 10 | 9 | 8 | 8 | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max <table border="1"> <tr> <td>Rated Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>4</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> </table> | Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | Z-40°C / Z+20°C | 4 | 3 | 3 | 2 | 2 | 2 | 2 |
| Rated Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | | | | | | | | | | |
| Z-40°C / Z+20°C | 4 | 3 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | |
| Endurance | Test conditions Duration time :2000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change : $\leq \pm 20\%$ of the initial measured value Dissipation factor : $\leq 150\%$ of the initial specified value Leakage current : \leq The initial specified value | | | | | | | | | | | | | | | | |
| Shelf Life | Test conditions Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(μ F)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K-100K |
|-----------------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.80 | 1.00 | 1.30 | 1.45 | 1.65 | 1.7 |
| 10 < CAP ≤ 100 | 0.80 | 1.00 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 2200 | 0.80 | 1.00 | 1.16 | 1.25 | 1.35 | 1.38 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 |
|-----|-----------|------------------------|-----------|--------------------------|--------|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 |
| d φ | 0.5 | | | 0.6 | |
| α | D=16 | | D=18 | | D > 18 |
| | L:25~35.5 | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 5x11 | 36 |
| 6.3 | 33 | 5x11 | 44 |
| 6.3 | 47 | 5x11 | 53 |
| 6.3 | 100 | 5x11 | 74 |
| 6.3 | 220 | 6.3x11 | 131 |
| 6.3 | 330 | 6.3x11 | 161 |
| 6.3 | 470 | 8x11.5 | 242 |
| 6.3 | 1000 | 10x12.5 | 390 |
| 6.3 | 2200 | 13x20 | 665 |
| 10 | 22 | 5x11 | 50 |
| 10 | 33 | 5x11 | 66 |
| 10 | 47 | 5x11 | 75 |
| 10 | 100 | 5x11 | 104 |
| 10 | 220 | 8x11.5 | 193 |
| 10 | 330 | 8x11.5 | 256 |
| 10 | 470 | 8x11.5 | 319 |
| 10 | 1000 | 10x16 | 605 |
| 10 | 2200 | 13x20 | 860 |
| 16 | 10 | 5x11 | 39 |
| 16 | 22 | 5x11 | 62 |
| 16 | 33 | 5x11 | 68 |
| 16 | 47 | 5x11 | 105 |
| 16 | 100 | 6.3x11 | 138 |
| 16 | 220 | 8x11.5 | 220 |
| 16 | 330 | 8x11.5 | 268 |
| 16 | 470 | 10x12.5 | 407 |
| 16 | 1000 | 10x20 | 704 |
| 16 | 2200 | 13x25 | 890 |
| 25 | 4.7 | 5x11 | 32 |
| 25 | 10 | 5x11 | 43 |
| 25 | 22 | 5x11 | 65 |
| 25 | 33 | 5x11 | 76 |
| 25 | 47 | 6.3x11 | 116 |
| 25 | 100 | 8x11.5 | 149 |
| 25 | 220 | 10x12.5 | 246 |
| 25 | 330 | 10x12.5 | 352 |
| 25 | 470 | 10x16 | 484 |
| 25 | 1000 | 13x20 | 847 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 35 | 4.7 | 5x11 | 33 |
| 35 | 10 | 5x11 | 48 |
| 35 | 22 | 6.3x11 | 71 |
| 35 | 33 | 6.3x11 | 83 |
| 35 | 47 | 6.3x11 | 125 |
| 35 | 100 | 8x11.5 | 187 |
| 35 | 220 | 10x12.5 | 330 |
| 35 | 330 | 10x16 | 440 |
| 35 | 470 | 13x20 | 590 |
| 35 | 1000 | 13x25 | 1012 |
| 50 | 0.1 | 5x11 | 9 |
| 50 | 0.22 | 5x11 | 9 |
| 50 | 0.33 | 5x11 | 9 |
| 50 | 0.47 | 5x11 | 12 |
| 50 | 1 | 5x11 | 17 |
| 50 | 2.2 | 5x11 | 24 |
| 50 | 3.3 | 5x11 | 29 |
| 50 | 4.7 | 5x11 | 36 |
| 50 | 10 | 5x11 | 52 |
| 50 | 22 | 6.3x11 | 77 |
| 50 | 33 | 6.3x11 | 99 |
| 50 | 47 | 8x11.5 | 138 |
| 50 | 100 | 10x12.5 | 217 |
| 50 | 220 | 10x20 | 380 |
| 50 | 330 | 13x20 | 506 |
| 50 | 470 | 13x25 | 705 |
| 63 | 0.1 | 5x11 | 9 |
| 63 | 0.22 | 5x11 | 9 |
| 63 | 0.33 | 5x11 | 9 |
| 63 | 0.47 | 5x11 | 12 |
| 63 | 1 | 5x11 | 17 |
| 63 | 2.2 | 5x11 | 24 |
| 63 | 3.3 | 5x11 | 32 |
| 63 | 4.7 | 5x11 | 39 |
| 63 | 10 | 6.3x11 | 58 |
| 63 | 22 | 6.3x11 | 94 |
| 63 | 33 | 8x11.5 | 110 |
| 63 | 47 | 8x11.5 | 152 |
| 63 | 100 | 10x16 | 260 |
| 63 | 220 | 13x20 | 440 |
| 63 | 330 | 13x25 | 594 |

GL Series Low Impedance, Long Life



Features

- ◆ Low impedance for high frequency, Anti-Solvent Design.
- ◆ Long Life 2000 ~ 6000 hrs at 105°C depending on case size.
- ◆ Radial type for switching power supply.
- ◆ RoHS Compliant

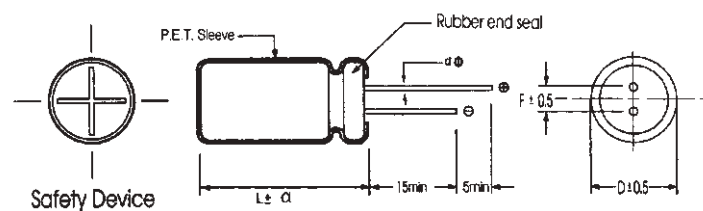
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------------|------------|---------|------|-----|------|--------|------|-----------------|----|----|----|----|-----|-----|-----|-----------------|---|---|---|---|---|---|---|-----------------|---|---|---|---|---|---|---|
| Operating Temperature Range | -55 to +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 63 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.47 to 10000 µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C, max.) | I ≤ 0.01 CV or 3 (µA) After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | <table border="1"> <tr> <th>Working Voltage (VDC)</th> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td> </tr> <tr> <th>D.F. (%)max</th> <td>20</td><td>18</td><td>16</td><td>14</td><td>12</td><td>10</td><td>9</td> </tr> </table> | Working Voltage (VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | D.F. (%)max | 20 | 18 | 16 | 14 | 12 | 10 | 9 | | | | | | | | | | | | | | | | |
| | Working Voltage (VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. (%)max | 20 | 18 | 16 | 14 | 12 | 10 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| For Capacitance > 1000 µF, add 2% per another 1000 µF. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <th>Working Voltage(VDC)</th> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td> </tr> <tr> <th>Z-25°C / Z+20°C</th> <td>4</td><td>3</td><td>2</td><td>2</td><td>1.5</td><td>1.5</td><td>1.5</td> </tr> <tr> <th>Z-40°C / Z+20°C</th> <td>6</td><td>4</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td> </tr> <tr> <th>Z-55°C / Z+20°C</th> <td>8</td><td>6</td><td>5</td><td>5</td><td>4</td><td>4</td><td>4</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 1.5 | 1.5 | 1.5 | Z-40°C / Z+20°C | 6 | 4 | 3 | 3 | 2 | 2 | 2 | Z-55°C / Z+20°C | 8 | 6 | 5 | 5 | 4 | 4 | 4 |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 1.5 | 1.5 | 1.5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 6 | 4 | 3 | 3 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z-55°C / Z+20°C | 8 | 6 | 5 | 5 | 4 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| For Capacitance > 1000 µF, add 0.5 per another 1000 µF for -25°C / +20°C add 1 per another 1000 µF for -40°C / +20°C add 1.5 per another 1000 µF for -55°C / +20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test conditions Duration time :as right Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :≤ ±20% of the initial measured value Dissipation factor :≤ 200% of the initial specified value Leakage current :≤ The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <th>D φ</th> <th>Life hours</th> </tr> <tr> <td>5-6.3 φ</td> <td>2000</td> </tr> <tr> <td>8 φ</td> <td>3000</td> </tr> <tr> <td>≥ 10 φ</td> <td>6000</td> </tr> </table> | D φ | Life hours | 5-6.3 φ | 2000 | 8 φ | 3000 | ≥ 10 φ | 6000 | | | | | | | | | | | | | | | | | | | | | | | | |
| D φ | Life hours | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-6.3 φ | 2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 φ | 3000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ≥ 10 φ | 6000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test conditions Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(µF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP ≤ 100 | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |
| 100 < CAP ≤ 1000 | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1.0 |
| 1000 < CAP | 0.63 | 0.78 | 0.87 | 0.91 | 0.98 | 1.0 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 |
|-----|------------|-----|-------------------|---------------|------------|-----|---------------------|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10 |
| d φ | 0.5 | | L < 20 0.5 | L ≥ 20 0.6 | | 0.6 | | 0.8 |
| | 0.5 | | 0.6 | | 0.6 | | 0.8 | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 | |
| | L: 25~35.5 | | L < 25 and L ≥ 40 | | L: 25~31.5 | | L < 25 and L ≥ 35.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 6.3 | 100 | 5x11 | 185 | 0.950 |
| 6.3 | 120 | 5x11 | 190 | 0.900 |
| 6.3 | 150 | 6.3x11 | 210 | 0.750 |
| 6.3 | 180 | 6.3x11 | 240 | 0.700 |
| 6.3 | 220 | 6.3x11 | 300 | 0.550 |
| 6.3 | 270 | 6.3x11 | 310 | 0.490 |
| 6.3 | 330 | 6.3x15 | 320 | 0.340 |
| 6.3 | 330 | 8x11.5 | 390 | 0.300 |
| 6.3 | 470 | 6.3x15 | 435 | 0.250 |
| 6.3 | 470 | 8x11.5 | 430 | 0.220 |
| 6.3 | 560 | 8x11.5 | 480 | 0.200 |
| 6.3 | 680 | 8x11.5 | 510 | 0.180 |
| 6.3 | 820 | 8x16 | 620 | 0.140 |
| 6.3 | 1000 | 8x16 | 710 | 0.100 |
| 6.3 | 1000 | 10x12.5 | 625 | 0.120 |
| 6.3 | 1200 | 10x16 | 810 | 0.095 |
| 6.3 | 1500 | 10x16 | 1050 | 0.074 |
| 6.3 | 1800 | 10x20 | 1200 | 0.065 |
| 6.3 | 2200 | 10x20 | 1300 | 0.060 |
| 6.3 | 2200 | 10x25 | 1400 | 0.057 |
| 6.3 | 2700 | 10x25 | 1400 | 0.055 |
| 6.3 | 2700 | 13x20 | 1410 | 0.052 |
| 6.3 | 3300 | 13x20 | 1500 | 0.048 |
| 6.3 | 4700 | 13x25 | 1800 | 0.032 |
| 6.3 | 4700 | 13x30 | 1950 | 0.025 |
| 6.3 | 6800 | 13x30 | 2020 | 0.024 |
| 6.3 | 6800 | 16x25 | 2230 | 0.021 |
| 6.3 | 8200 | 16x31.5 | 2530 | 0.020 |
| 6.3 | 10000 | 16x35.5 | 2740 | 0.019 |
| 10 | 22 | 5x11 | 56 | 2.600 |
| 10 | 27 | 5x11 | 57 | 2.400 |
| 10 | 33 | 5x11 | 58 | 2.200 |
| 10 | 39 | 5x11 | 95 | 1.850 |
| 10 | 47 | 5x11 | 120 | 1.200 |
| 10 | 56 | 5x11 | 130 | 1.050 |
| 10 | 68 | 5x11 | 145 | 0.890 |
| 10 | 82 | 5x11 | 170 | 0.750 |
| 10 | 100 | 5x11 | 205 | 0.480 |
| 10 | 120 | 5x11 | 230 | 0.440 |
| 10 | 150 | 6.3x11 | 270 | 0.370 |
| 10 | 180 | 6.3x11 | 290 | 0.350 |
| 10 | 220 | 6.3x11 | 330 | 0.280 |
| 10 | 270 | 6.3x15 | 370 | 0.250 |
| 10 | 270 | 8x11.5 | 390 | 0.210 |
| 10 | 330 | 6.3x15 | 445 | 0.150 |
| 10 | 330 | 8x11.5 | 430 | 0.160 |
| 10 | 470 | 8x11.5 | 555 | 0.115 |
| 10 | 560 | 8x11.5 | 620 | 0.095 |
| 10 | 680 | 8x16 | 630 | 0.090 |
| 10 | 820 | 8x20 | 870 | 0.084 |
| 10 | 1000 | 8x20 | 1040 | 0.070 |
| 10 | 1000 | 10x16 | 1010 | 0.072 |
| 10 | 1200 | 10x16 | 1130 | 0.062 |
| 10 | 1500 | 10x20 | 1270 | 0.056 |
| 10 | 1800 | 10x25 | 1430 | 0.045 |
| 10 | 1800 | 13x20 | 1450 | 0.048 |
| 10 | 2200 | 13x20 | 1690 | 0.040 |
| 10 | 2700 | 13x20 | 1800 | 0.033 |
| 10 | 3300 | 13x25 | 1980 | 0.029 |
| 10 | 4700 | 13x30 | 2300 | 0.025 |
| 10 | 4700 | 16x25 | 2100 | 0.029 |
| 10 | 6800 | 16x31.5 | 2340 | 0.023 |
| 10 | 8200 | 16x35.5 | 2580 | 0.019 |
| 10 | 10000 | 18x31.5 | 2770 | 0.017 |
| 16 | 10 | 5x11 | 37 | 4.000 |
| 16 | 15 | 5x11 | 60 | 3.520 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 16 | 22 | 5x11 | 70 | 2.000 |
| 16 | 27 | 5x11 | 110 | 1.600 |
| 16 | 33 | 5x11 | 130 | 1.260 |
| 16 | 39 | 5x11 | 150 | 0.870 |
| 16 | 47 | 5x11 | 190 | 0.520 |
| 16 | 56 | 5x11 | 205 | 0.490 |
| 16 | 68 | 5x11 | 210 | 0.450 |
| 16 | 82 | 6.3x11 | 250 | 0.370 |
| 16 | 100 | 6.3x11 | 260 | 0.310 |
| 16 | 120 | 6.3x11 | 290 | 0.290 |
| 16 | 150 | 6.3x11 | 300 | 0.260 |
| 16 | 180 | 6.3x15 | 370 | 0.230 |
| 16 | 180 | 8x11.5 | 368 | 0.240 |
| 16 | 220 | 6.3x15 | 470 | 0.200 |
| 16 | 220 | 8x11.5 | 455 | 0.210 |
| 16 | 270 | 8x11.5 | 490 | 0.170 |
| 16 | 330 | 8x11.5 | 550 | 0.120 |
| 16 | 470 | 8x16 | 745 | 0.092 |
| 16 | 470 | 10x12.5 | 722 | 0.095 |
| 16 | 560 | 10x12.5 | 780 | 0.082 |
| 16 | 680 | 10x16 | 920 | 0.074 |
| 16 | 820 | 10x16 | 1020 | 0.067 |
| 16 | 1000 | 10x20 | 1180 | 0.050 |
| 16 | 1200 | 10x25 | 1370 | 0.047 |
| 16 | 1500 | 10x25 | 1470 | 0.041 |
| 16 | 1800 | 13x20 | 1630 | 0.038 |
| 16 | 2200 | 13x20 | 1800 | 0.035 |
| 16 | 2200 | 13x25 | 1950 | 0.033 |
| 16 | 2700 | 13x25 | 2050 | 0.031 |
| 16 | 3300 | 13x30 | 2410 | 0.025 |
| 16 | 3300 | 16x25 | 2340 | 0.028 |
| 16 | 4700 | 16x31.5 | 2650 | 0.022 |
| 16 | 4700 | 18x25 | 2570 | 0.024 |
| 16 | 6800 | 18x31.5 | 2700 | 0.020 |
| 16 | 8200 | 18x35.5 | 2830 | 0.018 |
| 16 | 10000 | 18x40 | 3300 | 0.015 |
| 25 | 10 | 5x11 | 56 | 2.100 |
| 25 | 15 | 5x11 | 97 | 1.950 |
| 25 | 22 | 5x11 | 120 | 1.800 |
| 25 | 27 | 5x11 | 130 | 1.560 |
| 25 | 33 | 5x11 | 150 | 1.200 |
| 25 | 39 | 5x11 | 170 | 0.820 |
| 25 | 47 | 5x11 | 220 | 0.500 |
| 25 | 56 | 5x11 | 245 | 0.440 |
| 25 | 68 | 6.3x11 | 270 | 0.390 |
| 25 | 82 | 6.3x11 | 285 | 0.330 |
| 25 | 100 | 6.3x11 | 300 | 0.280 |
| 25 | 120 | 6.3x11 | 350 | 0.220 |
| 25 | 150 | 6.3x15 | 420 | 0.200 |
| 25 | 180 | 6.3x15 | 440 | 0.180 |
| 25 | 180 | 8x11.5 | 435 | 0.190 |
| 25 | 220 | 8x11.5 | 550 | 0.125 |
| 25 | 270 | 8x11.5 | 620 | 0.095 |
| 25 | 330 | 8x16 | 740 | 0.085 |
| 25 | 330 | 10x12.5 | 720 | 0.082 |
| 25 | 470 | 10x16 | 1040 | 0.065 |
| 25 | 560 | 10x16 | 1070 | 0.061 |
| 25 | 680 | 10x20 | 1280 | 0.052 |
| 25 | 820 | 10x25 | 1460 | 0.043 |
| 25 | 1000 | 10x25 | 1530 | 0.039 |
| 25 | 1000 | 13x25 | 1580 | 0.038 |
| 25 | 1200 | 13x25 | 1800 | 0.036 |
| 25 | 1500 | 13x25 | 2020 | 0.032 |
| 25 | 1800 | 13x30 | 2300 | 0.027 |
| 25 | 2200 | 13x30 | 2480 | 0.025 |
| 25 | 2200 | 16x25 | 2405 | 0.027 |

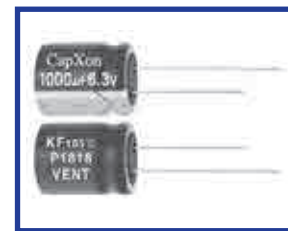
| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mAmps/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 25 | 2700 | 16x31.5 | 2670 | 0.024 |
| 25 | 3300 | 16x31.5 | 2960 | 0.020 |
| 25 | 3300 | 18x25 | 3050 | 0.022 |
| 25 | 4700 | 16x40 | 3490 | 0.022 |
| 25 | 4700 | 18x35.5 | 3520 | 0.021 |
| 25 | 6800 | 18x40 | 3600 | 0.017 |
| 35 | 10 | 5x11 | 70 | 1.900 |
| 35 | 15 | 5x11 | 115 | 1.720 |
| 35 | 22 | 5x11 | 130 | 1.360 |
| 35 | 27 | 5x11 | 140 | 1.200 |
| 35 | 33 | 5x11 | 175 | 0.950 |
| 35 | 39 | 6.3x11 | 200 | 0.740 |
| 35 | 47 | 6.3x11 | 250 | 0.440 |
| 35 | 56 | 6.3x11 | 270 | 0.400 |
| 35 | 68 | 6.3x11 | 300 | 0.350 |
| 35 | 82 | 6.3x15 | 350 | 0.290 |
| 35 | 100 | 6.3x15 | 390 | 0.180 |
| 35 | 100 | 8x11.5 | 380 | 0.190 |
| 35 | 120 | 8x11.5 | 460 | 0.170 |
| 35 | 150 | 8x16 | 580 | 0.150 |
| 35 | 180 | 8x16 | 630 | 0.130 |
| 35 | 220 | 8x16 | 740 | 0.095 |
| 35 | 220 | 10x12.5 | 720 | 0.098 |
| 35 | 270 | 8x20 | 830 | 0.086 |
| 35 | 270 | 10x16 | 840 | 0.088 |
| 35 | 330 | 10x16 | 995 | 0.065 |
| 35 | 470 | 10x20 | 1150 | 0.050 |
| 35 | 560 | 10x25 | 1310 | 0.048 |
| 35 | 680 | 13x20 | 1440 | 0.044 |
| 35 | 820 | 13x20 | 1600 | 0.038 |
| 35 | 1000 | 13x30 | 1950 | 0.036 |
| 35 | 1200 | 16x25 | 2200 | 0.029 |
| 35 | 1500 | 16x31.5 | 2520 | 0.027 |
| 35 | 1800 | 16x31.5 | 2560 | 0.026 |
| 35 | 2200 | 16x31.5 | 2650 | 0.025 |
| 35 | 2200 | 18x25 | 2570 | 0.026 |
| 35 | 2700 | 18x31.5 | 2660 | 0.023 |
| 35 | 3300 | 18x35.5 | 3000 | 0.020 |
| 35 | 4700 | 18x40 | 3000 | 0.019 |
| 50 | 0.47 | 5x11 | 15 | 5.000 |
| 50 | 1 | 5x11 | 25 | 3.950 |
| 50 | 2.2 | 5x11 | 33 | 2.600 |
| 50 | 3.3 | 5x11 | 45 | 2.000 |
| 50 | 4.7 | 5x11 | 58 | 1.890 |
| 50 | 5.6 | 5x11 | 80 | 1.850 |
| 50 | 6.8 | 5x11 | 85 | 1.770 |
| 50 | 8.2 | 5x11 | 90 | 1.720 |
| 50 | 10 | 5x11 | 100 | 1.700 |
| 50 | 15 | 5x11 | 110 | 1.530 |
| 50 | 22 | 6.3x11 | 135 | 1.000 |
| 50 | 27 | 6.3x11 | 160 | 0.930 |
| 50 | 33 | 6.3x11 | 230 | 0.740 |
| 50 | 39 | 6.3x11 | 240 | 0.650 |
| 50 | 47 | 8x11.5 | 285 | 0.500 |
| 50 | 56 | 8x11.5 | 300 | 0.390 |
| 50 | 68 | 8x11.5 | 340 | 0.300 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mAmps/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 50 | 82 | 8x11.5 | 400 | 0.250 |
| 50 | 100 | 8x16 | 475 | 0.180 |
| 50 | 120 | 8x16 | 520 | 0.170 |
| 50 | 150 | 10x16 | 675 | 0.130 |
| 50 | 180 | 10x16 | 760 | 0.095 |
| 50 | 220 | 10x20 | 900 | 0.085 |
| 50 | 270 | 10x20 | 950 | 0.075 |
| 50 | 330 | 10x25 | 1050 | 0.068 |
| 50 | 470 | 13x20 | 1490 | 0.048 |
| 50 | 560 | 13x20 | 1550 | 0.045 |
| 50 | 680 | 13x25 | 1840 | 0.041 |
| 50 | 820 | 13x30 | 2060 | 0.036 |
| 50 | 1000 | 13x40 | 2200 | 0.033 |
| 50 | 1000 | 16x31.5 | 2130 | 0.030 |
| 50 | 1200 | 16x31.5 | 2520 | 0.027 |
| 50 | 1500 | 16x35.5 | 2700 | 0.026 |
| 50 | 1800 | 18x31.5 | 2800 | 0.025 |
| 50 | 2200 | 18x35.5 | 2900 | 0.024 |
| 50 | 2700 | 18x40 | 2970 | 0.021 |
| 63 | 0.47 | 5x11 | 16 | 5.000 |
| 63 | 1 | 5x11 | 27 | 3.950 |
| 63 | 2.2 | 5x11 | 38 | 2.600 |
| 63 | 3.3 | 5x11 | 48 | 2.000 |
| 63 | 4.7 | 5x11 | 62 | 1.890 |
| 63 | 5.6 | 5x11 | 85 | 1.820 |
| 63 | 6.8 | 5x11 | 90 | 1.750 |
| 63 | 8.2 | 5x11 | 100 | 1.690 |
| 63 | 10 | 5x11 | 105 | 1.650 |
| 63 | 15 | 5x11 | 110 | 1.470 |
| 63 | 22 | 6.3x11 | 170 | 0.800 |
| 63 | 27 | 6.3x11 | 190 | 0.750 |
| 63 | 33 | 8x11.5 | 245 | 0.610 |
| 63 | 39 | 8x11.5 | 270 | 0.580 |
| 63 | 47 | 8x11.5 | 290 | 0.560 |
| 63 | 56 | 8x11.5 | 320 | 0.380 |
| 63 | 68 | 8x16 | 480 | 0.300 |
| 63 | 82 | 8x16 | 510 | 0.280 |
| 63 | 100 | 10x16 | 590 | 0.240 |
| 63 | 120 | 10x16 | 660 | 0.160 |
| 63 | 150 | 10x20 | 790 | 0.110 |
| 63 | 180 | 10x20 | 850 | 0.095 |
| 63 | 220 | 10x25 | 1020 | 0.082 |
| 63 | 220 | 13x20 | 1024 | 0.080 |
| 63 | 270 | 13x20 | 1100 | 0.072 |
| 63 | 330 | 10x30 | 1200 | 0.064 |
| 63 | 330 | 13x25 | 1160 | 0.067 |
| 63 | 470 | 16x25 | 1750 | 0.048 |
| 63 | 560 | 16x25 | 1830 | 0.044 |
| 63 | 680 | 16x31.5 | 2070 | 0.040 |
| 63 | 820 | 16x31.5 | 2100 | 0.035 |
| 63 | 1000 | 16x35.5 | 2450 | 0.031 |
| 63 | 1200 | 18x31.5 | 2500 | 0.026 |
| 63 | 1500 | 18x35.5 | 2700 | 0.025 |
| 63 | 1800 | 18x40 | 2900 | 0.024 |
| 63 | 2200 | 18x40 | 2990 | 0.023 |

KF Series Low Impedance

Features

- ◆ Used in communication equipments, switching power supply, industrial measuring instruments, etc.
- ◆ Endurance 2000~5000 Hrs at 105°C
- ◆ Safety vent construction design.
- ◆ RoHS Compliant



Specifications

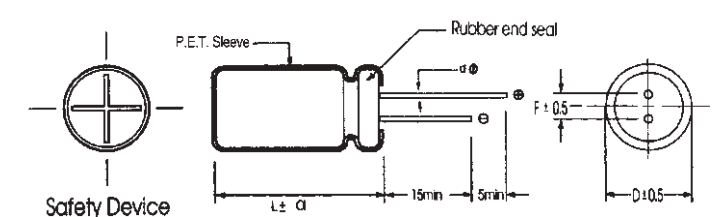
| Item | Performance Characteristics | | | | | | | | |
|---|---|--|-----|------------|---------|------|-----|------|--------|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C | | | | | | | |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 450 VDC | | | | | | | |
| Capacitance Range | 0.47 to 15000 µF | 0.47 to 470 µF | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (µA) After 2 minutes whichever is greater measured with rated working voltage applied. | I ≤ 0.03 CV (µA) After 2 minutes with rated working voltage applied. | | | | | | | |
| Dissipation Factor (tan δ · at 20°C · 120Hz) | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 | | | | | | | |
| | D.F. (%)max. | 18 16 14 12 10 9 8 8 | | | | | | | |
| | Working Voltage(VDC) | 160 200 250 350 400 420 450 | | | | | | | |
| | D.F. (%)max. | 12 12 12 15 15 17 17 | | | | | | | |
| For capacitance > 1000 µF, add 2% per another 1000µF. | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | |
| | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 | | | | | | | |
| | Z-25°C / Z+20°C | 4 3 3 3 3 3 2 2 | | | | | | | |
| | Z-40°C / Z+20°C | 8 6 4 3 3 3 3 3 | | | | | | | |
| | Working Voltage(VDC) | 160 200 250 350 400 450 | | | | | | | |
| | Z-25°C / Z+20°C | 2 2 3 5 5 6 | | | | | | | |
| | Z-40°C / Z+20°C | 3 6 6 6 6 - | | | | | | | |
| For capacitance > 1000 µF, add 0.5 per another 1000µF for -25°C / +20°C add 1 per another 1000µF for -40°C / +20°C | | | | | | | | | |
| Endurance | Test conditions | | | | | | | | |
| | Duration time : as right Ambient temperature : +105°C Applied voltage : Rated DC working voltage After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤ 200% of the initial specified value Leakage current : ≤ The initial specified value | <table border="1"> <tr> <th>D φ</th> <th>Life hours</th> </tr> <tr> <td>5-6.3 φ</td> <td>2000</td> </tr> <tr> <td>8 φ</td> <td>3000</td> </tr> <tr> <td>≥ 10 φ</td> <td>5000</td> </tr> </table> | D φ | Life hours | 5-6.3 φ | 2000 | 8 φ | 3000 | ≥ 10 φ |
| D φ | Life hours | | | | | | | | |
| 5-6.3 φ | 2000 | | | | | | | | |
| 8 φ | 3000 | | | | | | | | |
| ≥ 10 φ | 5000 | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | |
| | Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP ≤ 100 | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |
| 100 < CAP ≤ 1000 | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1.0 |
| 1000 < CAP | 0.63 | 0.78 | 0.87 | 0.91 | 0.98 | 1.0 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 |
|-----|------------|-----|-------------------|--------|------------|-----|---------------------|----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10 |
| d φ | 0.5 | | L < 20 | L ≥ 20 | 0.6 | | 0.8 | |
| | | | 0.5 | 0.6 | | | | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 | |
| | L: 25~35.5 | | L < 25 and L ≥ 40 | | L: 25~31.5 | | L < 25 and L ≥ 35.5 | |
| | 1.5 | | 1.5 | | 2.0 | | 2.0 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|---------------------------|
| 6.3 | 100 | 5x11 | 170 | 1.00 |
| 6.3 | 120 | 5x11 | 175 | 0.92 |
| 6.3 | 150 | 6.3x11 | 220 | 0.81 |
| 6.3 | 150 | 5x11 | 185 | 0.90 |
| 6.3 | 180 | 6.3x11 | 240 | 0.76 |
| 6.3 | 220 | 6.3x11 | 310 | 0.65 |
| 6.3 | 270 | 6.3x11 | 340 | 0.54 |
| 6.3 | 330 | 8x11.5 | 390 | 0.42 |
| 6.3 | 470 | 8x11.5 | 450 | 0.25 |
| 6.3 | 560 | 8x11.5 | 490 | 0.23 |
| 6.3 | 680 | 8x11.5 | 550 | 0.21 |
| 6.3 | 820 | 8x16 | 620 | 0.20 |
| 6.3 | 1000 | 10x12.5 | 770 | 0.17 |
| 6.3 | 1000 | 8x16 | 750 | 0.18 |
| 6.3 | 1200 | 10x16 | 860 | 0.16 |
| 6.3 | 1500 | 10x16 | 1100 | 0.14 |
| 6.3 | 1800 | 10x20 | 1250 | 0.11 |
| 6.3 | 2200 | 10x20 | 1380 | 0.090 |
| 6.3 | 2200 | 10x25 | 1470 | 0.095 |
| 6.3 | 2700 | 10x25 | 1490 | 0.075 |
| 6.3 | 2700 | 13x20 | 1550 | 0.075 |
| 6.3 | 3300 | 13x20 | 1650 | 0.036 |
| 6.3 | 4700 | 13x30 | 2100 | 0.036 |
| 6.3 | 4700 | 13x25 | 1900 | 0.040 |
| 6.3 | 5600 | 13x30 | 2160 | 0.034 |
| 6.3 | 6800 | 16x25 | 2350 | 0.032 |
| 6.3 | 8200 | 16x31.5 | 2550 | 0.027 |
| 6.3 | 10000 | 16x35.5 | 2700 | 0.024 |
| 6.3 | 15000 | 18x35.5 | 2950 | 0.023 |
| 10 | 22 | 5x11 | 98 | 2.700 |
| 10 | 33 | 5x11 | 100 | 2.600 |
| 10 | 47 | 5x11 | 150 | 1.340 |
| 10 | 56 | 5x11 | 160 | 1.230 |
| 10 | 68 | 5x11 | 170 | 1.050 |
| 10 | 100 | 5x11 | 210 | 0.800 |
| 10 | 120 | 6.3x11 | 250 | 0.750 |
| 10 | 150 | 6.3x11 | 290 | 0.610 |
| 10 | 180 | 6.3x11 | 320 | 0.460 |
| 10 | 220 | 6.3x11 | 340 | 0.350 |
| 10 | 270 | 8x11.5 | 400 | 0.300 |
| 10 | 330 | 8x11.5 | 460 | 0.270 |
| 10 | 470 | 8x11.5 | 580 | 0.250 |
| 10 | 560 | 10x12.5 | 635 | 0.160 |
| 10 | 560 | 8x11.5 | 550 | 0.170 |
| 10 | 680 | 10x12.5 | 765 | 0.110 |
| 10 | 820 | 10x16 | 890 | 0.100 |
| 10 | 1000 | 10x16 | 1040 | 0.076 |
| 10 | 1200 | 10x16 | 1200 | 0.067 |
| 10 | 1500 | 10x20 | 1400 | 0.062 |
| 10 | 1800 | 10x25 | 1550 | 0.058 |
| 10 | 2200 | 13x20 | 1750 | 0.041 |
| 10 | 2200 | 10x25 | 1650 | 0.052 |
| 10 | 2700 | 13x20 | 1900 | 0.035 |
| 10 | 3300 | 13x25 | 2000 | 0.031 |
| 10 | 4700 | 16x25 | 2100 | 0.030 |
| 10 | 5600 | 16x25 | 2290 | 0.028 |
| 10 | 6800 | 16x31.5 | 2650 | 0.026 |
| 10 | 8200 | 16x35.5 | 2770 | 0.026 |
| 10 | 10000 | 18x35.5 | 2850 | 0.024 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|---------------------------|
| 16 | 10 | 5x11 | 74 | 4.700 |
| 16 | 22 | 5x11 | 100 | 2.60 |
| 16 | 33 | 5x11 | 114 | 2.00 |
| 16 | 47 | 5x11 | 155 | 1.10 |
| 16 | 56 | 5x11 | 180 | 0.82 |
| 16 | 68 | 5x11 | 195 | 0.69 |
| 16 | 100 | 6.3x11 | 265 | 0.50 |
| 16 | 120 | 6.3x11 | 270 | 0.47 |
| 16 | 150 | 6.3x11 | 290 | 0.41 |
| 16 | 180 | 8x11.5 | 370 | 0.34 |
| 16 | 180 | 6.3x11 | 315 | 0.38 |
| 16 | 220 | 8x11.5 | 480 | 0.25 |
| 16 | 270 | 8x11.5 | 520 | 0.21 |
| 16 | 330 | 8x11.5 | 590 | 0.156 |
| 16 | 470 | 10x12.5 | 750 | 0.124 |
| 16 | 560 | 10x12.5 | 785 | 0.105 |
| 16 | 680 | 10x16 | 1100 | 0.092 |
| 16 | 820 | 10x16 | 1180 | 0.078 |
| 16 | 1000 | 10x20 | 1350 | 0.065 |
| 16 | 1200 | 10x25 | 1500 | 0.061 |
| 16 | 1500 | 10x30 | 1600 | 0.056 |
| 16 | 1500 | 13x20 | 1380 | 0.060 |
| 16 | 1800 | 13x20 | 1800 | 0.047 |
| 16 | 1800 | 10x25 | 1730 | 0.050 |
| 16 | 2200 | 13x25 | 2000 | 0.038 |
| 16 | 2200 | 13x20 | 1880 | 0.040 |
| 16 | 2700 | 13x25 | 2450 | 0.033 |
| 16 | 3300 | 16x25 | 2790 | 0.030 |
| 16 | 3300 | 13x30 | 2640 | 0.030 |
| 16 | 4700 | 16x31.5 | 2880 | 0.026 |
| 16 | 5600 | 16x35.5 | 2990 | 0.025 |
| 16 | 6800 | 18x35.5 | 3200 | 0.024 |
| 16 | 8200 | 18x35.5 | 3320 | 0.024 |
| 16 | 10000 | 18x40 | 3550 | 0.024 |
| 25 | 4.7 | 5x11 | 68 | 3.950 |
| 25 | 5.6 | 5x11 | 75 | 3.250 |
| 25 | 6.8 | 5x11 | 80 | 2.980 |
| 25 | 10 | 5x11 | 85 | 2.560 |
| 25 | 22 | 5x11 | 125 | 1.950 |
| 25 | 33 | 5x11 | 155 | 1.420 |
| 25 | 47 | 5x11 | 190 | 1.100 |
| 25 | 47 | 6.3x11 | 220 | 1.000 |
| 25 | 56 | 6.3x11 | 250 | 0.790 |
| 25 | 68 | 6.3x11 | 280 | 0.650 |
| 25 | 100 | 6.3x11 | 370 | 0.350 |
| 25 | 120 | 6.3x11 | 380 | 0.330 |
| 25 | 150 | 8x11.5 | 410 | 0.310 |
| 25 | 180 | 8x11.5 | 455 | 0.250 |
| 25 | 220 | 8x11.5 | 550 | 0.150 |
| 25 | 270 | 10x12.5 | 720 | 0.125 |
| 25 | 330 | 10x12.5 | 820 | 0.114 |
| 25 | 470 | 10x16 | 1200 | 0.076 |
| 25 | 560 | 10x16 | 1250 | 0.072 |
| 25 | 680 | 10x20 | 1320 | 0.065 |
| 25 | 820 | 10x20 | 1400 | 0.052 |
| 25 | 820 | 10x25 | 1530 | 0.052 |
| 25 | 1000 | 13x20 | 1650 | 0.045 |
| 25 | 1200 | 13x25 | 1980 | 0.041 |
| 25 | 1500 | 13x25 | 2210 | 0.038 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|---------------------------|
| 25 | 1800 | 16x25 | 2510 | 0.036 |
| 25 | 2200 | 16x25 | 2650 | 0.035 |
| 25 | 2700 | 16x25 | 2820 | 0.031 |
| 25 | 3300 | 16x31.5 | 3240 | 0.026 |
| 25 | 4700 | 16x35.5 | 3650 | 0.024 |
| 25 | 5600 | 18x35.5 | 3720 | 0.024 |
| 25 | 6800 | 18x40 | 3850 | 0.024 |
| 35 | 4.7 | 5x11 | 85 | 3.650 |
| 35 | 5.6 | 5x11 | 92 | 3.090 |
| 35 | 6.8 | 5x11 | 97 | 2.820 |
| 35 | 10 | 5x11 | 105 | 2.370 |
| 35 | 22 | 5x11 | 150 | 1.500 |
| 35 | 33 | 5x11 | 180 | 1.210 |
| 35 | 47 | 6.3x11 | 280 | 0.800 |
| 35 | 56 | 6.3x11 | 310 | 0.640 |
| 35 | 68 | 8x11.5 | 350 | 0.520 |
| 35 | 100 | 8x11.5 | 450 | 0.250 |
| 35 | 120 | 8x11.5 | 510 | 0.220 |
| 35 | 150 | 8x11.5 | 540 | 0.191 |
| 35 | 180 | 10x12.5 | 650 | 0.172 |
| 35 | 220 | 10x12.5 | 750 | 0.114 |
| 35 | 270 | 10x16 | 910 | 0.095 |
| 35 | 330 | 10x16 | 1050 | 0.079 |
| 35 | 470 | 10x20 | 1200 | 0.065 |
| 35 | 560 | 10x25 | 1500 | 0.061 |
| 35 | 680 | 13x20 | 1570 | 0.056 |
| 35 | 820 | 13x20 | 1700 | 0.048 |
| 35 | 1000 | 13x25 | 1900 | 0.042 |
| 35 | 1200 | 13x30 | 2130 | 0.039 |
| 35 | 1500 | 16x25 | 2270 | 0.036 |
| 35 | 1800 | 16x31.5 | 2700 | 0.035 |
| 35 | 2200 | 16x31.5 | 2780 | 0.034 |
| 35 | 2700 | 16x35.5 | 2850 | 0.029 |
| 35 | 3300 | 18x35.5 | 3100 | 0.026 |
| 35 | 4700 | 18x40 | 3500 | 0.024 |
| 50 | 0.47 | 5x11 | 25 | 5.400 |
| 50 | 1 | 5x11 | 40 | 4.000 |
| 50 | 2.2 | 5x11 | 55 | 2.800 |
| 50 | 3.3 | 5x11 | 60 | 2.200 |
| 50 | 4.7 | 5x11 | 90 | 2.000 |
| 50 | 5.6 | 5x11 | 105 | 1.930 |
| 50 | 6.8 | 5x11 | 110 | 1.890 |
| 50 | 10 | 5x11 | 120 | 1.820 |
| 50 | 22 | 6.3x11 | 150 | 1.250 |
| 50 | 33 | 6.3x11 | 250 | 0.800 |
| 50 | 47 | 6.3x11 | 290 | 0.650 |
| 50 | 56 | 8x11.5 | 310 | 0.490 |
| 50 | 68 | 8x11.5 | 375 | 0.330 |
| 50 | 100 | 10x12.5 | 480 | 0.170 |
| 50 | 120 | 10x12.5 | 530 | 0.156 |
| 50 | 150 | 10x12.5 | 590 | 0.132 |
| 50 | 180 | 10x16 | 860 | 0.114 |
| 50 | 220 | 10x16 | 930 | 0.096 |
| 50 | 270 | 10x20 | 1060 | 0.078 |
| 50 | 330 | 10x25 | 1150 | 0.065 |
| 50 | 470 | 13x20 | 1590 | 0.055 |
| 50 | 560 | 13x20 | 1740 | 0.050 |
| 50 | 680 | 13x25 | 1930 | 0.044 |
| 50 | 820 | 13x30 | 2100 | 0.039 |
| 50 | 1000 | 16x25 | 2300 | 0.036 |
| 50 | 1200 | 16x31.5 | 2650 | 0.036 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|---------------------------|
| 50 | 1500 | 16x35.5 | 2750 | 0.034 |
| 50 | 1800 | 16x35.5 | 2850 | 0.034 |
| 50 | 2200 | 18x35.5 | 3040 | 0.032 |
| 50 | 2700 | 18x40 | 3070 | 0.027 |
| 50 | 3300 | 18x40 | 3100 | 0.025 |
| 63 | 0.47 | 5x11 | 25 | 5.400 |
| 63 | 1 | 5x11 | 33 | 4.000 |
| 63 | 2.2 | 5x11 | 45 | 2.800 |
| 63 | 3.3 | 5x11 | 58 | 2.200 |
| 63 | 4.7 | 5x11 | 65 | 2.000 |
| 63 | 5.6 | 5x11 | 95 | 1.900 |
| 63 | 6.8 | 5x11 | 100 | 1.820 |
| 63 | 10 | 5x11 | 110 | 1.750 |
| 63 | 22 | 6.3x11 | 180 | 0.800 |
| 63 | 33 | 8x11.5 | 270 | 0.610 |
| 63 | 47 | 8x11.5 | 300 | 0.560 |
| 63 | 56 | 8x11.5 | 330 | 0.380 |
| 63 | 68 | 10x12.5 | 480 | 0.210 |
| 63 | 100 | 10x16 | 610 | 0.140 |
| 63 | 120 | 10x16 | 620 | 0.130 |
| 63 | 150 | 10x16 | 700 | 0.110 |
| 63 | 180 | 10x20 | 800 | 0.100 |
| 63 | 220 | 10x20 | 920 | 0.080 |
| 63 | 270 | 13x20 | 1150 | 0.065 |
| 63 | 330 | 13x20 | 1250 | 0.055 |
| 63 | 470 | 13x25 | 1620 | 0.053 |
| 63 | 560 | 13x25 | 1680 | 0.049 |
| 63 | 680 | 13x30 | 1950 | 0.043 |
| 63 | 820 | 16x25 | 2150 | 0.038 |
| 63 | 1000 | 16x31.5 | 2350 | 0.034 |
| 63 | 1200 | 16x35.5 | 2550 | 0.032 |
| 63 | 1500 | 18x35.5 | 2710 | 0.031 |
| 63 | 1800 | 18x40 | 3000 | 0.027 |
| 80 | 0.47 | 5x11 | 18 | 5.850 |
| 80 | 1 | 5x11 | 24 | 4.300 |
| 80 | 2.2 | 5x11 | 36 | 3.200 |
| 80 | 3.3 | 5x11 | 47 | 2.700 |
| 80 | 4.7 | 5x11 | 63 | 2.500 |
| 80 | 5.6 | 5x11 | 85 | 2.300 |
| 80 | 6.8 | 5x11 | 92 | 1.850 |
| 80 | 10 | 5x11 | 105 | 1.700 |
| 80 | 22 | 6.3x11 | 175 | 0.830 |
| 80 | 33 | 8x11.5 | 280 | 0.610 |
| 80 | 47 | 8x11.5 | 310 | 0.550 |
| 80 | 56 | 8x11.5 | 360 | 0.410 |
| 80 | 68 | 8x16 | 400 | 0.280 |
| 80 | 100 | 8x20 | 500 | 0.220 |
| 80 | 120 | 10x16 | 580 | 0.180 |
| 80 | 150 | 10x20 | 680 | 0.150 |
| 80 | 180 | 10x20 | 800 | 0.112 |
| 80 | 220 | 13x20 | 900 | 0.090 |
| 80 | 270 | 13x20 | 1080 | 0.095 |
| 80 | 330 | 13x25 | 1210 | 0.085 |
| 80 | 470 | 16x25 | 1500 | 0.070 |
| 80 | 560 | 16x25 | 1640 | 0.062 |
| 80 | 680 | 18x25 | 1680 | 0.059 |
| 80 | 820 | 18x31.5 | 1780 | 0.056 |
| 80 | 1000 | 18x31.5 | 1850 | 0.045 |
| 80 | 1200 | 18x35.5 | 1960 | 0.042 |
| 80 | 1500 | 18x40 | 2160 | 0.036 |
| 100 | 0.47 | 5x11 | 20 | 5.900 |

| VV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 100 | 1 | 5x11 | 30 | 4.400 |
| 100 | 2.2 | 5x11 | 42 | 3.300 |
| 100 | 3.3 | 5x11 | 55 | 2.800 |
| 100 | 4.7 | 5x11 | 72 | 2.600 |
| 100 | 5.6 | 5x11 | 100 | 2.330 |
| 100 | 6.8 | 6.3x11 | 115 | 1.950 |
| 100 | 10 | 6.3x11 | 130 | 1.770 |
| 100 | 22 | 8x11.5 | 220 | 0.850 |
| 100 | 33 | 10x12.5 | 320 | 0.690 |
| 100 | 47 | 10x12.5 | 370 | 0.580 |
| 100 | 56 | 10x12.5 | 400 | 0.430 |
| 100 | 56 | 10x16 | 440 | 0.420 |
| 100 | 68 | 10x16 | 470 | 0.350 |
| 100 | 100 | 10x25 | 560 | 0.300 |
| 100 | 120 | 10x25 | 660 | 0.220 |
| 100 | 150 | 13x20 | 780 | 0.174 |
| 100 | 180 | 13x20 | 820 | 0.142 |
| 100 | 220 | 13x25 | 950 | 0.130 |
| 100 | 270 | 13x30 | 1120 | 0.110 |
| 100 | 330 | 16x25 | 1440 | 0.100 |
| 100 | 470 | 16x31.5 | 1650 | 0.090 |
| 100 | 560 | 16x35.5 | 1720 | 0.085 |
| 100 | 680 | 18x35.5 | 1790 | 0.080 |
| 100 | 820 | 18x35.5 | 1840 | 0.071 |
| 100 | 1000 | 18x40 | 1930 | 0.066 |
| 160 | 0.47 | 5x11 | 36 | 18.500 |
| 160 | 1 | 6.3x11 | 45 | 12.000 |
| 160 | 2.2 | 6.3x11 | 55 | 9.90 |
| 160 | 3.3 | 8x11.5 | 70 | 4.31 |
| 160 | 4.7 | 8x11.5 | 80 | 4.16 |
| 160 | 5.6 | 10x12.5 | 91 | 3.61 |
| 160 | 6.8 | 10x16 | 100 | 3.12 |
| 160 | 10 | 10x12.5 | 126 | 3.00 |
| 160 | 10 | 10x16 | 140 | 2.69 |
| 160 | 22 | 10x16 | 205 | 1.30 |
| 160 | 33 | 10x20 | 260 | 1.10 |
| 160 | 47 | 10x20 | 276 | 1.65 |
| 160 | 47 | 13x20 | 320 | 0.91 |
| 160 | 56 | 13x20 | 340 | 0.67 |
| 160 | 56 | 13x25 | 370 | 0.66 |
| 160 | 68 | 13x25 | 450 | 0.56 |
| 160 | 100 | 16x25 | 540 | 0.47 |
| 160 | 120 | 16x25 | 560 | 0.35 |
| 160 | 150 | 16x31.5 | 710 | 0.26 |
| 160 | 180 | 16x35.5 | 760 | 0.22 |
| 160 | 220 | 16x35.5 | 820 | 0.19 |
| 160 | 270 | 18x35.5 | 990 | 0.18 |
| 160 | 330 | 18x40 | 1180 | 0.16 |
| 200 | 0.47 | 5x11 | 36 | 16.50 |
| 200 | 0.47 | 6.3x11 | 41 | 16.50 |
| 200 | 1 | 6.3x11 | 45 | 7.76 |
| 200 | 2.2 | 6.3x11 | 55 | 5.18 |
| 200 | 3.3 | 8x11.5 | 71 | 4.25 |
| 200 | 4.7 | 8x11.5 | 78 | 5.00 |
| 200 | 4.7 | 10x12.5 | 85 | 4.12 |
| 200 | 5.6 | 8x11.5 | 90 | 4.50 |
| 200 | 5.6 | 10x12.5 | 95 | 3.55 |
| 200 | 6.8 | 8x16 | 115 | 3.25 |
| 200 | 6.8 | 10x16 | 140 | 2.71 |
| 200 | 10 | 8x11.5 | 115 | 3.75 |
| 200 | 10 | 10x16 | 150 | 2.02 |

| VV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 200 | 22 | 10x16 | 186 | 1.80 |
| 200 | 22 | 10x20 | 205 | 1.40 |
| 200 | 33 | 10x20 | 280 | 1.00 |
| 200 | 33 | 13x20 | 330 | 0.80 |
| 200 | 47 | 10x20 | 311 | 0.72 |
| 200 | 47 | 13x20 | 360 | 0.65 |
| 200 | 47 | 13x25 | 400 | 0.62 |
| 200 | 56 | 13x20 | 430 | 0.45 |
| 200 | 68 | 13x25 | 480 | 0.42 |
| 200 | 68 | 16x25 | 540 | 0.35 |
| 200 | 68 | 16x25 | 780 | 0.30 |
| 200 | 100 | 16x31.5 | 820 | 0.28 |
| 200 | 120 | 16x25 | 740 | 0.28 |
| 200 | 120 | 16x31.5 | 830 | 0.26 |
| 200 | 150 | 16x31.5 | 840 | 0.25 |
| 200 | 150 | 16x35.5 | 860 | 0.23 |
| 200 | 180 | 18x31.5 | 920 | 0.20 |
| 200 | 220 | 18x35.5 | 1050 | 0.19 |
| 200 | 220 | 18x40 | 1090 | 0.16 |
| 250 | 0.47 | 5x11 | 40 | 8.85 |
| 250 | 1 | 6.3x11 | 50 | 6.54 |
| 250 | 2.2 | 8x11.5 | 72 | 4.12 |
| 250 | 3.3 | 8x11.5 | 75 | 3.85 |
| 250 | 4.7 | 8x11.5 | 85 | 3.50 |
| 250 | 4.7 | 10x12.5 | 100 | 2.95 |
| 250 | 5.6 | 8x11.5 | 95 | 2.93 |
| 250 | 5.6 | 10x12.5 | 105 | 2.90 |
| 250 | 6.8 | 8x16 | 124 | 2.80 |
| 250 | 6.8 | 10x12.5 | 126 | 2.80 |
| 250 | 6.8 | 10x16 | 140 | 1.86 |
| 250 | 10 | 8x16 | 141 | 1.80 |
| 250 | 10 | 10x12.5 | 144 | 1.75 |
| 250 | 10 | 10x16 | 160 | 1.40 |
| 250 | 22 | 10x16 | 190 | 1.60 |
| 250 | 22 | 10x20 | 210 | 1.30 |
| 250 | 33 | 10x20 | 224 | 1.40 |
| 250 | 33 | 10x25 | 248 | 1.25 |
| 250 | 33 | 13x20 | 310 | 0.90 |
| 250 | 47 | 13x20 | 375 | 0.60 |
| 250 | 47 | 13x25 | 405 | 0.45 |
| 250 | 56 | 13x25 | 420 | 0.42 |
| 250 | 68 | 16x25 | 490 | 0.38 |
| 250 | 68 | 16x31.5 | 675 | 0.27 |
| 250 | 120 | 16x31.5 | 692 | 0.26 |
| 250 | 120 | 16x35.5 | 730 | 0.25 |
| 250 | 150 | 16x35.5 | 750 | 0.24 |
| 250 | 150 | 18x31.5 | 750 | 0.23 |
| 250 | 180 | 18x35.5 | 830 | 0.21 |
| 250 | 220 | 18x31.5 | 850 | 0.20 |
| 250 | 220 | 18x40 | 910 | 0.19 |
| 350 | 0.47 | 6.3x11 | 40 | 8.82 |
| 350 | 1 | 6.3x11.5 | 50 | 7.90 |
| 350 | 1 | 6.3x11 | 58 | 6.35 |
| 350 | 2.2 | 8x11.5 | 75 | 5.30 |
| 350 | 2.2 | 10x12.5 | 86 | 4.02 |
| 350 | 3.3 | 10x12.5 | 90 | 3.80 |
| 350 | 3.3 | 10x16 | 100 | 3.52 |
| 350 | 4.7 | 10x16 | 118 | 3.13 |
| 350 | 4.7 | 10x20 | 130 | 2.77 |
| 350 | 5.6 | 10x16 | 120 | 2.76 |
| 350 | 5.6 | 10x20 | 132 | 2.58 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|-----------------------------|
| 350 | 6.8 | 10x16 | 148 | 2.43 |
| 350 | 6.8 | 10x25 | 180 | 1.65 |
| 350 | 10 | 10x16 | 165 | 1.64 |
| 350 | 10 | 10x25 | 200 | 1.35 |
| 350 | 22 | 13x20 | 220 | 1.22 |
| 350 | 33 | 13x20 | 263 | 1.02 |
| 350 | 33 | 13x25 | 290 | 0.86 |
| 350 | 47 | 16x25 | 389 | 0.76 |
| 350 | 47 | 16x31.5 | 430 | 0.62 |
| 350 | 56 | 16x35.5 | 460 | 0.60 |
| 350 | 68 | 16x31.5 | 475 | 0.57 |
| 350 | 68 | 16x35.5 | 481 | 0.56 |
| 350 | 100 | 18x31.5 | 487 | 0.56 |
| 350 | 100 | 18x35.5 | 513 | 0.55 |
| 350 | 120 | 18x35.5 | 525 | 0.54 |
| 350 | 120 | 18x40 | 560 | 0.52 |
| 350 | 150 | 18x40 | 590 | 0.50 |
| 400 | 0.47 | 6.3x11 | 26 | 33.0 |
| 400 | 1 | 8x11.5 | 36 | 16.5 |
| 400 | 2.2 | 10x12.5 | 76 | 13.0 |
| 400 | 2.2 | 8x11.5 | 65 | 13.0 |
| 400 | 3.3 | 8x9 | 78 | 14.0 |
| 400 | 3.3 | 8x11.5 | 86 | 12.0 |
| 400 | 4.7 | 8x11.5 | 89 | 11.0 |
| 400 | 4.7 | 10x12.5 | 105 | 10.0 |
| 400 | 5.6 | 8x16 | 105 | 8.0 |
| 400 | 5.6 | 10x12.5 | 120 | 9.0 |
| 400 | 6.8 | 10x12.5 | 144 | 7.7 |
| 400 | 6.8 | 10x16 | 160 | 7.5 |
| 400 | 10 | 10x14 | 201 | 5.0 |
| 400 | 10 | 10x16 | 213 | 3.8 |
| 400 | 10 | 10x20 | 235 | 3.6 |
| 400 | 15 | 10x20 | 240 | 3.0 |
| 400 | 22 | 13x16 | 268 | 2.8 |
| 400 | 22 | 13x20 | 295 | 2.7 |
| 400 | 33 | 13x20 | 399 | 1.8 |
| 400 | 33 | 13x25 | 440 | 1.6 |
| 400 | 33 | 16x20 | 459 | 1.9 |
| 400 | 47 | 16x20 | 539 | 1.6 |
| 400 | 47 | 16x25 | 580 | 1.4 |
| 400 | 56 | 16x25 | 587 | 1.03 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|-----------------------------|
| 400 | 56 | 16x31.5 | 650 | 0.85 |
| 400 | 68 | 16x31.5 | 800 | 0.80 |
| 400 | 68 | 18x25 | 774 | 0.76 |
| 400 | 100 | 18x31.5 | 854 | 0.70 |
| 400 | 100 | 18x35.5 | 900 | 1.30 |
| 400 | 120 | 18x35.5 | 930 | 1.30 |
| 420 | 0.47 | 6.3x11 | 28 | 34.00 |
| 420 | 1 | 8x11.5 | 38 | 17.00 |
| 420 | 2.2 | 10x12.5 | 58 | 12.10 |
| 420 | 3.3 | 10x12.5 | 87 | 11.00 |
| 420 | 4.7 | 10x16 | 102 | 8.50 |
| 420 | 5.6 | 10x16 | 109 | 6.80 |
| 420 | 6.8 | 10x16 | 160 | 6.00 |
| 420 | 10 | 10x20 | 180 | 3.70 |
| 420 | 22 | 13x25 | 330 | 2.70 |
| 420 | 33 | 16x25 | 480 | 1.80 |
| 420 | 47 | 16x31.5 | 620 | 1.10 |
| 420 | 56 | 16x35.5 | 670 | 0.90 |
| 420 | 68 | 18x31.5 | 750 | 0.80 |
| 420 | 100 | 18x35.5 | 820 | 0.70 |
| 450 | 0.47 | 8x11.5 | 30 | 34.00 |
| 450 | 1 | 8x11.5 | 45 | 17.35 |
| 450 | 2.2 | 10x16 | 65 | 10.250 |
| 450 | 3.3 | 10x16 | 89 | 10.00 |
| 450 | 4.7 | 10x20 | 105 | 5.00 |
| 450 | 5.6 | 10x20 | 110 | 4.75 |
| 450 | 6.8 | 10x20 | 135 | 4.05 |
| 450 | 10 | 10x20 | 163 | 7.00 |
| 450 | 10 | 10x25 | 180 | 3.75 |
| 450 | 10 | 13x20 | 189 | 6.80 |
| 450 | 22 | 13x25 | 320 | 2.80 |
| 450 | 33 | 16x25 | 460 | 2.20 |
| 450 | 33 | 18x20 | 458 | 2.70 |
| 450 | 47 | 16x35.5 | 650 | 1.05 |
| 450 | 47 | 18x25 | 596 | 1.65 |
| 450 | 56 | 18x31.5 | 730 | 0.95 |
| 450 | 68 | 18x31.5 | 721 | 0.80 |
| 450 | 68 | 18x35.5 | 760 | 0.75 |
| 450 | 100 | 18x35.5 | 825 | 1.10 |
| 450 | 100 | 18x40 | 880 | 0.74 |
| 450 | 120 | 18x40 | 980 | 1.00 |

KZ Series Low Impedance



Features

- ◆ Used in communication equipments, switching power supply, industrial measuring instruments, etc.
- ◆ Endurance 1000~2000hrs.
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

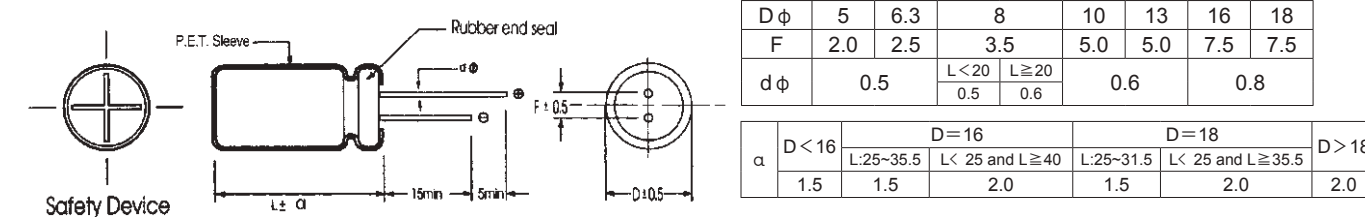
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | |
|---|---|----------------------|------------|---------|------|-------|------|----|-----------------|----|----|----|----|----|---|-----------------|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 50 VDC | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.47 to 6800 μF | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | $I \leq 0.01 CV$ or $3 (\mu A)$ After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$ · at 20°C · 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>D.F. (%)max.</td> <td>18</td> <td>16</td> <td>14</td> <td>12</td> <td>10</td> <td>9</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F. (%)max. | 18 | 16 | 14 | 12 | 10 | 9 | | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | |
| D.F. (%)max. | 18 | 16 | 14 | 12 | 10 | 9 | | | | | | | | | | | | | | | | |
| For capacitance > 1000 μF, add 2% per another 1000uF. | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-25°C / Z+20°C | 4 | 3 | 3 | 3 | 3 | 3 | Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 4 | 3 | 3 | 3 | 3 | 3 | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 | | | | | | | | | | | | | | | | |
| For capacitance > 1000 μF, add 0.5 per another 1000uF for -25°C / +20°C add 1 per another 1000uF for -40°C / +20°C | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test conditions Duration time : as right Ambient temperature : +105°C Applied voltage : Rated DC working voltage | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>D φ</td> <td>Life hours</td> </tr> <tr> <td>5-6.3 φ</td> <td>1000</td> </tr> <tr> <td>≥ 8 φ</td> <td>2000</td> </tr> </table> | D φ | Life hours | 5-6.3 φ | 1000 | ≥ 8 φ | 2000 | | | | | | | | | | | | | | | |
| D φ | Life hours | | | | | | | | | | | | | | | | | | | | | |
| 5-6.3 φ | 1000 | | | | | | | | | | | | | | | | | | | | | |
| ≥ 8 φ | 2000 | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤ 200% of the initial specified value Leakage current : ≤ The initial specified value | | | | | | | | | | | | | | | | | | | | | |
| | Test conditions Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP ≤ 100 | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |
| 100 < CAP ≤ 1000 | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1.0 |
| 1000 < CAP | 0.63 | 0.78 | 0.87 | 0.91 | 0.98 | 1.0 |

Diagram of Dimensions:(unit:mm)



Radial

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|---------------------------|
| 6.3 | 22 | 5x11 | 80 | 3.00 |
| 6.3 | 33 | 5x11 | 90 | 2.00 |
| 6.3 | 47 | 5x11 | 140 | 1.50 |
| 6.3 | 56 | 5x11 | 150 | 1.50 |
| 6.3 | 68 | 5x11 | 160 | 1.10 |
| 6.3 | 100 | 5x11 | 170 | 1.00 |
| 6.3 | 120 | 5x11 | 173 | 0.90 |
| 6.3 | 150 | 5x11 | 178 | 0.85 |
| 6.3 | 180 | 6.3x11 | 215 | 0.72 |
| 6.3 | 220 | 6.3x11 | 295 | 0.62 |
| 6.3 | 270 | 6.3x11 | 320 | 0.50 |
| 6.3 | 330 | 6.3x11 | 380 | 0.45 |
| 6.3 | 470 | 8x11.5 | 460 | 0.22 |
| 6.3 | 560 | 8x11.5 | 490 | 0.22 |
| 6.3 | 680 | 8x11.5 | 520 | 0.19 |
| 6.3 | 820 | 8x11.5 | 605 | 0.19 |
| 6.3 | 1000 | 8x11.5 | 680 | 0.18 |
| 6.3 | 1200 | 10x12.5 | 750 | 0.15 |
| 6.3 | 1500 | 10x12.5 | 820 | 0.14 |
| 6.3 | 1800 | 10x16 | 920 | 0.12 |
| 6.3 | 2200 | 10x20 | 1150 | 0.10 |
| 6.3 | 2700 | 10x20 | 1500 | 0.075 |
| 6.3 | 3300 | 10x20 | 1620 | 0.060 |
| 6.3 | 3900 | 13x25 | 1820 | 0.058 |
| 6.3 | 4700 | 13x25 | 1920 | 0.040 |
| 6.3 | 5600 | 13x30 | 2210 | 0.038 |
| 6.3 | 6800 | 16x25 | 2380 | 0.032 |
| 10 | 22 | 5x11 | 90 | 2.50 |
| 10 | 33 | 5x11 | 105 | 2.00 |
| 10 | 47 | 5x11 | 155 | 1.30 |
| 10 | 56 | 5x11 | 165 | 1.20 |
| 10 | 68 | 5x11 | 175 | 1.00 |
| 10 | 100 | 5x11 | 215 | 0.75 |
| 10 | 120 | 6.3x11 | 240 | 0.73 |
| 10 | 150 | 6.3x11 | 225 | 0.60 |
| 10 | 180 | 6.3x11 | 280 | 0.58 |
| 10 | 220 | 6.3x11 | 300 | 0.43 |
| 10 | 270 | 8x11.5 | 405 | 0.28 |
| 10 | 330 | 8x11.5 | 465 | 0.25 |
| 10 | 470 | 8x11.5 | 500 | 0.22 |
| 10 | 560 | 8x11.5 | 620 | 0.17 |
| 10 | 680 | 8x11.5 | 750 | 0.12 |
| 10 | 820 | 10x12.5 | 805 | 0.10 |
| 10 | 1000 | 10x12.5 | 1050 | 0.08 |
| 10 | 1200 | 10x16 | 1150 | 0.065 |
| 10 | 1500 | 10x16 | 1210 | 0.062 |
| 10 | 1800 | 10x20 | 1280 | 0.060 |
| 10 | 2200 | 10x20 | 1520 | 0.050 |
| 10 | 2700 | 13x20 | 1580 | 0.048 |
| 10 | 3300 | 13x20 | 1700 | 0.043 |
| 10 | 3900 | 13x25 | 1860 | 0.040 |
| 10 | 4700 | 13x25 | 1950 | 0.038 |
| 10 | 5600 | 16x25 | 2290 | 0.033 |
| 10 | 6800 | 16x25 | 2480 | 0.028 |
| 16 | 10 | 5x11 | 80 | 4.00 |
| 16 | 22 | 5x11 | 110 | 2.00 |
| 16 | 33 | 5x11 | 114 | 1.80 |
| 16 | 47 | 5x11 | 160 | 1.00 |
| 16 | 56 | 5x11 | 180 | 0.80 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|---------------------------|
| 16 | 68 | 5x11 | 200 | 0.65 |
| 16 | 100 | 5x11 | 255 | 0.55 |
| 16 | 120 | 6.3x11 | 270 | 0.45 |
| 16 | 150 | 6.3x11 | 292 | 0.40 |
| 16 | 180 | 6.3x11 | 380 | 0.32 |
| 16 | 220 | 6.3x11 | 430 | 0.25 |
| 16 | 270 | 8x11.5 | 480 | 0.20 |
| 16 | 330 | 8x11.5 | 595 | 0.15 |
| 16 | 470 | 8x11.5 | 650 | 0.15 |
| 16 | 560 | 8x11.5 | 730 | 0.12 |
| 16 | 680 | 10x12.5 | 890 | 0.09 |
| 16 | 820 | 10x12.5 | 980 | 0.085 |
| 16 | 1000 | 10x16 | 1180 | 0.070 |
| 16 | 1200 | 10x20 | 1320 | 0.060 |
| 16 | 1500 | 10x20 | 1450 | 0.056 |
| 16 | 1800 | 10x20 | 1510 | 0.053 |
| 16 | 2200 | 13x20 | 1820 | 0.040 |
| 16 | 2700 | 13x20 | 2050 | 0.035 |
| 16 | 3300 | 13x25 | 2300 | 0.033 |
| 16 | 3900 | 16x25 | 2550 | 0.033 |
| 16 | 4700 | 16x25 | 2580 | 0.032 |
| 16 | 5600 | 16x31.5 | 2650 | 0.030 |
| 16 | 6800 | 16x31.5 | 2900 | 0.024 |
| 25 | 4.7 | 5x11 | 72 | 3.50 |
| 25 | 5.6 | 5x11 | 75 | 3.50 |
| 25 | 6.8 | 5x11 | 83 | 2.80 |
| 25 | 10 | 5x11 | 87 | 2.50 |
| 25 | 22 | 5x11 | 118 | 1.80 |
| 25 | 33 | 5x11 | 155 | 1.40 |
| 25 | 47 | 5x11 | 183 | 0.90 |
| 25 | 56 | 5x11 | 207 | 0.83 |
| 25 | 68 | 5x11 | 210 | 0.69 |
| 25 | 100 | 6.3x11 | 378 | 0.34 |
| 25 | 120 | 6.3x11 | 380 | 0.33 |
| 25 | 150 | 8x11.5 | 390 | 0.325 |
| 25 | 180 | 8x11.5 | 430 | 0.25 |
| 25 | 220 | 8x11.5 | 550 | 0.15 |
| 25 | 270 | 8x11.5 | 520 | 0.15 |
| 25 | 330 | 8x11.5 | 710 | 0.13 |
| 25 | 470 | 8x11.5 | 980 | 0.078 |
| 25 | 470 | 8x16 | 1050 | 0.070 |
| 25 | 560 | 10x16 | 1080 | 0.065 |
| 25 | 680 | 10x16 | 1100 | 0.065 |
| 25 | 820 | 10x20 | 1350 | 0.050 |
| 25 | 1000 | 10x20 | 1580 | 0.045 |
| 25 | 1200 | 13x20 | 1720 | 0.040 |
| 25 | 1500 | 13x20 | 1780 | 0.040 |
| 25 | 1800 | 13x20 | 1980 | 0.035 |
| 25 | 2200 | 13x25 | 2000 | 0.033 |
| 25 | 2700 | 13x25 | 2250 | 0.032 |
| 25 | 3300 | 16x25 | 2580 | 0.027 |
| 25 | 4700 | 16x31.5 | 2850 | 0.025 |
| 25 | 5600 | 16x35.5 | 3000 | 0.025 |
| 25 | 6800 | 18x35.5 | 3550 | 0.025 |
| 35 | 4.7 | 5x11 | 87 | 3.50 |
| 35 | 5.6 | 5x11 | 95 | 3.00 |
| 35 | 6.8 | 5x11 | 98 | 2.70 |
| 35 | 10 | 5x11 | 107 | 2.20 |
| 35 | 22 | 5x11 | 150 | 1.50 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 35 | 33 | 5x11 | 180 | 1.20 |
| 35 | 47 | 5x11 | 257 | 0.75 |
| 35 | 56 | 6.3x11 | 283 | 0.60 |
| 35 | 68 | 6.3x11 | 290 | 0.55 |
| 35 | 100 | 6.3x11 | 430 | 0.26 |
| 35 | 120 | 8x11.5 | 470 | 0.20 |
| 35 | 150 | 8x11.5 | 510 | 0.20 |
| 35 | 180 | 8x11.5 | 570 | 0.18 |
| 35 | 220 | 8x11.5 | 620 | 0.13 |
| 35 | 270 | 10x12.5 | 850 | 0.12 |
| 35 | 330 | 8x16 | 1050 | 0.08 |
| 35 | 470 | 10x16 | 1100 | 0.065 |
| 35 | 560 | 13x20 | 1300 | 0.060 |
| 35 | 680 | 13x20 | 1570 | 0.056 |
| 35 | 820 | 13x20 | 1700 | 0.048 |
| 35 | 1000 | 13x20 | 1820 | 0.042 |
| 35 | 1200 | 13x25 | 2130 | 0.038 |
| 35 | 1500 | 13x25 | 2150 | 0.038 |
| 35 | 1800 | 13x25 | 2450 | 0.035 |
| 35 | 2200 | 16x25 | 2650 | 0.034 |
| 35 | 2700 | 16x31.5 | 2690 | 0.030 |
| 35 | 3300 | 16x35.5 | 2750 | 0.027 |
| 35 | 4700 | 18x35.5 | 2940 | 0.025 |
| 35 | 5600 | 18x35.5 | 3050 | 0.024 |
| 50 | 0.47 | 5x11 | 28 | 5.00 |
| 50 | 1 | 5x11 | 42 | 3.80 |
| 50 | 2.2 | 5x11 | 55 | 2.80 |
| 50 | 3.3 | 5x11 | 62 | 2.00 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 50 | 4.7 | 5x11 | 90 | 2.00 |
| 50 | 5.6 | 5x11 | 108 | 1.80 |
| 50 | 6.8 | 5x11 | 112 | 1.80 |
| 50 | 10 | 5x11 | 120 | 1.75 |
| 50 | 22 | 5x11 | 150 | 1.50 |
| 50 | 33 | 6.3x11 | 233 | 0.78 |
| 50 | 47 | 6.3x11 | 270 | 0.65 |
| 50 | 56 | 6.3x11 | 290 | 0.60 |
| 50 | 68 | 6.3x11 | 310 | 0.50 |
| 50 | 100 | 8x11.5 | 480 | 0.17 |
| 50 | 120 | 10x12.5 | 500 | 0.164 |
| 50 | 150 | 10x12.5 | 560 | 0.16 |
| 50 | 180 | 10x12.5 | 580 | 0.14 |
| 50 | 220 | 10x16 | 640 | 0.09 |
| 50 | 270 | 10x16 | 905 | 0.08 |
| 50 | 330 | 10x16 | 1050 | 0.07 |
| 50 | 470 | 13x20 | 1450 | 0.05 |
| 50 | 560 | 13x20 | 1510 | 0.05 |
| 50 | 680 | 13x20 | 1750 | 0.05 |
| 50 | 820 | 13x25 | 1980 | 0.04 |
| 50 | 1000 | 13x25 | 2000 | 0.04 |
| 50 | 1200 | 16x25 | 2200 | 0.038 |
| 50 | 1500 | 16x25 | 2300 | 0.038 |
| 50 | 1800 | 16x31.5 | 2610 | 0.036 |
| 50 | 2200 | 16x31.5 | 2900 | 0.033 |
| 50 | 2700 | 18x35.5 | 3000 | 0.028 |
| 50 | 3300 | 18x35.5 | 3050 | 0.026 |

GF Series Low Impedance



Features

- ◆ Used in mother board, computer peripheral, etc.
- ◆ Endurance 2000 ~ 5000 Hrs at 105 °C
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

Specifications

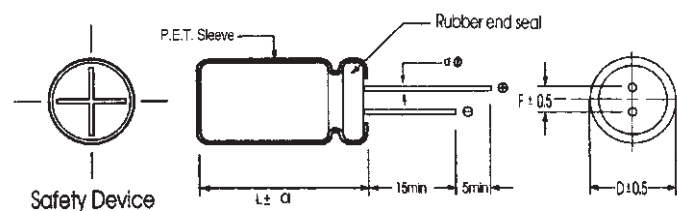
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|-----------------------|------------|---------|------|-----|------|--------|------|-----|--------------------|----|----|----|----|---|---|---|---|--------------------|---|---|---|---|---|---|---|---|
| Operating Temperature Range | -55 to +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 100 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 4.7 to 6800 μF | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C, max.) | $I \leq 0.01 CV$ or $3 (\mu A)$ After 2 minutes whichever is greater measured with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$ · at 20°C · 120Hz) | <table border="1"> <tr> <th>Working Voltage (VDC)</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <th>D.F. (%)max</th> <td>16</td> <td>14</td> <td>12</td> <td>10</td> <td>9</td> <td>8</td> <td>8</td> <td>8</td> </tr> </table> | Working Voltage (VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | D.F. (%)max | 16 | 14 | 12 | 10 | 9 | 8 | 8 | 8 | | | | | | | | | |
| | Working Voltage (VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | |
| D.F. (%)max | 16 | 14 | 12 | 10 | 9 | 8 | 8 | 8 | | | | | | | | | | | | | | | | | | | | |
| For capacitance > 1000 μF, add 2% per another 1000 μF. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <th>Working Voltage</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <th>Z(-25°C) / Z(20°C)</th> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> </tr> <tr> <th>Z(-40°C) / Z(20°C)</th> <td>8</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> | Working Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | Z(-25°C) / Z(20°C) | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | Z(-40°C) / Z(20°C) | 8 | 6 | 4 | 3 | 3 | 3 | 3 | 3 |
| | Working Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | |
| Z(-25°C) / Z(20°C) | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | | | | | | | | | | | | | | | | | | | | |
| Z(-40°C) / Z(20°C) | 8 | 6 | 4 | 3 | 3 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | |
| For Capacitance > 1000 μF, add 0.5 per another 1000 μF for -25°C/+20°C add 1 per another 1000 μF for -40°C/+20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test conditions Duration time :as right Ambient temperature :+105°C Applied voltage :Rated DC working voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <th>D φ</th> <th>Life hours</th> </tr> <tr> <td>5-6.3 φ</td> <td>2000</td> </tr> <tr> <td>8 φ</td> <td>3000</td> </tr> <tr> <td>≥ 10 φ</td> <td>5000</td> </tr> </table> | D φ | Life hours | 5-6.3 φ | 2000 | 8 φ | 3000 | ≥ 10 φ | 5000 | | | | | | | | | | | | | | | | | | | |
| D φ | Life hours | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-6.3 φ | 2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 φ | 3000 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ≥ 10 φ | 5000 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤ 200% of the initial specified value Leakage current : ≤ The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test conditions Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(μF)/Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|------|------|------|------|----------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.0 |
| 10 < CAP ≤ 100 | 0.52 | 0.65 | 0.80 | 0.89 | 0.97 | 1.0 |
| 100 < CAP ≤ 1000 | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1.0 |
| 1000 < CAP | 0.63 | 0.78 | 0.87 | 0.91 | 0.98 | 1.0 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|-----|-----|--------------------|---------------|--------------------|-----|--------|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| d φ | 0.5 | | L < 20 0.5 | L ≥ 20 0.6 | 0.6 | | 0.8 |
| | α | | D=16 L: 25~35.5 | | D=18 L: 25~31.5 | | D > 18 |
| | | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 |

Case Size

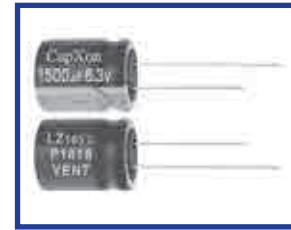
| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA/105°C /100kHz) | Max ESR (Ω) at 20°C/100kHz |
|----------|----------|-----------|-----------------------------------|----------------------------|
| 6.3 | 100 | 5x11 | 200 | 0.400 |
| 6.3 | 120 | 5x11 | 210 | 0.380 |
| 6.3 | 150 | 5x11 | 225 | 0.350 |
| 6.3 | 180 | 6.3x11 | 300 | 0.320 |
| 6.3 | 220 | 6.3x11 | 360 | 0.250 |
| 6.3 | 270 | 6.3x11 | 377 | 0.240 |
| 6.3 | 330 | 6.3x11 | 395 | 0.200 |
| 6.3 | 390 | 8x11.5 | 576 | 0.140 |
| 6.3 | 470 | 8x11.5 | 600 | 0.095 |
| 6.3 | 560 | 8x16 | 720 | 0.087 |
| 6.3 | 680 | 8x16 | 800 | 0.080 |
| 6.3 | 680 | 10x16 | 814 | 0.084 |
| 6.3 | 820 | 8x20 | 970 | 0.070 |
| 6.3 | 1000 | 10x12.5 | 1000 | 0.055 |
| 6.3 | 1200 | 8x20 | 1150 | 0.048 |
| 6.3 | 1200 | 10x16 | 1180 | 0.050 |
| 6.3 | 1500 | 10x20 | 1400 | 0.045 |
| 6.3 | 1500 | 10x25 | 1560 | 0.043 |
| 6.3 | 1800 | 10x20 | 1500 | 0.041 |
| 6.3 | 2200 | 10x25 | 1720 | 0.037 |
| 6.3 | 2200 | 13x20 | 1890 | 0.039 |
| 6.3 | 2700 | 13x20 | 2080 | 0.034 |
| 6.3 | 3300 | 13x20 | 2290 | 0.026 |
| 6.3 | 3900 | 10x30 | 2450 | 0.024 |
| 6.3 | 3900 | 13x25 | 2670 | 0.022 |
| 6.3 | 4700 | 13x30 | 3200 | 0.021 |
| 6.3 | 5600 | 13x35 | 3270 | 0.020 |
| 6.3 | 6800 | 16x31.5 | 3490 | 0.018 |
| 10 | 68 | 5x11 | 190 | 0.700 |
| 10 | 82 | 5x11 | 210 | 0.500 |
| 10 | 100 | 5x11 | 242 | 0.310 |
| 10 | 120 | 5x11 | 261 | 0.280 |
| 10 | 150 | 6.3x11 | 300 | 0.260 |
| 10 | 180 | 6.3x11 | 350 | 0.220 |
| 10 | 220 | 6.3x11 | 390 | 0.180 |
| 10 | 270 | 6.3x15 | 460 | 0.160 |
| 10 | 330 | 8x11.5 | 540 | 0.110 |
| 10 | 390 | 8x11.5 | 620 | 0.095 |
| 10 | 470 | 8x11.5 | 750 | 0.075 |
| 10 | 560 | 8x16 | 870 | 0.072 |
| 10 | 680 | 8x20 | 1010 | 0.068 |
| 10 | 820 | 8x20 | 1030 | 0.065 |
| 10 | 1000 | 8x20 | 1220 | 0.050 |
| 10 | 1000 | 10x16 | 1400 | 0.042 |
| 10 | 1200 | 10x20 | 1560 | 0.035 |
| 10 | 1500 | 10x20 | 1670 | 0.032 |
| 10 | 1800 | 10x25 | 2000 | 0.028 |
| 10 | 2200 | 13x20 | 2370 | 0.025 |
| 10 | 2700 | 13x20 | 2400 | 0.023 |
| 10 | 3300 | 13x25 | 2720 | 0.021 |
| 10 | 3900 | 13x30 | 3000 | 0.020 |
| 10 | 4700 | 13x35 | 3450 | 0.019 |
| 10 | 5600 | 16x31.5 | 3460 | 0.018 |
| 10 | 6800 | 16x31.5 | 3630 | 0.016 |
| 16 | 47 | 5x11 | 200 | 0.400 |
| 16 | 56 | 5x11 | 220 | 0.380 |
| 16 | 68 | 5x11 | 230 | 0.350 |
| 16 | 82 | 5x11 | 260 | 0.310 |
| 16 | 100 | 6.3x11 | 360 | 0.250 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA/105°C /100kHz) | Max ESR (Ω) at 20°C/100kHz |
|----------|----------|-----------|-----------------------------------|----------------------------|
| 16 | 120 | 6.3x11 | 365 | 0.230 |
| 16 | 150 | 6.3x11 | 385 | 0.210 |
| 16 | 180 | 8x11.5 | 520 | 0.190 |
| 16 | 220 | 8x11.5 | 575 | 0.140 |
| 16 | 270 | 8x11.5 | 600 | 0.120 |
| 16 | 330 | 8x11.5 | 740 | 0.080 |
| 16 | 390 | 8x16 | 790 | 0.075 |
| 16 | 470 | 8x16 | 990 | 0.062 |
| 16 | 470 | 10x12.5 | 1000 | 0.058 |
| 16 | 560 | 8x20 | 1070 | 0.057 |
| 16 | 680 | 8x20 | 1120 | 0.055 |
| 16 | 680 | 10x16 | 1280 | 0.052 |
| 16 | 820 | 10x20 | 1400 | 0.048 |
| 16 | 1000 | 10x20 | 1840 | 0.035 |
| 16 | 1200 | 10x25 | 1920 | 0.032 |
| 16 | 1500 | 10x25 | 2050 | 0.030 |
| 16 | 1500 | 13x20 | 2200 | 0.029 |
| 16 | 1800 | 13x20 | 2380 | 0.026 |
| 16 | 2200 | 13x25 | 2750 | 0.022 |
| 16 | 2700 | 13x25 | 3000 | 0.022 |
| 16 | 3300 | 13x35 | 3490 | 0.018 |
| 16 | 3900 | 16x25 | 3520 | 0.018 |
| 16 | 4700 | 16x31.5 | 3770 | 0.017 |
| 25 | 39 | 5x11 | 210 | 0.420 |
| 25 | 47 | 5x11 | 240 | 0.350 |
| 25 | 56 | 5x11 | 256 | 0.310 |
| 25 | 68 | 6.3x11 | 300 | 0.280 |
| 25 | 82 | 6.3x11 | 350 | 0.240 |
| 25 | 100 | 6.3x11 | 410 | 0.150 |
| 25 | 120 | 6.3x15 | 490 | 0.130 |
| 25 | 150 | 8x11.5 | 540 | 0.110 |
| 25 | 180 | 8x11.5 | 620 | 0.098 |
| 25 | 220 | 8x11.5 | 750 | 0.075 |
| 25 | 270 | 8x16 | 850 | 0.063 |
| 25 | 330 | 8x16 | 990 | 0.056 |
| 25 | 330 | 10x12.5 | 1010 | 0.054 |
| 25 | 390 | 10x12.5 | 1050 | 0.051 |
| 25 | 470 | 8x20 | 1260 | 0.045 |
| 25 | 470 | 10x16 | 1415 | 0.042 |
| 25 | 560 | 10x20 | 1450 | 0.040 |
| 25 | 680 | 10x20 | 1570 | 0.035 |
| 25 | 820 | 10x25 | 1910 | 0.032 |
| 25 | 1000 | 13x20 | 2340 | 0.025 |
| 25 | 1200 | 13x20 | 2390 | 0.025 |
| 25 | 1500 | 13x25 | 2710 | 0.023 |
| 25 | 1800 | 13x30 | 3150 | 0.021 |
| 25 | 2200 | 13x35 | 3420 | 0.018 |
| 25 | 2700 | 16x31.5 | 3480 | 0.018 |
| 25 | 3300 | 16x31.5 | 3600 | 0.018 |
| 35 | 33 | 5x11 | 230 | 0.320 |
| 35 | 39 | 6.3x11 | 277 | 0.310 |
| 35 | 47 | 6.3x11 | 340 | 0.200 |
| 35 | 56 | 6.3x11 | 375 | 0.200 |
| 35 | 68 | 6.3x11 | 400 | 0.190 |
| 35 | 82 | 8x11.5 | 480 | 0.170 |
| 35 | 100 | 8x11.5 | 560 | 0.150 |
| 35 | 120 | 8x11.5 | 585 | 0.130 |
| 35 | 150 | 8x11.5 | 680 | 0.110 |
| 35 | 180 | 8x16 | 810 | 0.098 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|-----------------------------|
| 35 | 220 | 8x16 | 1000 | 0.056 |
| 35 | 220 | 10x12.5 | 1060 | 0.052 |
| 35 | 270 | 10x16 | 1190 | 0.050 |
| 35 | 330 | 8x20 | 1210 | 0.041 |
| 35 | 330 | 10x16 | 1400 | 0.038 |
| 35 | 390 | 10x20 | 1550 | 0.035 |
| 35 | 470 | 10x20 | 1850 | 0.034 |
| 35 | 560 | 10x25 | 2040 | 0.031 |
| 35 | 680 | 13x20 | 2260 | 0.029 |
| 35 | 820 | 13x25 | 2630 | 0.021 |
| 35 | 1000 | 13x25 | 2780 | 0.019 |
| 35 | 1200 | 13x30 | 2950 | 0.019 |
| 35 | 1200 | 16x25 | 3150 | 0.018 |
| 35 | 1500 | 13x35 | 3350 | 0.018 |
| 35 | 1500 | 16x31.5 | 3600 | 0.017 |
| 35 | 1800 | 16x31.5 | 3670 | 0.016 |
| 35 | 2200 | 16x31.5 | 3750 | 0.015 |
| 35 | 2700 | 18x31.5 | 3850 | 0.014 |
| 50 | 22 | 5x11 | 220 | 0.350 |
| 50 | 27 | 6.3x11 | 265 | 0.340 |
| 50 | 33 | 6.3x11 | 280 | 0.320 |
| 50 | 39 | 6.3x11 | 300 | 0.280 |
| 50 | 47 | 8x11.5 | 360 | 0.200 |
| 50 | 56 | 8x11.5 | 385 | 0.190 |
| 50 | 68 | 8x11.5 | 400 | 0.170 |
| 50 | 82 | 8x11.5 | 550 | 0.120 |
| 50 | 100 | 8x11.5 | 730 | 0.075 |
| 50 | 120 | 8x16 | 770 | 0.073 |
| 50 | 120 | 10x12.5 | 790 | 0.072 |
| 50 | 150 | 10x12.5 | 870 | 0.068 |
| 50 | 180 | 8x20 | 1060 | 0.055 |
| 50 | 180 | 10x16 | 1090 | 0.055 |
| 50 | 220 | 10x16 | 1385 | 0.045 |
| 50 | 270 | 10x20 | 1500 | 0.043 |
| 50 | 330 | 10x25 | 1850 | 0.032 |
| 50 | 390 | 13x20 | 1910 | 0.031 |
| 50 | 470 | 13x20 | 2000 | 0.030 |
| 50 | 560 | 13x20 | 2150 | 0.028 |
| 50 | 680 | 13x25 | 2490 | 0.026 |
| 50 | 820 | 13x30 | 2770 | 0.025 |
| 50 | 820 | 16x25 | 2960 | 0.024 |
| 50 | 1000 | 16x25 | 3000 | 0.020 |
| 63 | 10 | 5x11 | 135 | 0.950 |
| 63 | 15 | 6.3x11 | 168 | 0.850 |
| 63 | 18 | 6.3x11 | 170 | 0.820 |
| 63 | 22 | 6.3x11 | 250 | 0.750 |
| 63 | 27 | 6.3x11 | 260 | 0.550 |
| 63 | 33 | 6.3x11 | 270 | 0.380 |
| 63 | 39 | 8x11.5 | 320 | 0.350 |
| 63 | 47 | 8x11.5 | 400 | 0.220 |
| 63 | 56 | 8x11.5 | 420 | 0.220 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|-----------------------------|
| 63 | 68 | 10x12.5 | 500 | 0.200 |
| 63 | 82 | 8x16 | 540 | 0.170 |
| 63 | 82 | 10x12.5 | 570 | 0.160 |
| 63 | 100 | 10x12.5 | 720 | 0.140 |
| 63 | 120 | 8x20 | 790 | 0.140 |
| 63 | 120 | 10x16 | 835 | 0.130 |
| 63 | 150 | 10x16 | 900 | 0.110 |
| 63 | 180 | 10x20 | 1200 | 0.095 |
| 63 | 220 | 10x25 | 1315 | 0.075 |
| 63 | 270 | 13x20 | 1400 | 0.071 |
| 63 | 330 | 10x30 | 1750 | 0.047 |
| 63 | 330 | 13x25 | 1870 | 0.045 |
| 63 | 390 | 13x25 | 1920 | 0.044 |
| 63 | 470 | 13x30 | 2225 | 0.041 |
| 63 | 470 | 16x20 | 1970 | 0.043 |
| 63 | 560 | 16x25 | 2350 | 0.039 |
| 63 | 680 | 16x31.5 | 2600 | 0.035 |
| 63 | 820 | 16x31.5 | 2650 | 0.031 |
| 63 | 1000 | 16x35.5 | 2780 | 0.026 |
| 63 | 1000 | 18x31.5 | 3230 | 0.028 |
| 100 | 4.7 | 5x11 | 105 | 1.600 |
| 100 | 5.6 | 5x11 | 116 | 1.490 |
| 100 | 6.8 | 5x11 | 120 | 1.450 |
| 100 | 10 | 6.3x11 | 170 | 0.700 |
| 100 | 15 | 8x11.5 | 255 | 0.610 |
| 100 | 18 | 8x11.5 | 270 | 0.560 |
| 100 | 22 | 8x11.5 | 320 | 0.480 |
| 100 | 27 | 8x11.5 | 340 | 0.390 |
| 100 | 33 | 8x16 | 400 | 0.310 |
| 100 | 39 | 8x16 | 425 | 0.290 |
| 100 | 39 | 10x12.5 | 440 | 0.270 |
| 100 | 47 | 10x12.5 | 450 | 0.250 |
| 100 | 56 | 10x16 | 540 | 0.210 |
| 100 | 68 | 10x20 | 630 | 0.180 |
| 100 | 82 | 10x20 | 720 | 0.150 |
| 100 | 100 | 10x25 | 890 | 0.120 |
| 100 | 120 | 10x25 | 900 | 0.120 |
| 100 | 120 | 13x20 | 980 | 0.110 |
| 100 | 150 | 13x20 | 1100 | 0.095 |
| 100 | 180 | 13x25 | 1250 | 0.078 |
| 100 | 220 | 13x30 | 1420 | 0.065 |
| 100 | 220 | 16x20 | 1270 | 0.075 |
| 100 | 270 | 13x35 | 1630 | 0.057 |
| 100 | 270 | 16x25 | 1570 | 0.058 |
| 100 | 330 | 13x40 | 1650 | 0.045 |
| 100 | 390 | 16x31.5 | 1850 | 0.043 |
| 100 | 470 | 16x35.5 | 1900 | 0.032 |
| 100 | 470 | 18x31.5 | 1700 | 0.038 |
| 100 | 560 | 16x40 | 2170 | 0.032 |
| 100 | 560 | 18x31.5 | 2100 | 0.031 |
| 100 | 680 | 18x35.5 | 2400 | 0.029 |

LZ Series Ultra Low Impedance



Features

- ◆ Ultra low impedance in 100KHz.
- ◆ Allow higher ripple current applied due to ultra low impedance.
- ◆ Endurance 2000hrs at 105°C
- ◆ Suitable for application of mother board, computer peripheral etc.
- ◆ RoHS Compliant

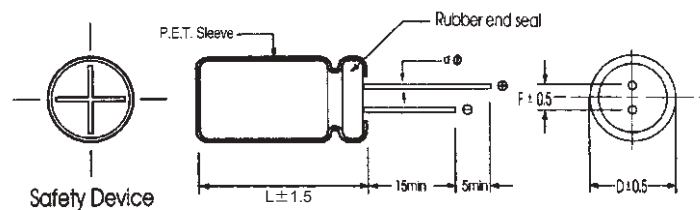
Specifications

| Item | Performance Characteristics | | | | |
|---|---|--|----|----|----|
| Operating Temperature Range | -40 ~ +105°C | | | | |
| Rated Voltage Range | 6.3 ~ 25V with rate working voltage applied | | | | |
| Capacitance Range | 220 to 3300 μF | | | | |
| Capacitance Tolerance | ±20% (20°C, 120Hz) | | | | |
| Leakage Current (+20°C, max.) | I ≤ 0.01CV or 3 μA After 2 minutes whichever is greater measured | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Rated Voltage(V) | 6.3 | 10 | 16 | 25 |
| | D.F. (%) max | 14 | 12 | 10 | 9 |
| For capacitance > 1000 μF, add 2% per another 1000 μF | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | |
| | Rated Voltage(V) | 6.3 | 10 | 16 | 25 |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 |
| | Z-40°C / Z+20°C | 6 | 4 | 3 | 3 |
| For Capacitance Value > 1000 μF, add 0.5 per another 1000 μF for -25°C / +20°C add 1 per another 1000 μF for -40°C / +20°C | | | | | |
| Endurance | Test Conditions | | | | |
| | Duration | : 2000 hrs | | | |
| | Ambient temperature | : +105°C | | | |
| | Applied voltage | : Rated DC working voltage | | | |
| | After test requirement at +20°C | : Within ±25% of the initial measured value | | | |
| | Capacitance change | : Not exceed 200% of the initial specified value | | | |
| | Dissipation factor | : Not exceed the specified value | | | |
| | Leakage current | : Not exceed the specified value | | | |
| Shelf Life | Test Conditions | | | | |
| | Duration | : 1000 hrs | | | |
| | Ambient temperature | : +105°C | | | |
| | After test requirement at +20°C | : Within ±25% of the initial measured value | | | |
| | Capacitance change | : Not exceed 200% of the initial specified value | | | |
| | Dissipation factor | : Not exceed the specified value | | | |
| | Leakage current | : Not exceed the specified value | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)/Frequency(Hz) | 120 | 1K | 10K | 100K |
|-----------------------|------|------|------|------|
| 100~330uF | 0.40 | 0.75 | 0.93 | 1.00 |
| 390~1000uF | 0.50 | 0.85 | 0.95 | 1.00 |
| 1200~3300uF | 0.55 | 0.90 | 0.98 | 1.00 |

Diagram of Dimensions:(unit:mm)



| | | | |
|-----|--------|--------|-----|
| D φ | 8 | | 10 |
| F | 3.5 | | 5.0 |
| d φ | L < 20 | L ≥ 20 | 0.6 |
| | 0.5 | 0.6 | |

Case Size

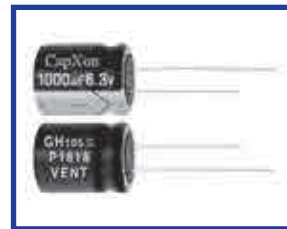
| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 6.3 | 560 | 8x11.5 | 1080 | 0.04 |
| 6.3 | 680 | 8x11.5 | 1080 | 0.04 |
| 6.3 | 820 | 8x11.5 | 1080 | 0.04 |
| 6.3 | 1000 | 8x16 | 1100 | 0.04 |
| 6.3 | 1000 | 10x12.5 | 1500 | 0.03 |
| 6.3 | 1200 | 8x16 | 1450 | 0.03 |
| 6.3 | 1500 | 8x20 | 1850 | 0.02 |
| 6.3 | 1500 | 10x12.5 | 1500 | 0.03 |
| 6.3 | 1800 | 10x16 | 1910 | 0.02 |
| 6.3 | 2200 | 8x20 | 1850 | 0.02 |
| 6.3 | 2200 | 10x16 | 1910 | 0.02 |
| 6.3 | 2700 | 10x20 | 2540 | 0.01 |
| 6.3 | 3300 | 10x30 | 2800 | 0.01 |
| 10 | 470 | 8x11.5 | 1080 | 0.04 |
| 10 | 560 | 8x11.5 | 1080 | 0.04 |
| 10 | 680 | 8x11.5 | 1080 | 0.04 |
| 10 | 680 | 10x12.5 | 1500 | 0.03 |
| 10 | 820 | 10x12.5 | 1450 | 0.03 |
| 10 | 1000 | 8x16 | 1450 | 0.03 |
| 10 | 1000 | 10x12.5 | 1500 | 0.03 |
| 10 | 1200 | 8x20 | 1850 | 0.02 |
| 10 | 1500 | 8x20 | 1850 | 0.02 |
| 10 | 1500 | 10x16 | 1910 | 0.02 |
| 10 | 1800 | 10x20 | 2540 | 0.02 |
| 10 | 2200 | 10x20 | 2540 | 0.02 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 10 | 2200 | 10x25 | 2800 | 0.01 |
| 16 | 330 | 8x11.5 | 1080 | 0.04 |
| 16 | 470 | 8x11.5 | 1080 | 0.04 |
| 16 | 470 | 10x12.5 | 1500 | 0.03 |
| 16 | 560 | 8x16 | 1450 | 0.03 |
| 16 | 680 | 8x16 | 1450 | 0.03 |
| 16 | 680 | 10x12.5 | 1500 | 0.03 |
| 16 | 820 | 8x20 | 1850 | 0.02 |
| 16 | 1000 | 8x20 | 1850 | 0.02 |
| 16 | 1000 | 10x16 | 1910 | 0.02 |
| 16 | 1200 | 10x20 | 2540 | 0.02 |
| 16 | 1500 | 10x20 | 2540 | 0.02 |
| 16 | 1800 | 10x25 | 2800 | 0.01 |
| 25 | 220 | 8x11.5 | 1080 | 0.032 |
| 25 | 270 | 8x11.5 | 1150 | 0.031 |
| 25 | 330 | 8x11.5 | 1450 | 0.029 |
| 25 | 330 | 10x12.5 | 1650 | 0.027 |
| 25 | 470 | 8x20 | 1720 | 0.020 |
| 25 | 470 | 10x12.5 | 1700 | 0.025 |
| 25 | 470 | 10x16 | 1830 | 0.022 |
| 25 | 560 | 10x16 | 1850 | 0.021 |
| 25 | 680 | 8x20 | 1820 | 0.018 |
| 25 | 680 | 10x16 | 1920 | 0.02 |
| 25 | 680 | 10x20 | 2060 | 0.02 |
| 25 | 1000 | 10x20 | 2180 | 0.02 |

GH Series

Features

- ◆ Low impedance
- ◆ High temperature, Long life 3,000 to 10,000 hours at 105°C
- ◆ AEC-Q200 qualified



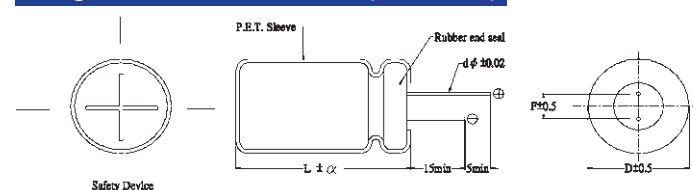
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|----------------------|-------------|--------|--------|-------------------|------------|------------|-----------------|----|----|----|----|-----|-----|-----------------|---|---|---|---|---|---|-----------------|---|---|---|---|---|---|
| Operating Temperature Range | -55 to +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 100 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.47 to 12000 µF | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C, max.) | $I \leq 0.01 CV$ or $3 (\mu A)$ (After 2 minute with rated working voltage applied.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>D.F.(%)max.</td> <td>22</td> <td>19</td> <td>16</td> <td>14</td> <td>12</td> <td>10</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | D.F.(%)max. | 22 | 19 | 16 | 14 | 12 | 10 | | | | | | | | | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | | | | | | | |
| D.F.(%)max. | 22 | 19 | 16 | 14 | 12 | 10 | | | | | | | | | | | | | | | | | | | | | | | |
| For capacitance > 1000 µ F, add 2% per another 1000 µ F. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Rated voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>1.5</td> <td>1.5</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>6</td> <td>4</td> <td>3</td> <td>3</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-55°C / Z+20°C</td> <td>8</td> <td>6</td> <td>5</td> <td>5</td> <td>4</td> <td>4</td> </tr> </table> | Rated voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 1.5 | 1.5 | Z-40°C / Z+20°C | 6 | 4 | 3 | 3 | 2 | 2 | Z-55°C / Z+20°C | 8 | 6 | 5 | 5 | 4 | 4 |
| | Rated voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | | | | | | | | | | | | | | | | | | | | | | |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 1.5 | 1.5 | | | | | | | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 6 | 4 | 3 | 3 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | | |
| Z-55°C / Z+20°C | 8 | 6 | 5 | 5 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | |
| For Capacitance > 1000 µ F, add 0.5 per another 1000 µ F for -25°C/+20°C add 1 per another 1000 µ F for -40°C/+20°C add 1.5 per another 1000 µ F for -55°C/+20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Duration time: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>D φ</td> <td>5-6.3 φ</td> <td>8-12 φ</td> <td>≥ 13 φ</td> </tr> <tr> <td>+105°C Life hours</td> <td>5000 hours</td> <td>7000 hours</td> <td>10000 hours</td> </tr> </table> | D φ | 5-6.3 φ | 8-12 φ | ≥ 13 φ | +105°C Life hours | 5000 hours | 7000 hours | 10000 hours | | | | | | | | | | | | | | | | | | | | |
| D φ | 5-6.3 φ | 8-12 φ | ≥ 13 φ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| +105°C Life hours | 5000 hours | 7000 hours | 10000 hours | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :± 25% of the initial measured value Dissipation factor :≤200% of the initial specified value Leakage current :≤The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Duration time :1000 Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(µ F)\Frequency(Hz) | 120 | 400 | 1K | 10K | 100K |
|------------------------|------|------|------|------|------|
| CAP ≤ 10 | 0.40 | 0.52 | 0.60 | 0.92 | 1 |
| 10 < CAP ≤ 100 | 0.67 | 0.80 | 0.83 | 0.94 | 1 |
| 100 < CAP ≤ 1000 | 0.75 | 0.84 | 0.88 | 0.95 | 1 |
| 1000 < CAP | 0.82 | 0.87 | 0.92 | 0.95 | 1 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|--------|---------------|-------------------|------------|---------------------|--------|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| d φ | 0.5 | L < 20 0.5 | L ≥ 20 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| α | D < 16 | D = 16 | | D = 18 | | D > 18 | |
| | 1.5 | L: 25~35.5 | L < 25 and L ≥ 40 | L: 25~31.5 | L < 25 and L ≥ 35.5 | 2.0 | 2.0 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz | WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|---------------------------|----------|----------|-----------|---------------------------------------|---------------------------|
| 6.3 | 82 | 5x11 | 198 | 1.63 | 10 | 150 | 6.3x11 | 282 | 0.95 |
| 6.3 | 100 | 5x11 | 210 | 1.45 | 10 | 180 | 6.3x11 | 318 | 0.68 |
| 6.3 | 120 | 5x11 | 222 | 1.28 | 10 | 220 | 6.3x11 | 366 | 0.60 |
| 6.3 | 150 | 6.3x11 | 240 | 1.16 | 10 | 220 | 6.3x15 | 390 | 0.58 |
| 6.3 | 180 | 6.3x11 | 282 | 1.04 | 10 | 270 | 6.3x15 | 414 | 0.56 |
| 6.3 | 220 | 6.3x11 | 378 | 0.89 | 10 | 270 | 8x11.5 | 420 | 0.53 |
| 6.3 | 270 | 6.3x11 | 396 | 0.77 | 10 | 330 | 6.3x11 | 402 | 0.50 |
| 6.3 | 330 | 6.3x11 | 396 | 0.77 | 10 | 330 | 6.3x15 | 462 | 0.47 |
| 6.3 | 330 | 6.3x15 | 426 | 0.68 | 10 | 330 | 8x11.5 | 492 | 0.45 |
| 6.3 | 330 | 8x11.5 | 444 | 0.68 | 10 | 390 | 6.3x15 | 456 | 0.42 |
| 6.3 | 390 | 6.3x15 | 462 | 0.58 | 10 | 390 | 8x11.5 | 516 | 0.42 |
| 6.3 | 390 | 8x11.5 | 480 | 0.52 | 10 | 470 | 6.3x15 | 480 | 0.37 |
| 6.3 | 470 | 6.3x15 | 504 | 0.41 | 10 | 470 | 8x11.5 | 552 | 0.30 |
| 6.3 | 470 | 8x11.5 | 534 | 0.38 | 10 | 560 | 8x11.5 | 588 | 0.28 |
| 6.3 | 470 | 10x12.5 | 564 | 0.38 | 10 | 560 | 8x16 | 636 | 0.25 |
| 6.3 | 560 | 8x11.5 | 570 | 0.36 | 10 | 560 | 10x12.5 | 636 | 0.25 |
| 6.3 | 560 | 8x16 | 600 | 0.36 | 10 | 680 | 8x16 | 660 | 0.21 |
| 6.3 | 560 | 10x12.5 | 612 | 0.36 | 10 | 680 | 8x20 | 684 | 0.20 |
| 6.3 | 680 | 8x11.5 | 582 | 0.33 | 10 | 680 | 10x12.5 | 684 | 0.20 |
| 6.3 | 680 | 8x16 | 618 | 0.33 | 10 | 820 | 8x16 | 732 | 0.20 |
| 6.3 | 680 | 10x12.5 | 642 | 0.33 | 10 | 820 | 8x20 | 828 | 0.18 |
| 6.3 | 820 | 8x11.5 | 666 | 0.25 | 10 | 820 | 10x12.5 | 876 | 0.16 |
| 6.3 | 820 | 10x12.5 | 720 | 0.25 | 10 | 820 | 10x16 | 936 | 0.16 |
| 6.3 | 1000 | 8x16 | 690 | 0.22 | 10 | 1000 | 8x16 | 1020 | 0.16 |
| 6.3 | 1000 | 8x20 | 756 | 0.22 | 10 | 1000 | 8x20 | 1122 | 0.14 |
| 6.3 | 1000 | 10x12.5 | 708 | 0.22 | 10 | 1000 | 10x12.5 | 1032 | 0.14 |
| 6.3 | 1200 | 8x20 | 840 | 0.18 | 10 | 1000 | 10x16 | 1140 | 0.13 |
| 6.3 | 1200 | 10x16 | 888 | 0.18 | 10 | 1200 | 8x20 | 1248 | 0.13 |
| 6.3 | 1500 | 8x20 | 1056 | 0.15 | 10 | 1200 | 10x16 | 1272 | 0.13 |
| 6.3 | 1500 | 10x16 | 1128 | 0.12 | 10 | 1200 | 10x20 | 1368 | 0.12 |
| 6.3 | 1500 | 10x20 | 1176 | 0.12 | 10 | 1500 | 10x20 | 1536 | 0.106 |
| 6.3 | 1800 | 8x25 | 1230 | 0.11 | 10 | 1500 | 13x16 | 1620 | 0.110 |
| 6.3 | 1800 | 10x20 | 1308 | 0.11 | 10 | 1800 | 10x25 | 1650 | 0.102 |
| 6.3 | 2200 | 10x20 | 1350 | 0.10 | 10 | 1800 | 13x20 | 1704 | 0.098 |
| 6.3 | 2200 | 10x25 | 1362 | 0.10 | 10 | 2200 | 10x25 | 1776 | 0.095 |
| 6.3 | 2700 | 10x25 | 1488 | 0.09 | 10 | 2200 | 10x30 | 1860 | 0.093 |
| 6.3 | 2700 | 10x30 | 1560 | 0.09 | 10 | 2200 | 13x20 | 1872 | 0.093 |
| 6.3 | 2700 | 13x20 | 1512 | 0.09 | 10 | 2200 | 16x16 | 1926 | 0.093 |
| 6.3 | 3300 | 10x30 | 1620 | 0.085 | 10 | 2700 | 10x30 | 2076 | 0.084 |
| 6.3 | 3300 | 13x20 | 1584 | 0.085 | 10 | 2700 | 13x20 | 2028 | 0.084 |
| 6.3 | 3900 | 13x25 | 1860 | 0.080 | 10 | 2700 | 13x25 | 2124 | 0.084 |
| 6.3 | 4700 | 13x25 | 1938 | 0.075 | 10 | 2700 | 18x16 | 2241 | 0.084 |
| 6.3 | 4700 | 13x30 | 1992 | 0.070 | 10 | 3300 | 10x30 | 2232 | 0.070 |
| 6.3 | 5600 | 13x30 | 1992 | 0.068 | 10 | 3300 | 13x25 | 2268 | 0.070 |
| 6.3 | 5600 | 16x25 | 2196 | 0.068 | 10 | 3300 | 16x25 | 2316 | 0.070 |
| 6.3 | 6800 | 13x30 | 2520 | 0.063 | 10 | 3900 | 13x25 | 2304 | 0.065 |
| 6.3 | 6800 | 16x25 | 2718 | 0.063 | 10 | 3900 | 13x30 | 2376 | 0.065 |
| 10 | 22 | 5x11 | 66 | 3.08 | 10 | 3900 | 16x20 | 2362 | 0.070 |
| 10 | 27 | 5x11 | 72 | 2.67 | 10 | 3900 | 16x25 | 2544 | 0.065 |
| 10 | 33 | 5x11 | 72 | 2.33 | 10 | 4700 | 13x30 | 2484 | 0.065 |
| 10 | 39 | 5x11 | 120 | 2.02 | 10 | 4700 | 13x35 | 2568 | 0.060 |
| 10 | 47 | 5x11 | 132 | 1.71 | 10 | 4700 | 16x25 | 2634 | 0.057 |
| 10 | 56 | 5x11 | 144 | 1.47 | 10 | 5600 | 13x35 | 2640 | 0.054 |
| 10 | 68 | 5x11 | 162 | 1.30 | 10 | 5600 | 16x25 | 2473 | 0.054 |
| 10 | 82 | 5x11 | 192 | 1.15 | 10 | 5600 | 16x31.5 | 2736 | 0.050 |
| 10 | 100 | 5x11 | 222 | 1.02 | 10 | 5600 | 18x20 | 2460 | 0.057 |
| 10 | 100 | 6.3x11 | 240 | 1.02 | 10 | 6800 | 16x31.5 | 2964 | 0.046 |
| 10 | 120 | 5x11 | 246 | 1.02 | 10 | 6800 | 18x25 | 2866 | 0.052 |
| 10 | 120 | 6.3x11 | 258 | 1.02 | 10 | 8200 | 16x35.5 | 3350 | 0.043 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|-----------------------------|
| 10 | 8200 | 18x31.5 | 3392 | 0.044 |
| 10 | 10000 | 16x40 | 3850 | 0.040 |
| 10 | 10000 | 18x35.5 | 3850 | 0.041 |
| 10 | 12000 | 18x40 | 4150 | 0.037 |
| 16 | 10 | 5x11 | 36 | 3.90 |
| 16 | 15 | 5x11 | 72 | 3.32 |
| 16 | 22 | 5x11 | 72 | 2.64 |
| 16 | 27 | 5x11 | 132 | 2.37 |
| 16 | 33 | 5x11 | 144 | 2.00 |
| 16 | 39 | 5x11 | 168 | 1.61 |
| 16 | 47 | 5x11 | 186 | 1.35 |
| 16 | 56 | 5x11 | 210 | 1.24 |
| 16 | 68 | 5x11 | 228 | 1.18 |
| 16 | 82 | 6.3x11 | 264 | 1.03 |
| 16 | 100 | 5x11 | 228 | 1.10 |
| 16 | 100 | 6.3x11 | 264 | 0.86 |
| 16 | 120 | 6.3x11 | 312 | 0.66 |
| 16 | 150 | 6.3x11 | 336 | 0.58 |
| 16 | 150 | 6.3x15 | 396 | 0.58 |
| 16 | 180 | 6.3x15 | 420 | 0.56 |
| 16 | 180 | 8x11.5 | 426 | 0.54 |
| 16 | 220 | 6.3x15 | 504 | 0.52 |
| 16 | 220 | 8x11.5 | 540 | 0.46 |
| 16 | 270 | 6.3x15 | 540 | 0.42 |
| 16 | 270 | 8x11.5 | 582 | 0.38 |
| 16 | 330 | 6.3x15 | 588 | 0.34 |
| 16 | 330 | 8x11.5 | 588 | 0.37 |
| 16 | 330 | 8x16 | 618 | 0.35 |
| 16 | 390 | 8x11.5 | 612 | 0.33 |
| 16 | 390 | 8x16 | 654 | 0.33 |
| 16 | 390 | 10x12.5 | 648 | 0.33 |
| 16 | 470 | 8x16 | 846 | 0.29 |
| 16 | 470 | 8x20 | 900 | 0.28 |
| 16 | 470 | 10x12.5 | 882 | 0.28 |
| 16 | 560 | 8x16 | 864 | 0.26 |
| 16 | 560 | 8x20 | 936 | 0.24 |
| 16 | 560 | 10x12.5 | 882 | 0.24 |
| 16 | 560 | 10x16 | 960 | 0.20 |
| 16 | 680 | 8x20 | 960 | 0.20 |
| 16 | 680 | 10x16 | 1044 | 0.18 |
| 16 | 820 | 8x20 | 1104 | 0.17 |
| 16 | 820 | 10x16 | 1254 | 0.15 |
| 16 | 820 | 10x20 | 1320 | 0.15 |
| 16 | 1000 | 10x16 | 1404 | 0.14 |
| 16 | 1000 | 10x20 | 1476 | 0.12 |
| 16 | 1200 | 10x20 | 1500 | 0.13 |
| 16 | 1200 | 10x25 | 1578 | 0.11 |
| 16 | 1500 | 10x25 | 1620 | 0.096 |
| 16 | 1500 | 13x20 | 1728 | 0.095 |
| 16 | 1500 | 16x16 | 1778 | 0.095 |
| 16 | 1800 | 10x30 | 1776 | 0.097 |
| 16 | 1800 | 13x20 | 1854 | 0.094 |
| 16 | 1800 | 13x25 | 1956 | 0.090 |
| 16 | 2200 | 13x20 | 2082 | 0.090 |
| 16 | 2200 | 13x25 | 2340 | 0.085 |
| 16 | 2200 | 18x16 | 2300 | 0.090 |
| 16 | 2700 | 13x25 | 2436 | 0.076 |
| 16 | 2700 | 13x30 | 2496 | 0.072 |
| 16 | 2700 | 16x20 | 2362 | 0.074 |
| 16 | 2700 | 16x25 | 2544 | 0.072 |
| 16 | 3300 | 13x30 | 2562 | 0.068 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|-----------------------------|
| 16 | 3300 | 13x35 | 2628 | 0.066 |
| 16 | 3300 | 16x25 | 2700 | 0.064 |
| 16 | 3900 | 13x35 | 2664 | 0.050 |
| 16 | 3900 | 16x25 | 2736 | 0.060 |
| 16 | 3900 | 16x31.5 | 2856 | 0.058 |
| 16 | 3900 | 18x20 | 2721 | 0.060 |
| 16 | 4700 | 16x31.5 | 2886 | 0.050 |
| 16 | 4700 | 18x25 | 2844 | 0.055 |
| 16 | 5600 | 16x35.5 | 2968 | 0.046 |
| 16 | 5600 | 18x31.5 | 3084 | 0.048 |
| 16 | 5600 | 18x35.5 | 3168 | 0.045 |
| 16 | 6800 | 16x40 | 3252 | 0.040 |
| 16 | 6800 | 18x35.5 | 3252 | 0.040 |
| 16 | 8200 | 18x35.5 | 3750 | 0.038 |
| 16 | 10000 | 18x40 | 4150 | 0.036 |
| 25 | 10 | 5x11 | 66 | 3.01 |
| 25 | 15 | 5x11 | 120 | 2.64 |
| 25 | 22 | 5x11 | 144 | 2.30 |
| 25 | 27 | 5x11 | 156 | 2.03 |
| 25 | 33 | 5x11 | 174 | 1.72 |
| 25 | 39 | 5x11 | 174 | 1.50 |
| 25 | 47 | 5x11 | 222 | 1.37 |
| 25 | 47 | 6.3x11 | 240 | 1.28 |
| 25 | 56 | 5x11 | 264 | 1.25 |
| 25 | 68 | 6.3x11 | 300 | 0.97 |
| 25 | 82 | 6.3x11 | 312 | 0.79 |
| 25 | 100 | 6.3x11 | 360 | 0.68 |
| 25 | 100 | 8x11.5 | 516 | 0.54 |
| 25 | 120 | 6.3x11 | 402 | 0.58 |
| 25 | 120 | 6.3x15 | 462 | 0.56 |
| 25 | 150 | 6.3x15 | 510 | 0.54 |
| 25 | 150 | 8x11.5 | 528 | 0.52 |
| 25 | 180 | 6.3x15 | 546 | 0.51 |
| 25 | 180 | 8x11.5 | 552 | 0.46 |
| 25 | 220 | 8x11.5 | 618 | 0.42 |
| 25 | 220 | 8x16 | 642 | 0.40 |
| 25 | 270 | 8x11.5 | 750 | 0.34 |
| 25 | 270 | 8x16 | 756 | 0.32 |
| 25 | 270 | 10x12.5 | 816 | 0.32 |
| 25 | 330 | 8x16 | 960 | 0.25 |
| 25 | 330 | 10x12.5 | 924 | 0.24 |
| 25 | 470 | 8x20 | 1056 | 0.23 |
| 25 | 470 | 10x12.5 | 1020 | 0.21 |
| 25 | 470 | 10x16 | 1080 | 0.21 |
| 25 | 560 | 8x20 | 1224 | 0.17 |
| 25 | 560 | 10x16 | 1260 | 0.15 |
| 25 | 680 | 10x20 | 1470 | 0.11 |
| 25 | 680 | 13x16 | 1550 | 0.10 |
| 25 | 820 | 10x20 | 1668 | 0.11 |
| 25 | 820 | 10x25 | 1704 | 0.10 |
| 25 | 1000 | 10x25 | 1812 | 0.093 |
| 25 | 1000 | 13x20 | 1872 | 0.090 |
| 25 | 1000 | 16x16 | 1926 | 0.088 |
| 25 | 1200 | 13x20 | 2028 | 0.082 |
| 25 | 1200 | 18x16 | 2241 | 0.080 |
| 25 | 1500 | 13x20 | 2124 | 0.067 |
| 25 | 1500 | 13x25 | 2190 | 0.065 |
| 25 | 1800 | 13x30 | 2310 | 0.058 |
| 25 | 1800 | 16x20 | 2173 | 0.056 |
| 25 | 1800 | 16x25 | 2340 | 0.058 |
| 25 | 2200 | 13x30 | 2592 | 0.052 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mAmps/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|----------------------------|
| 25 | 2200 | 16x25 | 2712 | 0.050 |
| 25 | 2200 | 18x20 | 2697 | 0.052 |
| 25 | 2700 | 13x35 | 2850 | 0.050 |
| 25 | 2700 | 16x25 | 2674 | 0.048 |
| 25 | 2700 | 16x31.5 | 2958 | 0.046 |
| 25 | 3300 | 16x31.5 | 3204 | 0.038 |
| 25 | 3300 | 16x35.5 | 3288 | 0.036 |
| 25 | 3300 | 18x25 | 3156 | 0.041 |
| 25 | 3900 | 16x35.5 | 3500 | 0.036 |
| 25 | 3900 | 18x31.5 | 3544 | 0.036 |
| 25 | 4700 | 16x40 | 3800 | 0.034 |
| 25 | 4700 | 18x35.5 | 3800 | 0.034 |
| 25 | 5600 | 18x40 | 4100 | 0.030 |
| 35 | 10 | 5x11 | 84 | 2.65 |
| 35 | 15 | 5x11 | 144 | 2.29 |
| 35 | 22 | 5x11 | 162 | 1.90 |
| 35 | 27 | 5x11 | 174 | 1.58 |
| 35 | 27 | 6.3x11 | 198 | 1.42 |
| 35 | 33 | 5x11 | 222 | 1.25 |
| 35 | 33 | 6.3x11 | 240 | 1.25 |
| 35 | 39 | 6.3x11 | 252 | 1.10 |
| 35 | 47 | 5x11 | 232 | 0.10 |
| 35 | 47 | 6.3x11 | 264 | 0.92 |
| 35 | 56 | 6.3x11 | 282 | 0.75 |
| 35 | 56 | 6.3x15 | 306 | 0.68 |
| 35 | 68 | 6.3x11 | 312 | 0.62 |
| 35 | 68 | 6.3x15 | 348 | 0.55 |
| 35 | 82 | 6.3x15 | 354 | 0.51 |
| 35 | 82 | 8x11.5 | 384 | 0.47 |
| 35 | 100 | 6.3x11 | 329 | 0.49 |
| 35 | 100 | 6.3x15 | 378 | 0.47 |
| 35 | 100 | 8x11.5 | 414 | 0.45 |
| 35 | 120 | 8x11.5 | 546 | 0.42 |
| 35 | 120 | 8x16 | 612 | 0.38 |
| 35 | 150 | 8x11.5 | 618 | 0.38 |
| 35 | 150 | 8x16 | 714 | 0.35 |
| 35 | 150 | 10x12.5 | 720 | 0.35 |
| 35 | 180 | 8x16 | 792 | 0.32 |
| 35 | 180 | 10x12.5 | 804 | 0.32 |
| 35 | 220 | 8x16 | 864 | 0.26 |
| 35 | 220 | 8x20 | 936 | 0.24 |
| 35 | 220 | 10x12.5 | 888 | 0.24 |
| 35 | 270 | 8x20 | 1056 | 0.22 |
| 35 | 270 | 10x12.5 | 984 | 0.24 |
| 35 | 270 | 10x16 | 1068 | 0.21 |
| 35 | 330 | 8x20 | 1140 | 0.16 |
| 35 | 330 | 10x16 | 1176 | 0.15 |
| 35 | 470 | 10x20 | 1302 | 0.11 |
| 35 | 470 | 10x25 | 1398 | 0.10 |
| 35 | 470 | 13x16 | 1272 | 0.11 |
| 35 | 470 | 13x20 | 1398 | 0.10 |
| 35 | 560 | 10x25 | 1572 | 0.096 |
| 35 | 560 | 13x20 | 1584 | 0.096 |
| 35 | 680 | 10x25 | 1680 | 0.084 |
| 35 | 680 | 13x20 | 1692 | 0.082 |
| 35 | 680 | 16x16 | 1741 | 0.080 |
| 35 | 820 | 13x20 | 1818 | 0.068 |
| 35 | 820 | 13x25 | 1944 | 0.062 |
| 35 | 1000 | 10x30 | 2136 | 0.060 |
| 35 | 1000 | 13x25 | 2184 | 0.060 |
| 35 | 1000 | 13x30 | 2280 | 0.058 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mAmps/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|----------------------------|
| 35 | 1000 | 18x16 | 2189 | 0.056 |
| 35 | 1200 | 13x25 | 2292 | 0.052 |
| 35 | 1200 | 16x20 | 2384 | 0.052 |
| 35 | 1200 | 16x25 | 2568 | 0.050 |
| 35 | 1500 | 13x35 | 2820 | 0.048 |
| 35 | 1500 | 16x31.5 | 2928 | 0.048 |
| 35 | 1800 | 13x35 | 2976 | 0.045 |
| 35 | 1800 | 16x25 | 2722 | 0.048 |
| 35 | 1800 | 16x31.5 | 3012 | 0.045 |
| 35 | 1800 | 18x20 | 2708 | 0.048 |
| 35 | 2200 | 16x31.5 | 3228 | 0.036 |
| 35 | 2200 | 18x25 | 3132 | 0.036 |
| 35 | 2700 | 16x35.5 | 3295 | 0.032 |
| 35 | 2700 | 18x31.5 | 3336 | 0.032 |
| 35 | 3300 | 16x40 | 3800 | 0.029 |
| 35 | 3300 | 18x35.5 | 3800 | 0.029 |
| 35 | 3900 | 18x40 | 4100 | 0.026 |
| 50 | 0.47 | 5x11 | 12 | 7.23 |
| 50 | 1 | 5x11 | 24 | 4.31 |
| 50 | 2.2 | 5x11 | 36 | 3.60 |
| 50 | 3.3 | 5x11 | 48 | 3.50 |
| 50 | 4.7 | 5x11 | 66 | 3.30 |
| 50 | 5.6 | 5x11 | 96 | 3.20 |
| 50 | 6.8 | 5x11 | 96 | 3.00 |
| 50 | 8.2 | 5x11 | 108 | 2.80 |
| 50 | 10 | 5x11 | 120 | 2.60 |
| 50 | 15 | 5x11 | 150 | 1.87 |
| 50 | 22 | 5x11 | 162 | 1.60 |
| 50 | 22 | 6.3x11 | 168 | 1.27 |
| 50 | 27 | 6.3x11 | 192 | 1.02 |
| 50 | 33 | 6.3x11 | 282 | 0.87 |
| 50 | 33 | 6.3x15 | 296 | 0.85 |
| 50 | 39 | 6.3x11 | 306 | 0.72 |
| 50 | 39 | 6.3x15 | 330 | 0.70 |
| 50 | 47 | 6.3x11 | 303 | 0.06 |
| 50 | 47 | 6.3x15 | 348 | 0.55 |
| 50 | 47 | 8x11.5 | 366 | 0.55 |
| 50 | 56 | 6.3x11 | 324 | 0.05 |
| 50 | 56 | 8x11.5 | 378 | 0.47 |
| 50 | 68 | 8x11.5 | 420 | 0.36 |
| 50 | 82 | 6.3x15 | 462 | 0.35 |
| 50 | 82 | 8x11.5 | 492 | 0.32 |
| 50 | 82 | 8x16 | 528 | 0.28 |
| 50 | 100 | 8x11.5 | 540 | 0.28 |
| 50 | 100 | 8x16 | 576 | 0.25 |
| 50 | 120 | 8x16 | 630 | 0.25 |
| 50 | 150 | 8x16 | 696 | 0.24 |
| 50 | 150 | 8x20 | 756 | 0.24 |
| 50 | 150 | 10x12.5 | 702 | 0.25 |
| 50 | 150 | 10x16 | 780 | 0.24 |
| 50 | 180 | 8x20 | 864 | 0.24 |
| 50 | 180 | 10x16 | 912 | 0.24 |
| 50 | 220 | 10x16 | 1056 | 0.24 |
| 50 | 220 | 10x20 | 1122 | 0.20 |
| 50 | 270 | 10x20 | 1212 | 0.10 |
| 50 | 270 | 10x25 | 1284 | 0.10 |
| 50 | 270 | 13x16 | 1278 | 0.10 |
| 50 | 330 | 10x25 | 1404 | 0.095 |
| 50 | 330 | 13x20 | 1500 | 0.082 |
| 50 | 470 | 10x30 | 1750 | 0.078 |
| 50 | 470 | 13x20 | 1776 | 0.078 |

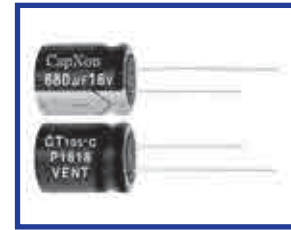
| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|-----------------------------|
| 50 | 470 | 13x25 | 1860 | 0.078 |
| 50 | 470 | 16x16 | 1827 | 0.078 |
| 50 | 560 | 13x20 | 2094 | 0.075 |
| 50 | 560 | 13x25 | 2172 | 0.070 |
| 50 | 560 | 18x16 | 2314 | 0.073 |
| 50 | 680 | 13x25 | 2304 | 0.057 |
| 50 | 680 | 16x25 | 2376 | 0.057 |
| 50 | 820 | 13x30 | 2412 | 0.052 |
| 50 | 820 | 16x20 | 2085 | 0.054 |
| 50 | 820 | 16x31.5 | 2484 | 0.052 |
| 50 | 1000 | 13x40 | 2750 | 0.048 |
| 50 | 1000 | 16x25 | 2676 | 0.050 |
| 50 | 1000 | 16x31.5 | 2736 | 0.048 |
| 50 | 1000 | 18x20 | 2662 | 0.050 |
| 50 | 1200 | 16x31.5 | 2952 | 0.045 |
| 50 | 1200 | 16x35.5 | 3048 | 0.042 |
| 50 | 1200 | 18x25 | 2854 | 0.047 |
| 50 | 1500 | 16x35.5 | 3216 | 0.038 |
| 50 | 1800 | 16x40 | 3550 | 0.035 |
| 50 | 1800 | 18x31.5 | 3368 | 0.035 |
| 50 | 2200 | 18x35.5 | 3550 | 0.032 |
| 50 | 2700 | 18x40 | 3790 | 0.030 |
| 50 | 3300 | 18x40 | 3810 | 0.028 |
| 63 | 10 | 5x11 | 116 | 3.02 |
| 63 | 15 | 5x11 | 131 | 2.37 |
| 63 | 22 | 5x11 | 151 | 1.77 |
| 63 | 22 | 6.3x11 | 194 | 1.39 |
| 63 | 27 | 6.3x11 | 202 | 1.29 |
| 63 | 33 | 6.3x11 | 228 | 1.01 |
| 63 | 39 | 6.3x11 | 243 | 0.89 |
| 63 | 47 | 6.3x11 | 264 | 0.75 |
| 63 | 47 | 8x11.5 | 313 | 0.73 |
| 63 | 56 | 8x11.5 | 320 | 0.70 |
| 63 | 68 | 8x11.5 | 378 | 0.50 |
| 63 | 68 | 8x16 | 477 | 0.42 |
| 63 | 82 | 8x11.5 | 390 | 0.47 |
| 63 | 82 | 8x16 | 477 | 0.42 |
| 63 | 82 | 10x12.5 | 481 | 0.43 |
| 63 | 100 | 8x16 | 515 | 0.36 |
| 63 | 100 | 10x12.5 | 515 | 0.38 |
| 63 | 120 | 8x16 | 512 | 0.36 |
| 63 | 120 | 8x20 | 604 | 0.32 |
| 63 | 120 | 10x12.5 | 528 | 0.36 |
| 63 | 120 | 10x16 | 639 | 0.30 |
| 63 | 150 | 8x20 | 604 | 0.32 |
| 63 | 150 | 10x16 | 666 | 0.28 |
| 63 | 180 | 8x25 | 742 | 0.26 |
| 63 | 180 | 10x16 | 662 | 0.28 |
| 63 | 180 | 10x20 | 757 | 0.26 |
| 63 | 220 | 8x25 | 789 | 0.23 |
| 63 | 220 | 10x16 | 730 | 0.23 |
| 63 | 220 | 10x20 | 892 | 0.20 |
| 63 | 220 | 13x16 | 911 | 0.20 |
| 63 | 270 | 10x20 | 986 | 0.16 |
| 63 | 270 | 13x20 | 1241 | 0.13 |
| 63 | 330 | 10x25 | 1242 | 0.13 |
| 63 | 330 | 13x16 | 1086 | 0.15 |
| 63 | 330 | 13x20 | 1282 | 0.13 |
| 63 | 330 | 13x25 | 1611 | 0.100 |
| 63 | 390 | 13x25 | 1618 | 0.093 |
| 63 | 470 | 13x20 | 1516 | 0.093 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---|-----------------------------|
| 63 | 470 | 13x25 | 1698 | 0.090 |
| 63 | 470 | 13x30 | 1863 | 0.088 |
| 63 | 470 | 16x20 | 1857 | 0.082 |
| 63 | 560 | 13x25 | 1727 | 0.087 |
| 63 | 560 | 13x30 | 1942 | 0.081 |
| 63 | 560 | 16x20 | 1857 | 0.082 |
| 63 | 680 | 13x30 | 2082 | 0.071 |
| 63 | 680 | 13x35 | 2273 | 0.068 |
| 63 | 680 | 16x20 | 1835 | 0.084 |
| 63 | 820 | 13x40 | 2454 | 0.066 |
| 63 | 820 | 16x25 | 2229 | 0.066 |
| 63 | 820 | 18x20 | 2108 | 0.073 |
| 63 | 1000 | 13x45 | 2653 | 0.063 |
| 63 | 1000 | 16x31.5 | 2690 | 0.056 |
| 63 | 1000 | 18x25 | 2307 | 0.071 |
| 63 | 1200 | 16x31.5 | 2727 | 0.054 |
| 63 | 1200 | 18x25 | 2470 | 0.062 |
| 63 | 1500 | 18x31.5 | 2997 | 0.051 |
| 63 | 1500 | 18x35.5 | 3256 | 0.048 |
| 63 | 1800 | 16x40 | 3760 | 0.036 |
| 63 | 1800 | 18x35.5 | 3481 | 0.042 |
| 63 | 2200 | 18x40 | 3938 | 0.035 |
| 80 | 10 | 5x11 | 100 | 4.07 |
| 80 | 15 | 5x11 | 113 | 3.20 |
| 80 | 22 | 6.3x11 | 167 | 1.88 |
| 80 | 27 | 6.3x11 | 174 | 1.74 |
| 80 | 33 | 6.3x11 | 196 | 1.37 |
| 80 | 39 | 8x11.5 | 244 | 1.20 |
| 80 | 47 | 8x11.5 | 265 | 1.02 |
| 80 | 56 | 8x11.5 | 275 | 0.95 |
| 80 | 56 | 8x16 | 326 | 0.90 |
| 80 | 68 | 8x16 | 380 | 0.66 |
| 80 | 68 | 10x12.5 | 388 | 0.66 |
| 80 | 82 | 8x16 | 389 | 0.63 |
| 80 | 82 | 10x12.5 | 388 | 0.66 |
| 80 | 100 | 8x20 | 509 | 0.45 |
| 80 | 100 | 10x16 | 522 | 0.45 |
| 80 | 100 | 13x16 | 634 | 0.44 |
| 80 | 120 | 10x16 | 534 | 0.43 |
| 80 | 150 | 10x20 | 657 | 0.35 |
| 80 | 150 | 13x16 | 665 | 0.40 |
| 80 | 180 | 10x20 | 677 | 0.33 |
| 80 | 180 | 10x25 | 755 | 0.32 |
| 80 | 180 | 13x16 | 721 | 0.34 |
| 80 | 220 | 10x25 | 767 | 0.31 |
| 80 | 220 | 13x20 | 830 | 0.31 |
| 80 | 270 | 13x20 | 890 | 0.27 |
| 80 | 270 | 13x25 | 1019 | 0.25 |
| 80 | 330 | 13x20 | 1060 | 0.19 |
| 80 | 330 | 16x20 | 1253 | 0.18 |
| 80 | 390 | 13x30 | 1427 | 0.15 |
| 80 | 470 | 13x30 | 1533 | 0.13 |
| 80 | 470 | 13x35 | 1711 | 0.12 |
| 80 | 470 | 16x25 | 1432 | 0.16 |
| 80 | 470 | 18x20 | 1471 | 0.15 |
| 80 | 560 | 13x40 | 1685 | 0.14 |
| 80 | 560 | 16x25 | 1479 | 0.15 |
| 80 | 560 | 18x20 | 1471 | 0.15 |
| 80 | 680 | 16x31.5 | 1757 | 0.13 |
| 80 | 680 | 18x25 | 1582 | 0.15 |
| 80 | 820 | 16x35.5 | 1929 | 0.12 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|---------------------------|
| 80 | 820 | 18x25 | 1699 | 0.13 |
| 80 | 1000 | 16x35.5 | 1929 | 0.12 |
| 80 | 1000 | 16x40 | 2151 | 0.11 |
| 80 | 1000 | 18x31.5 | 2041 | 0.11 |
| 80 | 1200 | 16x40 | 2378 | 0.09 |
| 80 | 1200 | 18x35.5 | 2315 | 0.095 |
| 80 | 1500 | 16x40 | 2461 | 0.084 |
| 80 | 1500 | 18x40 | 2641 | 0.083 |
| 80 | 1800 | 18x40 | 2657 | 0.082 |
| 100 | 4.7 | 5x11 | 84 | 5.75 |
| 100 | 5.6 | 5x11 | 90 | 5.00 |
| 100 | 6.8 | 5x11 | 96 | 4.36 |
| 100 | 8.2 | 5x11 | 105 | 3.68 |
| 100 | 10 | 6.3x11 | 141 | 2.63 |
| 100 | 10 | 8x11.5 | 180 | 2.20 |
| 100 | 15 | 6.3x11 | 151 | 2.31 |
| 100 | 22 | 6.3x11 | 168 | 1.85 |
| 100 | 22 | 8x11.5 | 228 | 1.38 |
| 100 | 27 | 8x11.5 | 234 | 1.31 |
| 100 | 33 | 8x11.5 | 240 | 1.24 |
| 100 | 39 | 8x16 | 282 | 1.20 |
| 100 | 47 | 8x16 | 335 | 0.85 |
| 100 | 47 | 10x12.5 | 350 | 0.81 |
| 100 | 47 | 10x16 | 357 | 0.78 |
| 100 | 56 | 8x16 | 354 | 0.76 |
| 100 | 56 | 8x20 | 414 | 0.68 |
| 100 | 56 | 10x12.5 | 364 | 0.75 |
| 100 | 68 | 8x20 | 424 | 0.65 |
| 100 | 68 | 10x16 | 425 | 0.68 |
| 100 | 82 | 8x20 | 474 | 0.52 |
| 100 | 82 | 10x16 | 486 | 0.52 |
| 100 | 100 | 8x30 | 636 | 0.42 |
| 100 | 100 | 10x16 | 522 | 0.45 |
| 100 | 100 | 10x20 | 596 | 0.42 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|---------------------------|
| 100 | 100 | 13x16 | 641 | 0.43 |
| 100 | 100 | 13x20 | 750 | 0.38 |
| 100 | 120 | 8x35 | 738 | 0.36 |
| 100 | 120 | 10x20 | 611 | 0.40 |
| 100 | 120 | 10x25 | 702 | 0.37 |
| 100 | 120 | 13x16 | 665 | 0.40 |
| 100 | 150 | 10x25 | 743 | 0.33 |
| 100 | 150 | 10x30 | 834 | 0.31 |
| 100 | 150 | 13x20 | 805 | 0.33 |
| 100 | 180 | 13x20 | 858 | 0.29 |
| 100 | 180 | 13x25 | 963 | 0.28 |
| 100 | 220 | 13x20 | 890 | 0.27 |
| 100 | 220 | 13x25 | 1019 | 0.25 |
| 100 | 220 | 16x16 | 915 | 0.27 |
| 100 | 220 | 16x20 | 1063 | 0.25 |
| 100 | 270 | 10x40 | 1107 | 0.23 |
| 100 | 270 | 13x30 | 1236 | 0.20 |
| 100 | 270 | 16x25 | 1281 | 0.20 |
| 100 | 330 | 13x30 | 1382 | 0.16 |
| 100 | 330 | 13x35 | 1584 | 0.14 |
| 100 | 330 | 16x25 | 1531 | 0.14 |
| 100 | 390 | 13x40 | 1748 | 0.13 |
| 100 | 390 | 18x25 | 1582 | 0.15 |
| 100 | 470 | 16x25 | 1479 | 0.15 |
| 100 | 470 | 16x31.5 | 1910 | 0.11 |
| 100 | 470 | 18x25 | 1637 | 0.14 |
| 100 | 560 | 16x35.5 | 1854 | 0.13 |
| 100 | 560 | 18x31.5 | 1877 | 0.13 |
| 100 | 680 | 16x35.5 | 1929 | 0.12 |
| 100 | 680 | 18x35.5 | 2151 | 0.11 |
| 100 | 820 | 18x35.5 | 2202 | 0.105 |
| 100 | 820 | 18x40 | 2406 | 0.100 |
| 100 | 1000 | 18x40 | 2469 | 0.095 |

GT Series 105°C Miniaturized, Long Life



Features

- ◆ Long Life: 105°C 10000hours.
- ◆ RoHS compliance.

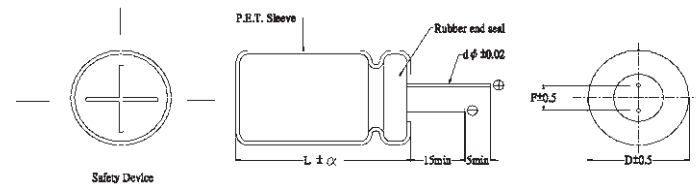
Specifications

| Item | Performance Characteristics |
|---|---|
| Operating Temperature Range | -40 to +105°C |
| Rated Voltage Range | 10~100V.DC |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | $I \leq 0.01CV$ or $3\mu A$ whichever is greater. (After 2 minutes) I= Leakage Current(μA) C= Rated Capacitance V= Rated voltage(V) |
| Dissipation Factor ($\tan \delta$, at 20°C , 120Hz) | Working Voltage(VDC) 10 16 25 35 50 63 100 |
| | D.F.(%)max. 45 35 30 22 19 17 15 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Rated voltage(VDC) 10 16 25 35 50 63 |
| | Z-25°C / Z+20°C 10 8 6 6 5 5 |
| For capacitance > 1000 μF, add 1 per another 1000 μF for -40°C/+20°C. | |
| Endurance | Duration time :10000Hrs |
| | Ambient temperature :+105°C |
| | Applied voltage :Rated DC working voltage |
| | After test requirement at +20°C |
| | Capacitance change :≤ ±25% of the initial measured value |
| | Dissipation factor :≤300% of the initial specified value |
| Leakage current :≤The initial specified value | |
| Shelf Life | Test condition |
| | Duration time :1000 Hrs |
| | Ambient temperature :+105°C |
| | Applied voltage :None |
| | After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 120 | 1K | 10K | 100K≤ |
|-----------------------|------|------|------|-------|
| 1~10 μ F | 0.42 | 0.60 | 0.80 | 1.00 |
| 22~33 μ F | 0.55 | 0.75 | 0.90 | 1.00 |
| 47~330 μ F | 0.70 | 0.85 | 0.95 | 1.00 |

Diagram of Dimensions:(unit:mm)



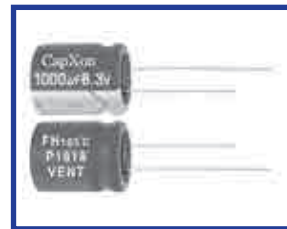
| | | | |
|----|-------|------|------|
| DΦ | 5 | 6.3 | 8 |
| F | 2.0 | 2.5 | 3.5 |
| dΦ | 0.5 | L<20 | L≥20 |
| | | 0.5 | 0.6 |
| α | α=1.5 | | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|--|
| 10 | 100 | 5x11 | 140 |
| 10 | 220 | 6.3x11 | 220 |
| 10 | 330 | 8x11.5 | 340 |
| 16 | 47 | 5x11 | 140 |
| 16 | 100 | 6.3x11 | 220 |
| 16 | 220 | 8x11.5 | 340 |
| 25 | 33 | 5x11 | 140 |
| 25 | 47 | 5x11 | 140 |
| 25 | 100 | 6.3x11 | 220 |
| 35 | 33 | 5x11 | 90 |
| 35 | 47 | 6.3x11 | 220 |
| 35 | 100 | 8x11.5 | 340 |
| 50 | 1 | 5x11 | 26 |
| 50 | 2.2 | 5x11 | 36 |
| 50 | 3.3 | 5x11 | 75 |
| 50 | 4.7 | 5x11 | 85 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|--|
| 50 | 10 | 5x11 | 95 |
| 50 | 22 | 5x11 | 140 |
| 50 | 33 | 6.3x11 | 200 |
| 50 | 47 | 6.3x11 | 200 |
| 50 | 100 | 8x11.5 | 280 |
| 63 | 10 | 5x11 | 85 |
| 63 | 22 | 6.3x11 | 180 |
| 63 | 33 | 6.3x11 | 180 |
| 63 | 47 | 8x11.5 | 250 |
| 100 | 1 | 5x11 | 40 |
| 100 | 2.2 | 5x11 | 50 |
| 100 | 3.3 | 5x11 | 60 |
| 100 | 4.7 | 5x11 | 70 |
| 100 | 10 | 6.3x11 | 150 |
| 100 | 22 | 8x11.5 | 230 |

FH 105°C high ripple current at frequency range



Features

- ◆ New innovative electrolyte is employed to minimize ESR
- ◆ Long life 4,000 to 10,000 hours at 105°C
- ◆ Non solvent proof type
- ◆ 6.3 to 100VDC newly type
- ◆ RoHS compliant

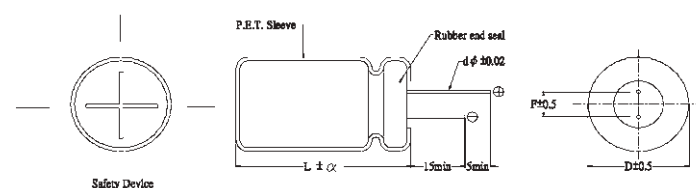
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|----------------------|------------|------------|------------|------------|----------|----------|----------|------------|---------------|------------|------------|----------|----|------------|------------|------------|---|---------------|---|---|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3 to 100VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 22~5600 µF | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I=0.01 CV or 3 (µA) (After 2 minute) with rated working voltage applied.) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td> </tr> <tr> <td>D. F.(%) max.</td> <td>22</td><td>19</td><td>16</td><td>14</td><td>12</td><td>10</td><td>9</td><td>8</td> </tr> </table> <p>For capacitance > 1000µF,add 2% per another 1000µF.</p> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | D. F.(%) max. | 22 | 19 | 16 | 14 | 12 | 10 | 9 | 8 | | | | | | | | | |
| Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | |
| D. F.(%) max. | 22 | 19 | 16 | 14 | 12 | 10 | 9 | 8 | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | <p>Impedance ratio max</p> <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>100</td> </tr> <tr> <td>Z-25°C/Z+20°C</td> <td>4</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td> </tr> <tr> <td>Z-40°C/Z+20°C</td> <td>8</td><td>6</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | Z-25°C/Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | Z-40°C/Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 | 3 | 3 |
| Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | |
| Z-25°C/Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | |
| Z-40°C/Z+20°C | 8 | 6 | 4 | 3 | 3 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | |
| Endurance | <p>Test conditions Duration time :</p> <table border="1"> <thead> <tr> <th rowspan="2">Voltage</th> <th colspan="2">SIZE</th> <th>φ D≤6.3</th> <th>φ D = 8,10</th> <th>φ D ≥ 13</th> </tr> </thead> <tbody> <tr> <td>6.3~10WV</td> <td>16~100WV</td> <td>4000 hours</td> <td>5000 hours</td> <td>6000 hours</td> <td>8000 hours</td> </tr> <tr> <td>16~100WV</td> <td></td> <td>5000 hours</td> <td>7000 hours</td> <td>10000hours</td> <td></td> </tr> </tbody> </table> <p>Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change : within ±25% of the initial measured value Dissipation factor : ≤200% of the initial specified value Leakage current : ≤The initial specified value</p> | Voltage | SIZE | | φ D≤6.3 | φ D = 8,10 | φ D ≥ 13 | 6.3~10WV | 16~100WV | 4000 hours | 5000 hours | 6000 hours | 8000 hours | 16~100WV | | 5000 hours | 7000 hours | 10000hours | | | | | | | | | | |
| Voltage | SIZE | | φ D≤6.3 | φ D = 8,10 | φ D ≥ 13 | | | | | | | | | | | | | | | | | | | | | | | |
| | 6.3~10WV | 16~100WV | 4000 hours | 5000 hours | 6000 hours | 8000 hours | | | | | | | | | | | | | | | | | | | | | | |
| 16~100WV | | 5000 hours | 7000 hours | 10000hours | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | <p>Test condition Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Hz | 50(60) | 120 | 400 | 1K | 10K | 100K |
|------------------|--------|------|------|------|------|------|
| CAP ≤ 10 | 0.47 | 0.59 | 0.76 | 0.85 | 0.97 | 1.00 |
| 10 < CAP ≤ 100 | 0.52 | 0.62 | 0.80 | 0.89 | 0.97 | 1.00 |
| 100 < CAP ≤ 1000 | 0.58 | 0.72 | 0.84 | 0.90 | 0.98 | 1.00 |
| 1000 < CAP | 0.63 | 0.78 | 0.87 | 0.91 | 0.98 | 1.00 |

Diagram of Dimensions:(unit:mm)



| φ D | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|--------|-----------|-------------------|-----------|---------------------|--------|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| φ d | 0.5 | L < 20 | L ≥ 20 | 0.6 | 0.8 | | |
| | | 0.5 | 0.6 | | | | |
| α | D < 16 | D=16 | | D=18 | | D > 18 | |
| | | L:25~35.5 | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | |

Radial

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|-----------------------------|
| 6.3 | 150 | 5x11 | 220 | 0.550 |
| 6.3 | 220 | 6.3x11 | 300 | 0.260 |
| 6.3 | 330 | 6.3x11 | 350 | 0.210 |
| 6.3 | 470 | 8x11.5 | 440 | 0.140 |
| 6.3 | 680 | 8x11.5 | 650 | 0.130 |
| 6.3 | 820 | 10x12.5 | 870 | 0.090 |
| 6.3 | 1000 | 8x16 | 850 | 0.080 |
| 6.3 | 1200 | 8x20 | 1060 | 0.075 |
| 6.3 | 1200 | 10x16 | 1220 | 0.064 |
| 6.3 | 1500 | 10x20 | 1410 | 0.050 |
| 6.3 | 1800 | 13x16 | 1460 | 0.049 |
| 6.3 | 2200 | 10x25 | 1660 | 0.046 |
| 6.3 | 2700 | 16x16 | 1950 | 0.042 |
| 6.3 | 3300 | 13x20 | 1910 | 0.038 |
| 6.3 | 3900 | 13x25 | 2240 | 0.029 |
| 6.3 | 3900 | 18x16 | 2220 | 0.040 |
| 6.3 | 4700 | 13x30 | 2660 | 0.027 |
| 6.3 | 5600 | 13x35 | 2890 | 0.024 |
| 6.3 | 5600 | 16x20 | 2540 | 0.027 |
| 6.3 | 6800 | 13x40 | 3360 | 0.017 |
| 6.3 | 6800 | 16x25 | 2940 | 0.021 |
| 6.3 | 6800 | 18x20 | 2870 | 0.026 |
| 6.3 | 8200 | 16x31.5 | 3460 | 0.017 |
| 6.3 | 10000 | 16x35.5 | 3620 | 0.015 |
| 6.3 | 10000 | 18x25 | 3150 | 0.019 |
| 6.3 | 12000 | 16x40 | 4090 | 0.013 |
| 6.3 | 12000 | 18x31.5 | 4180 | 0.015 |
| 6.3 | 15000 | 18x35.5 | 4230 | 0.014 |
| 6.3 | 18000 | 18x40 | 4290 | 0.012 |
| 10 | 100 | 5x11 | 220 | 0.580 |
| 10 | 220 | 6.3x11 | 350 | 0.230 |
| 10 | 330 | 6.3x11 | 450 | 0.220 |
| 10 | 470 | 8x11.5 | 650 | 0.130 |
| 10 | 680 | 8x16 | 850 | 0.096 |
| 10 | 680 | 10x12.5 | 870 | 0.085 |
| 10 | 820 | 10x16 | 950 | 0.075 |
| 10 | 1000 | 8x20 | 1060 | 0.072 |
| 10 | 1000 | 10x16 | 1220 | 0.064 |
| 10 | 1200 | 10x20 | 1410 | 0.045 |
| 10 | 1500 | 10x25 | 1560 | 0.043 |
| 10 | 1500 | 13x16 | 1460 | 0.049 |
| 10 | 2200 | 10x30 | 1920 | 0.030 |
| 10 | 2200 | 13x20 | 1910 | 0.035 |
| 10 | 2200 | 16x16 | 1950 | 0.042 |
| 10 | 2700 | 18x16 | 2220 | 0.043 |
| 10 | 3300 | 13x25 | 2240 | 0.029 |
| 10 | 3900 | 13x30 | 2660 | 0.025 |
| 10 | 3900 | 16x20 | 2540 | 0.027 |
| 10 | 4700 | 13x35 | 2890 | 0.020 |
| 10 | 5600 | 13x40 | 3360 | 0.017 |
| 10 | 5600 | 16x25 | 2940 | 0.021 |
| 10 | 5600 | 18x20 | 2870 | 0.026 |
| 10 | 6800 | 16x31.5 | 3460 | 0.017 |
| 10 | 6800 | 18x25 | 3150 | 0.019 |
| 10 | 8200 | 16x35.5 | 3620 | 0.015 |
| 10 | 8200 | 18x31.5 | 4180 | 0.015 |
| 10 | 10000 | 16x40 | 4090 | 0.013 |
| 10 | 10000 | 18x35.5 | 4230 | 0.014 |
| 10 | 12000 | 18x40 | 4290 | 0.012 |

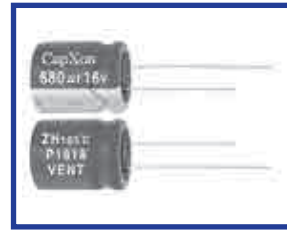
| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|-----------------------------|
| 16 | 56 | 5x11 | 220 | 0.560 |
| 16 | 100 | 6.3x11 | 300 | 0.220 |
| 16 | 120 | 6.3x11 | 350 | 0.215 |
| 16 | 220 | 8x11.5 | 500 | 0.180 |
| 16 | 330 | 8x11.5 | 650 | 0.140 |
| 16 | 470 | 8x11.5 | 740 | 0.100 |
| 16 | 470 | 8x16 | 850 | 0.095 |
| 16 | 470 | 10x12.5 | 870 | 0.085 |
| 16 | 680 | 8x20 | 1060 | 0.080 |
| 16 | 680 | 10x16 | 1220 | 0.060 |
| 16 | 820 | 10x20 | 1300 | 0.052 |
| 16 | 1000 | 10x20 | 1410 | 0.046 |
| 16 | 1000 | 13x16 | 1460 | 0.050 |
| 16 | 1200 | 10x25 | 1660 | 0.044 |
| 16 | 1500 | 10x25 | 1770 | 0.036 |
| 16 | 1500 | 10x30 | 1920 | 0.031 |
| 16 | 1500 | 13x20 | 1910 | 0.037 |
| 16 | 1500 | 16x16 | 1950 | 0.042 |
| 16 | 1800 | 10x25 | 1800 | 0.036 |
| 16 | 1800 | 13x25 | 2080 | 0.030 |
| 16 | 2200 | 13x25 | 2240 | 0.026 |
| 16 | 2200 | 18x16 | 2220 | 0.043 |
| 16 | 2700 | 13x30 | 2660 | 0.023 |
| 16 | 2700 | 16x20 | 2540 | 0.027 |
| 16 | 3300 | 13x35 | 2890 | 0.022 |
| 16 | 3900 | 13x40 | 3360 | 0.017 |
| 16 | 3900 | 16x25 | 2940 | 0.021 |
| 16 | 3900 | 18x20 | 2870 | 0.026 |
| 16 | 4700 | 16x31.5 | 3460 | 0.017 |
| 16 | 4700 | 18x25 | 3150 | 0.020 |
| 16 | 5600 | 16x35.5 | 3620 | 0.015 |
| 16 | 5600 | 18x31.5 | 4180 | 0.015 |
| 16 | 6800 | 16x40 | 4090 | 0.013 |
| 16 | 8200 | 18x35.5 | 4230 | 0.014 |
| 16 | 10000 | 18x40 | 4290 | 0.012 |
| 25 | 47 | 5x11 | 220 | 0.560 |
| 25 | 56 | 5x11 | 260 | 0.560 |
| 25 | 100 | 6.3x11 | 350 | 0.250 |
| 25 | 220 | 8x11.5 | 650 | 0.150 |
| 25 | 330 | 8x16 | 850 | 0.092 |
| 25 | 330 | 10x12.5 | 870 | 0.082 |
| 25 | 470 | 8x20 | 1060 | 0.074 |
| 25 | 470 | 10x12.5 | 1100 | 0.074 |
| 25 | 470 | 10x16 | 1220 | 0.068 |
| 25 | 680 | 10x20 | 1410 | 0.050 |
| 25 | 680 | 13x16 | 1460 | 0.049 |
| 25 | 820 | 10x25 | 1660 | 0.041 |
| 25 | 1000 | 10x30 | 1920 | 0.032 |
| 25 | 1000 | 13x20 | 1910 | 0.036 |
| 25 | 1000 | 16x16 | 1950 | 0.042 |
| 25 | 1200 | 18x16 | 2220 | 0.043 |
| 25 | 1500 | 13x25 | 2240 | 0.028 |
| 25 | 1800 | 13x30 | 2660 | 0.024 |
| 25 | 1800 | 16x20 | 2540 | 0.027 |
| 25 | 2200 | 13x30 | 2695 | 0.025 |
| 25 | 2200 | 13x35 | 2890 | 0.023 |
| 25 | 2200 | 18x20 | 2870 | 0.026 |
| 25 | 2700 | 13x40 | 3360 | 0.017 |
| 25 | 2700 | 16x25 | 2940 | 0.022 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100kHz) | Max ESR(Ω) at 20°C/100kHz | WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA _{rms} /105°C /100kHz) | Max ESR(Ω) at 20°C/100kHz |
|----------|----------|-----------|---|-----------------------------|----------|----------|-----------|---|-----------------------------|
| 25 | 3300 | 16x31.5 | 3460 | 0.017 | 50 | 1000 | 16x25 | 2565 | 0.025 |
| 25 | 3300 | 18x25 | 3150 | 0.019 | 50 | 1000 | 18x20 | 2500 | 0.036 |
| 25 | 3900 | 16x35.5 | 3620 | 0.015 | 50 | 1200 | 16x31.5 | 3020 | 0.030 |
| 25 | 3900 | 18x31.5 | 4180 | 0.015 | 50 | 1200 | 18x25 | 2750 | 0.026 |
| 25 | 4700 | 16x40 | 4090 | 0.013 | 50 | 1500 | 16x35.5 | 3160 | 0.019 |
| 25 | 4700 | 18x35.5 | 4230 | 0.014 | 50 | 1800 | 16x40 | 3720 | 0.016 |
| 25 | 5600 | 18x40 | 4290 | 0.012 | 50 | 1800 | 18x31.5 | 3645 | 0.021 |
| 35 | 33 | 5x11 | 230 | 0.550 | 50 | 2200 | 18x35.5 | 3690 | 0.017 |
| 35 | 47 | 5x11 | 300 | 0.450 | 50 | 2700 | 18x40 | 3810 | 0.014 |
| 35 | 56 | 6.3x11 | 360 | 0.210 | 50 | 3300 | 18x40 | 3810 | 0.014 |
| 35 | 100 | 6.3x11 | 480 | 0.180 | 63 | 15 | 5x11 | 65 | 1.800 |
| 35 | 150 | 8x11.5 | 680 | 0.140 | 63 | 33 | 6.3x11 | 260 | 1.200 |
| 35 | 220 | 8x11.5 | 870 | 0.095 | 63 | 47 | 8x11.5 | 360 | 0.660 |
| 35 | 220 | 8x16 | 1000 | 0.090 | 63 | 56 | 8x11.5 | 380 | 0.600 |
| 35 | 220 | 10x12.5 | 1060 | 0.080 | 63 | 82 | 8x16 | 460 | 0.440 |
| 35 | 270 | 8x20 | 1180 | 0.070 | 63 | 82 | 10x12.5 | 500 | 0.430 |
| 35 | 330 | 10x16 | 1380 | 0.062 | 63 | 100 | 10x12.5 | 640 | 0.340 |
| 35 | 470 | 10x20 | 1800 | 0.048 | 63 | 120 | 8x20 | 700 | 0.320 |
| 35 | 470 | 13x16 | 1560 | 0.049 | 63 | 120 | 10x16 | 760 | 0.300 |
| 35 | 560 | 10x25 | 1900 | 0.042 | 63 | 180 | 10x20 | 880 | 0.190 |
| 35 | 680 | 10x30 | 2000 | 0.035 | 63 | 180 | 13x16 | 800 | 0.180 |
| 35 | 680 | 13x20 | 2100 | 0.034 | 63 | 220 | 10x20 | 995 | 0.188 |
| 35 | 680 | 16x16 | 2050 | 0.042 | 63 | 220 | 10x25 | 1100 | 0.185 |
| 35 | 1000 | 13x20 | 2180 | 0.038 | 63 | 270 | 10x30 | 1200 | 0.120 |
| 35 | 1000 | 13x25 | 2400 | 0.028 | 63 | 270 | 13x20 | 1200 | 0.160 |
| 35 | 1000 | 18x16 | 2220 | 0.043 | 63 | 270 | 16x16 | 1200 | 0.110 |
| 35 | 1200 | 13x30 | 2800 | 0.024 | 63 | 330 | 13x25 | 1600 | 0.120 |
| 35 | 1200 | 16x20 | 2800 | 0.028 | 63 | 390 | 18x16 | 1610 | 0.096 |
| 35 | 1500 | 13x35 | 3000 | 0.022 | 63 | 470 | 13x30 | 1800 | 0.100 |
| 35 | 1800 | 13x40 | 3360 | 0.017 | 63 | 470 | 16x20 | 1500 | 0.077 |
| 35 | 1800 | 16x25 | 2940 | 0.020 | 63 | 560 | 13x35 | 2000 | 0.070 |
| 35 | 1800 | 18x20 | 2870 | 0.026 | 63 | 560 | 16x25 | 2000 | 0.073 |
| 35 | 2200 | 16x31.5 | 3460 | 0.017 | 63 | 680 | 13x40 | 2200 | 0.070 |
| 35 | 2200 | 18x20 | 2930 | 0.025 | 63 | 680 | 18x20 | 1600 | 0.072 |
| 35 | 2200 | 18x25 | 3150 | 0.019 | 63 | 820 | 16x31.5 | 2400 | 0.054 |
| 35 | 2700 | 16x35.5 | 3620 | 0.018 | 63 | 820 | 18x25 | 1800 | 0.052 |
| 35 | 2700 | 18x31.5 | 4180 | 0.016 | 63 | 1000 | 16x35.5 | 2500 | 0.048 |
| 35 | 3300 | 16x40 | 4090 | 0.013 | 63 | 1000 | 18*25 | 2290 | 0.052 |
| 35 | 3300 | 18x35.5 | 4230 | 0.014 | 63 | 1000 | 18x31.5 | 2800 | 0.047 |
| 35 | 3900 | 18x40 | 4300 | 0.012 | 63 | 1200 | 16x40 | 2920 | 0.040 |
| 50 | 22 | 5x11 | 220 | 0.650 | 63 | 1200 | 18x31.5 | 2850 | 0.045 |
| 50 | 47 | 6.3x11 | 270 | 0.370 | 63 | 1200 | 18x35.5 | 3000 | 0.039 |
| 50 | 56 | 6.3x11 | 300 | 0.290 | 63 | 1500 | 18x40 | 3200 | 0.036 |
| 50 | 100 | 8x11.5 | 680 | 0.160 | 100 | 6.8 | 5x11 | 65 | 1.800 |
| 50 | 120 | 8x16 | 760 | 0.120 | 100 | 15 | 6.3x11 | 130 | 1.000 |
| 50 | 150 | 10x12.5 | 800 | 0.120 | 100 | 27 | 8x11.5 | 300 | 0.610 |
| 50 | 180 | 8x20 | 1000 | 0.090 | 100 | 39 | 8x16 | 340 | 0.360 |
| 50 | 220 | 10x16 | 1300 | 0.082 | 100 | 47 | 10x12.5 | 400 | 0.420 |
| 50 | 270 | 10x20 | 1350 | 0.060 | 100 | 56 | 8x20 | 410 | 0.260 |
| 50 | 270 | 13x16 | 1270 | 0.061 | 100 | 68 | 10x16 | 460 | 0.300 |
| 50 | 330 | 10x25 | 1600 | 0.057 | 100 | 82 | 10x20 | 600 | 0.210 |
| 50 | 470 | 10x30 | 1800 | 0.048 | 100 | 82 | 13x16 | 540 | 0.180 |
| 50 | 470 | 13x20 | 1740 | 0.045 | 100 | 100 | 10x25 | 800 | 0.200 |
| 50 | 470 | 16x16 | 1710 | 0.055 | 100 | 120 | 10x30 | 830 | 0.120 |
| 50 | 560 | 13x25 | 1960 | 0.042 | 100 | 120 | 13x20 | 900 | 0.160 |
| 50 | 560 | 18x16 | 1940 | 0.054 | 100 | 150 | 13x20 | 1000 | 0.110 |
| 50 | 680 | 13x30 | 2320 | 0.030 | 100 | 150 | 16x16 | 1000 | 0.110 |
| 50 | 820 | 13x35 | 2520 | 0.025 | 100 | 180 | 13x25 | 1010 | 0.096 |
| 50 | 820 | 16x20 | 2220 | 0.034 | 100 | 180 | 18x16 | 1180 | 0.096 |
| 50 | 1000 | 13x35 | 2650 | 0.024 | 100 | 220 | 13x30 | 1210 | 0.080 |
| 50 | 1000 | 13x40 | 2930 | 0.021 | 100 | 220 | 16x20 | 1140 | 0.077 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|---------------------------|
| 100 | 270 | 13x35 | 1450 | 0.070 |
| 100 | 270 | 16x25 | 1480 | 0.073 |
| 100 | 330 | 13x40 | 1600 | 0.071 |
| 100 | 330 | 18x20 | 1400 | 0.072 |
| 100 | 390 | 16x31.5 | 1700 | 0.055 |
| 100 | 390 | 18x25 | 1740 | 0.054 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|---------------------------|
| 100 | 470 | 16x35.5 | 1910 | 0.047 |
| 100 | 470 | 18x31.5 | 1730 | 0.047 |
| 100 | 560 | 16x40 | 2140 | 0.036 |
| 100 | 680 | 18x35.5 | 2000 | 0.042 |
| 100 | 820 | 18x40 | 2480 | 0.040 |
| 100 | 1000 | 18x40 | 2580 | 0.038 |

ZH 105°C Miniaturized, Long Life, Low impedance



Features

- ◆ Long Life: 105°C 6000~10000 hours.
- ◆ RoHS compliance.

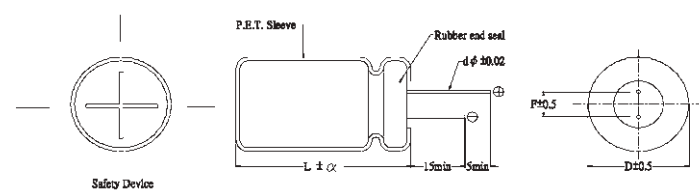
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------|------------|-----------|------|---------|------|----------|-------|-----|-----|-----------------|----|----|----|----|----|----|---|---|---|-----------------|---|---|---|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3~100V.DC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 2.2~8200 μF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | $I \leq 0.01CV$ or $3\mu A$ whichever is greater. (After 2 minutes) I= Leakage Current(μA) C= Rated Capacitance V= Rated voltage(V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <th>Working Voltage(VDC)</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>80</td> <td>100</td> </tr> <tr> <th>D. F.(%) max.</th> <td>22</td> <td>19</td> <td>16</td> <td>14</td> <td>12</td> <td>10</td> <td>9</td> <td>8</td> <td>8</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | D. F.(%) max. | 22 | 19 | 16 | 14 | 12 | 10 | 9 | 8 | 8 | | | | | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | | | | | | | | | | | | | | | | | | | | | |
| D. F.(%) max. | 22 | 19 | 16 | 14 | 12 | 10 | 9 | 8 | 8 | | | | | | | | | | | | | | | | | | | | | | |
| For capacitance > 1000μF, add 2% per another 1000μF. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <th>Working Voltage(VDC)</th> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>80</td> <td>100</td> </tr> <tr> <th>Z-25°C / Z+20°C</th> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <th>Z-40°C / Z+20°C</th> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | Z-25°C / Z+20°C | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | Z-40°C / Z+20°C | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | | | | | | | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| For capacitance > 1000 μ F, add 0.5 per another 1000 μ F for -25°C/+20°C. add 1 per another 1000 μ F for -40°C/+20°C. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test conditions Duration time : as right Ambient temperature : +105°C Applied voltage : Rated DC working voltage After test requirement at +20°C Capacitance change : $\leq \pm 25\%$ of the initial measured value.(6.3V,10V: $\pm 30\%$) Dissipation factor : $\leq 200\%$ of the initial specified value Leakage current : \leq The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <th>D Φ</th> <th>Life hours</th> </tr> <tr> <td>Φ D ≤ 6.3</td> <td>6000</td> </tr> <tr> <td>Φ D = 8</td> <td>8000</td> </tr> <tr> <td>Φ D ≥ 10</td> <td>10000</td> </tr> </table> | D Φ | Life hours | Φ D ≤ 6.3 | 6000 | Φ D = 8 | 8000 | Φ D ≥ 10 | 10000 | | | | | | | | | | | | | | | | | | | | | | |
| D Φ | Life hours | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Φ D ≤ 6.3 | 6000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Φ D = 8 | 8000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Φ D ≥ 10 | 10000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μ F)\Frequency(Hz) | 120 | 1K | 10K | 100K ≤ |
|-------------------------|------|------|------|--------|
| 8.2~33 μ F | 0.42 | 0.70 | 0.90 | 1.00 |
| 47~270 μ F | 0.50 | 0.73 | 0.92 | 1.00 |
| 330~680 μ F | 0.55 | 0.77 | 0.94 | 1.00 |
| 820~1800 μ F | 0.60 | 0.80 | 0.96 | 1.00 |
| 2200~8200 μ F | 0.70 | 0.85 | 0.98 | 1.00 |

Diagram of Dimensions:(unit:mm)



| φ D | 5 | 6 | 8 | 10 | 13 | 16 | 18 |
|-----|--------|------------|-------------------|------------|--------|-----|-----|
| F | 2.0 | 3.0 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| φ d | 0.5 | | L < 20 | L ≥ 20 | 0.6 | | 0.8 |
| | | | 0.5 | 0.6 | | | |
| α | D = 16 | | D = 18 | | D > 18 | | 2.0 |
| | D < 16 | L: 25~35.5 | L < 25 and L ≥ 40 | L: 25~31.5 | | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|-----------------------------|
| 6.3 | 220 | 5x11 | 355 | 0.230 |
| 6.3 | 470 | 6.3x11 | 550 | 0.100 |
| 6.3 | 820 | 8x11.5 | 955 | 0.060 |
| 6.3 | 1200 | 8x16 | 1260 | 0.050 |
| 6.3 | 1200 | 10x12.5 | 1340 | 0.044 |
| 6.3 | 1500 | 8x20 | 1510 | 0.034 |
| 6.3 | 1800 | 10x16 | 1770 | 0.033 |
| 6.3 | 2200 | 10x20 | 1970 | 0.025 |
| 6.3 | 2700 | 10x25 | 2260 | 0.023 |
| 6.3 | 3900 | 13x20 | 2490 | 0.022 |
| 6.3 | 4700 | 13x25 | 2910 | 0.020 |
| 6.3 | 5600 | 13x30 | 3460 | 0.018 |
| 6.3 | 6800 | 13x35 | 3580 | 0.017 |
| 6.3 | 6800 | 16x20 | 3260 | 0.020 |
| 6.3 | 8200 | 16x25 | 3640 | 0.018 |
| 10 | 150 | 5x11 | 355 | 0.230 |
| 10 | 330 | 6.3x11 | 550 | 0.100 |
| 10 | 680 | 8x11.5 | 955 | 0.060 |
| 10 | 1000 | 8x16 | 1260 | 0.050 |
| 10 | 1000 | 10x12.5 | 1340 | 0.049 |
| 10 | 1500 | 8x20 | 1510 | 0.034 |
| 10 | 1500 | 10x16 | 1770 | 0.033 |
| 10 | 1800 | 10x20 | 1970 | 0.025 |
| 10 | 2200 | 10x25 | 2260 | 0.023 |
| 10 | 2700 | 13x20 | 2440 | 0.022 |
| 10 | 3300 | 13x20 | 2490 | 0.021 |
| 10 | 3900 | 13x25 | 2910 | 0.020 |
| 10 | 4700 | 13x30 | 3460 | 0.018 |
| 10 | 4700 | 16x20 | 3260 | 0.020 |
| 10 | 5600 | 13x35 | 3580 | 0.017 |
| 10 | 6800 | 16x25 | 3640 | 0.018 |
| 16 | 100 | 5x11 | 355 | 0.230 |
| 16 | 220 | 6.3x11 | 550 | 0.100 |
| 16 | 470 | 8x11.5 | 955 | 0.060 |
| 16 | 680 | 8x16 | 1260 | 0.050 |
| 16 | 680 | 10x12.5 | 1340 | 0.044 |
| 16 | 1000 | 8x20 | 1510 | 0.034 |
| 16 | 1000 | 10x16 | 1770 | 0.033 |
| 16 | 1500 | 10x20 | 1970 | 0.025 |
| 16 | 1800 | 10x25 | 2260 | 0.023 |
| 16 | 2200 | 13x20 | 2490 | 0.022 |
| 16 | 2700 | 13x25 | 2910 | 0.020 |
| 16 | 3300 | 13x30 | 3460 | 0.018 |
| 16 | 3300 | 16x20 | 3260 | 0.023 |
| 16 | 3900 | 13x35 | 3580 | 0.017 |
| 16 | 4700 | 16x25 | 3640 | 0.018 |
| 25 | 68 | 5x11 | 355 | 0.240 |
| 25 | 150 | 6.3x11 | 550 | 0.100 |
| 25 | 330 | 8x11.5 | 955 | 0.060 |
| 25 | 390 | 8x16 | 1260 | 0.050 |
| 25 | 470 | 10x12.5 | 1340 | 0.044 |
| 25 | 560 | 8x20 | 1510 | 0.034 |
| 25 | 680 | 10x16 | 1770 | 0.033 |
| 25 | 820 | 10x20 | 1970 | 0.025 |
| 25 | 1000 | 10x20 | 2045 | 0.024 |
| 25 | 1000 | 10x25 | 2260 | 0.023 |
| 25 | 1500 | 13x20 | 2490 | 0.022 |
| 25 | 1800 | 13x25 | 2910 | 0.020 |
| 25 | 2200 | 13x30 | 3460 | 0.018 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mA rms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|---------------------------------------|-----------------------------|
| 25 | 2200 | 16x20 | 3260 | 0.020 |
| 25 | 2700 | 13x35 | 3580 | 0.017 |
| 25 | 3300 | 16x25 | 3640 | 0.018 |
| 35 | 47 | 5x11 | 355 | 0.500 |
| 35 | 100 | 6.3x11 | 550 | 0.110 |
| 35 | 220 | 8x11.5 | 955 | 0.062 |
| 35 | 270 | 8x16 | 1260 | 0.060 |
| 35 | 330 | 10x12.5 | 1340 | 0.043 |
| 35 | 390 | 8x20 | 1510 | 0.032 |
| 35 | 470 | 10x16 | 1770 | 0.033 |
| 35 | 560 | 10x20 | 1970 | 0.030 |
| 35 | 680 | 10x25 | 2260 | 0.028 |
| 35 | 820 | 10x25 | 2360 | 0.027 |
| 35 | 1000 | 10x30 | 2580 | 0.025 |
| 35 | 1000 | 13x20 | 2490 | 0.022 |
| 35 | 1200 | 13x25 | 2910 | 0.018 |
| 35 | 1500 | 13x30 | 3460 | 0.018 |
| 35 | 1500 | 16x20 | 3260 | 0.023 |
| 35 | 1800 | 13x35 | 3580 | 0.017 |
| 35 | 2200 | 16x25 | 3640 | 0.018 |
| 50 | 27 | 5x11 | 248 | 0.400 |
| 50 | 56 | 6.3x11 | 395 | 0.150 |
| 50 | 100 | 8x11.5 | 755 | 0.110 |
| 50 | 120 | 8x16 | 960 | 0.065 |
| 50 | 150 | 10x12.5 | 989 | 0.067 |
| 50 | 180 | 8x20 | 1200 | 0.051 |
| 50 | 220 | 10x16 | 1380 | 0.046 |
| 50 | 270 | 10x20 | 1590 | 0.033 |
| 50 | 330 | 10x20 | 1600 | 0.033 |
| 50 | 330 | 10x25 | 1880 | 0.032 |
| 50 | 470 | 13x20 | 2060 | 0.032 |
| 50 | 560 | 13x25 | 2420 | 0.028 |
| 50 | 680 | 13x30 | 2870 | 0.026 |
| 50 | 820 | 13x35 | 2970 | 0.024 |
| 50 | 820 | 16x20 | 2740 | 0.028 |
| 50 | 1000 | 16x25 | 3020 | 0.026 |
| 63 | 18 | 5x11 | 183 | 0.980 |
| 63 | 47 | 6.3x11 | 288 | 0.600 |
| 63 | 82 | 8x11.5 | 535 | 0.300 |
| 63 | 100 | 8x16 | 698 | 0.200 |
| 63 | 120 | 10x12.5 | 735 | 0.165 |
| 63 | 150 | 8x20 | 871 | 0.140 |
| 63 | 180 | 10x16 | 1008 | 0.130 |
| 63 | 220 | 10x20 | 1110 | 0.120 |
| 63 | 270 | 10x20 | 1210 | 0.086 |
| 63 | 270 | 13x16 | 1210 | 0.090 |
| 63 | 270 | 13x20 | 1330 | 0.088 |
| 63 | 330 | 10x25 | 1420 | 0.076 |
| 63 | 330 | 13x25 | 1610 | 0.073 |
| 63 | 390 | 13x20 | 1580 | 0.066 |
| 63 | 470 | 13x25 | 2000 | 0.048 |
| 63 | 470 | 13x30 | 2170 | 0.046 |
| 63 | 470 | 16x20 | 2090 | 0.047 |
| 63 | 560 | 13x30 | 2420 | 0.040 |
| 63 | 560 | 16x20 | 2110 | 0.048 |
| 63 | 680 | 13x35 | 2630 | 0.038 |
| 63 | 820 | 13x40 | 2950 | 0.032 |
| 63 | 820 | 16x25 | 2740 | 0.037 |
| 63 | 820 | 18x20 | 2510 | 0.043 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 63 | 1200 | 16x31.5 | 3000 | 0.029 |
| 63 | 1200 | 18x25 | 2810 | 0.036 |
| 63 | 1500 | 16x35.5 | 3050 | 0.026 |
| 63 | 1500 | 18x31.5 | 3310 | 0.030 |
| 63 | 1800 | 16x40 | 3580 | 0.024 |
| 63 | 1800 | 18x35.5 | 3580 | 0.025 |
| 63 | 2200 | 18x40 | 3680 | 0.023 |
| 80 | 12 | 5x11 | 173 | 1.540 |
| 80 | 33 | 6.3x11 | 277 | 0.630 |
| 80 | 56 | 8x11.5 | 472 | 0.400 |
| 80 | 68 | 8x16 | 595 | 0.280 |
| 80 | 82 | 10x12.5 | 634 | 0.250 |
| 80 | 100 | 8x20 | 745 | 0.210 |
| 80 | 120 | 10x16 | 790 | 0.187 |
| 80 | 180 | 10x20 | 1050 | 0.130 |
| 80 | 180 | 13x16 | 985 | 0.140 |
| 80 | 220 | 10x25 | 1180 | 0.120 |
| 80 | 270 | 13x20 | 1440 | 0.094 |
| 80 | 330 | 13x25 | 1630 | 0.066 |
| 80 | 390 | 13x30 | 1960 | 0.056 |
| 80 | 390 | 16x20 | 1760 | 0.064 |
| 80 | 470 | 13x35 | 2150 | 0.047 |
| 80 | 560 | 13x40 | 2350 | 0.045 |
| 80 | 560 | 16x25 | 2220 | 0.049 |
| 80 | 560 | 18x20 | 1960 | 0.059 |
| 80 | 680 | 16x31.5 | 2410 | 0.038 |
| 80 | 820 | 16x35.5 | 2610 | 0.032 |
| 80 | 820 | 18x25 | 2280 | 0.042 |
| 80 | 1000 | 16x40 | 2870 | 0.033 |

| WV (Vdc) | Cap (uF) | Size (mm) | Ripple current (mArms/105°C /100KHz) | Max ESR(Ω) at 20°C/100KHz |
|----------|----------|-----------|--------------------------------------|-----------------------------|
| 80 | 1000 | 18x31.5 | 2480 | 0.036 |
| 80 | 1200 | 18x35.5 | 2870 | 0.033 |
| 80 | 1500 | 18x40 | 3520 | 0.032 |
| 100 | 8.2 | 5x11 | 173 | 1.540 |
| 100 | 18 | 6.3x11 | 277 | 0.627 |
| 100 | 33 | 8x11.5 | 472 | 0.420 |
| 100 | 47 | 8x16 | 595 | 0.400 |
| 100 | 56 | 10x12.5 | 634 | 0.350 |
| 100 | 68 | 8x20 | 745 | 0.300 |
| 100 | 82 | 10x16 | 790 | 0.220 |
| 100 | 100 | 10x20 | 1050 | 0.150 |
| 100 | 100 | 13x16 | 985 | 0.160 |
| 100 | 120 | 10x25 | 1180 | 0.140 |
| 100 | 150 | 13x20 | 1440 | 0.094 |
| 100 | 220 | 13x25 | 1660 | 0.066 |
| 100 | 270 | 13x30 | 1960 | 0.056 |
| 100 | 270 | 16x20 | 1760 | 0.064 |
| 100 | 330 | 13x35 | 2150 | 0.047 |
| 100 | 390 | 13x40 | 2350 | 0.040 |
| 100 | 390 | 16x25 | 2220 | 0.049 |
| 100 | 390 | 18x20 | 1960 | 0.059 |
| 100 | 470 | 16x31.5 | 2410 | 0.036 |
| 100 | 470 | 18x25 | 2280 | 0.042 |
| 100 | 560 | 16x35.5 | 2610 | 0.032 |
| 100 | 560 | 18x31.5 | 2480 | 0.034 |
| 100 | 680 | 16x40 | 2870 | 0.030 |
| 100 | 680 | 18x35.5 | 2870 | 0.030 |
| 100 | 820 | 18x40 | 3520 | 0.029 |

KL Series Long Life 5,000 hrs



Features

- ◆ Used in electronic ballast, switching power supply, industrial measuring instruments.
- ◆ Endurance 5000 Hrs at 105°C
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

Specifications

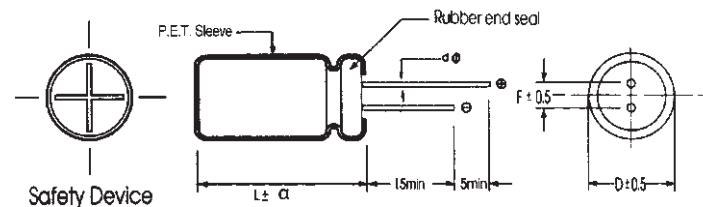
| Item | Performance Characteristics | | |
|--|--|---|-----------------------------|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C | |
| Rated Voltage Range | 160 to 400 VDC | 450 to 500 VDC | |
| Capacitance Range | 3.3 to 330 μF | 2.2 to 180 μF | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | |
| Leakage Current (+20°C,max.) | (CV ≤ 1000) I ≤ 0.1CV+40(μA) | (CV > 1000) I ≤ 0.04CV+100(μA) | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | After 1 minute with rated working voltage applied. C: rated Capacitance (μF) · V: working voltage(V) | | |
| Low Temperature Characteristics (at 120Hz) | Working Voltage(VDC) | 160 200 250 350 400 450 500 | |
| | D. F.(%) max. | 12 12 12 15 15 17 20 | |
| Endurance | Test conditions | Impedance ratio max | |
| | Duration time : 5000Hrs Ambient temperature : +105°C Applied voltage : Rated DC working voltage | Working Voltage(VDC) | 160 200 250 350 400 450 500 |
| Shelf Life | After test requirement at +20°C | Z-25°C / Z+20°C | 3 3 3 6 6 6 6 |
| | Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ± 200% of the initial specified value Leakage current : ± The initial specified value | Test conditions | |
| | Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None | After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 120 | 1K | 10K | ≥50K |
|---------------|-----|-----|-----|------|
| Multiplier | 1 | 1.5 | 1.7 | 1.9 |

Diagram of Dimensions:(unit:mm)



| φD | 10 | 13 | 16 | 18 | 22 | |
|----|-----------|-------------------|-----------|---------------------|-----|--------|
| F | 5.0 | 5.0 | 7.5 | 7.5 | 10 | |
| φd | 0.6 | | 0.8 | | | |
| α | D < 16 | D=16 | | D=18 | | D > 18 |
| | L:25~35.5 | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 160 | 3.3 | 10x12.5 | 52 |
| 160 | 4.7 | 10x12.5 | 60 |
| 160 | 10 | 10x12.5 | 104 |
| 160 | 10 | 10x16 | 115 |
| 160 | 15 | 10x16 | 150 |
| 160 | 22 | 10x16 | 190 |
| 160 | 22 | 10x20 | 210 |
| 160 | 33 | 10x16 | 235 |
| 160 | 33 | 10x20 | 258 |
| 160 | 33 | 13x20 | 300 |
| 160 | 47 | 10x20 | 270 |
| 160 | 47 | 13x20 | 310 |
| 160 | 68 | 13x20 | 430 |
| 160 | 68 | 13x25 | 470 |
| 160 | 100 | 13x25 | 540 |
| 160 | 100 | 16x20 | 540 |
| 160 | 100 | 16x25 | 590 |
| 160 | 120 | 16x20 | 560 |
| 160 | 150 | 16x25 | 650 |
| 160 | 180 | 16x31.5 | 750 |
| 160 | 220 | 16x31.5 | 820 |
| 160 | 220 | 18x25 | 710 |
| 160 | 270 | 18x31.5 | 880 |
| 160 | 330 | 18x31.5 | 930 |
| 160 | 330 | 18x40 | 1000 |
| 200 | 3.3 | 10x12.5 | 52 |
| 200 | 4.7 | 10x12.5 | 60 |
| 200 | 6.8 | 10x12.5 | 70 |
| 200 | 10 | 10x12.5 | 104 |
| 200 | 10 | 10x16 | 115 |
| 200 | 10 | 10x20 | 125 |
| 200 | 15 | 10x16 | 150 |
| 200 | 22 | 10x16 | 210 |
| 200 | 22 | 10x20 | 230 |
| 200 | 33 | 10x20 | 290 |
| 200 | 33 | 13x20 | 350 |
| 200 | 47 | 13x20 | 380 |
| 200 | 68 | 13x25 | 530 |
| 200 | 68 | 16x20 | 530 |
| 200 | 100 | 16x20 | 570 |
| 200 | 100 | 16x25 | 610 |
| 200 | 120 | 16x25 | 700 |
| 200 | 150 | 16x25 | 700 |
| 200 | 150 | 16x31.5 | 750 |
| 200 | 180 | 18x31.5 | 830 |
| 200 | 220 | 18x31.5 | 970 |
| 200 | 270 | 18x40 | 1100 |
| 200 | 330 | 18x45 | 1250 |
| 250 | 4.7 | 10x12.5 | 60 |
| 250 | 6.8 | 10x12.5 | 75 |
| 250 | 10 | 10x16 | 160 |
| 250 | 10 | 10x20 | 170 |
| 250 | 15 | 10x16 | 180 |
| 250 | 22 | 10x20 | 250 |
| 250 | 22 | 13x20 | 290 |
| 250 | 33 | 13x20 | 360 |
| 250 | 33 | 13x25 | 380 |
| 250 | 47 | 13x25 | 430 |
| 250 | 68 | 16x20 | 530 |
| 250 | 68 | 16x25 | 550 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 250 | 68 | 18x20 | 550 |
| 250 | 100 | 16x25 | 630 |
| 250 | 100 | 16x31.5 | 700 |
| 250 | 100 | 18x25 | 680 |
| 250 | 100 | 18x31.5 | 750 |
| 250 | 120 | 18x31.5 | 790 |
| 250 | 150 | 18x31.5 | 840 |
| 250 | 150 | 18x35.5 | 880 |
| 250 | 180 | 18x40 | 980 |
| 250 | 220 | 18x35.5 | 960 |
| 250 | 220 | 18x40 | 1020 |
| 350 | 4.7 | 10x12.5 | 65 |
| 350 | 6.8 | 10x16 | 100 |
| 350 | 10 | 10x20 | 170 |
| 350 | 10 | 13x20 | 180 |
| 350 | 15 | 13x20 | 200 |
| 350 | 22 | 13x20 | 290 |
| 350 | 33 | 13x25 | 320 |
| 350 | 33 | 16x20 | 320 |
| 350 | 47 | 16x25 | 430 |
| 350 | 47 | 16x31.5 | 440 |
| 350 | 68 | 16x35.5 | 550 |
| 350 | 100 | 18x31.5 | 750 |
| 350 | 100 | 18x35.5 | 780 |
| 400 | 3.3 | 10x12.5 | 55 |
| 400 | 4.7 | 10x16 | 100 |
| 400 | 6.8 | 10x16 | 120 |
| 400 | 6.8 | 10x20 | 125 |
| 400 | 10 | 10x16 | 156 |
| 400 | 10 | 10x20 | 170 |
| 400 | 10 | 13x20 | 200 |
| 400 | 15 | 10x16 | 156 |
| 400 | 15 | 13x20 | 200 |
| 400 | 22 | 13x25 | 320 |
| 400 | 22 | 16x20 | 320 |
| 400 | 33 | 16x20 | 400 |
| 400 | 33 | 16x25 | 430 |
| 400 | 47 | 16x20 | 420 |
| 400 | 47 | 16x25 | 450 |
| 400 | 47 | 16x31.5 | 530 |
| 400 | 68 | 16x25 | 480 |
| 400 | 68 | 16x31.5 | 530 |
| 400 | 82 | 16x31.5 | 580 |
| 400 | 100 | 16x31.5 | 710 |
| 400 | 100 | 18x35.5 | 750 |
| 400 | 120 | 16x35.5 | 800 |
| 400 | 120 | 18x31.5 | 800 |
| 400 | 150 | 16x40 | 920 |
| 400 | 150 | 18x31.5 | 890 |
| 400 | 180 | 18x40 | 1060 |
| 400 | 220 | 18x45 | 1200 |
| 450 | 2.2 | 10x12.5 | 45 |
| 450 | 3.3 | 10x16 | 65 |
| 450 | 4.7 | 10x12.5 | 95 |
| 450 | 4.7 | 10x16 | 105 |
| 450 | 6.8 | 10x16 | 125 |
| 450 | 6.8 | 10x20 | 140 |
| 450 | 10 | 10x20 | 170 |
| 450 | 10 | 13x20 | 190 |
| 450 | 10 | 13x25 | 220 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 450 | 15 | 16x20 | 270 |
| 450 | 22 | 13x20 | 280 |
| 450 | 22 | 16x20 | 320 |
| 450 | 22 | 16x25 | 360 |
| 450 | 33 | 16x25 | 440 |
| 450 | 33 | 18x25 | 460 |
| 450 | 47 | 16x31.5 | 480 |
| 450 | 47 | 18x25 | 450 |
| 450 | 56 | 16x31.5 | 530 |
| 450 | 68 | 16x35.5 | 600 |
| 450 | 68 | 18x25 | 580 |
| 450 | 68 | 18x31.5 | 620 |
| 450 | 82 | 16x35.5 | 680 |
| 450 | 100 | 16x35.5 | 750 |
| 450 | 120 | 18x35.5 | 840 |
| 450 | 150 | 18x40 | 970 |
| 450 | 180 | 18x45 | 1090 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 500 | 4.7 | 13x20 | 82 |
| 500 | 6.8 | 13x20 | 96 |
| 500 | 10 | 13x25 | 130 |
| 500 | 22 | 16x25 | 210 |
| 500 | 33 | 16x31.5 | 280 |
| 500 | 47 | 16x35.5 | 360 |
| 500 | 47 | 18x31.5 | 360 |
| 500 | 56 | 16x40 | 420 |
| 500 | 56 | 18x31.5 | 400 |
| 500 | 68 | 16x45 | 480 |
| 500 | 68 | 18x35.5 | 460 |
| 500 | 68 | 18x40 | 490 |
| 500 | 82 | 18x40 | 540 |
| 500 | 100 | 18x45 | 630 |
| 500 | 100 | 20x40 | 660 |
| 500 | 120 | 22x45 | 800 |

KH Series Long Life 5,000~10,000 hrs



Features

- ◆ Used in electronic ballast, switching power supply, industrial measuring instruments.
- ◆ higher ripple current
- ◆ Endurance 5000~10000 Hrs at 105°C
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

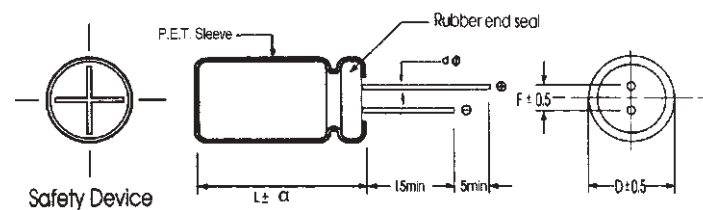
Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--------|--------------|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C | | | | | | | | | | |
| Rated Voltage Range | 10 to 400 VDC | 450 VDC | | | | | | | | | | |
| Capacitance Range | 6.8 to 3300 µF | 6.8 to 100 µF | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.01 CV or 3 (µA) | I ≤ 0.04 CV+100 (µA) | | | | | | | | | | |
| | After 1 minute with rated working voltage applied. I=Leakage Current(µA) C=Rated capacitance(µF) V=Rated Voltage(V) | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working oltage(VDC) | 10 16 25 35 50 160 200 250 350 400 450 | | | | | | | | | | |
| | D.F.(%)max. | 19 16 14 12 10 15 15 15 20 20 20 | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | |
| | Working oltage(VDC) | 10 16 25 35 50 160 200 250 350 400 450 | | | | | | | | | | |
| | Z-25°C / Z+20°C | 4 3 2 2 2 3 3 3 6 6 6 | | | | | | | | | | |
| Z-40°C / Z+20°C | 6 4 3 3 3 6 6 6 6 6 6 | | | | | | | | | | | |
| | Endurance | | | | | | | | | | | |
| Endurance | Test conditions | | | | | | | | | | D φ | Life (hours) |
| | Duration time : as right Ambient temperature : +105°C Applied voltage : Rated DC working voltage | | | | | | | | | | < 8 φ | 5000 |
| After test requirement at +20°C | | | | | | | | | | | 8 φ | 8000 |
| Capacitance change : ≤ ±20% of the initial measured value | | | | | | | | | | | ≥ 10 φ | 10000 |
| Dissipation factor : ≤ 200% of the initial specified value | | | | | | | | | | | | |
| Leakage current : ≤ The initial specified value | | | | | | | | | | | | |
| Shelf Life | Test conditions | | | | | | | | | | | |
| | Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None | | | | | | | | | | | |
| After test requirement at +20°C: Same limits as Endurance. | | | | | | | | | | | | |
| Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 120 | 1K | 10K | ≥ 100K |
|---------------|------|------|------|--------|
| Multiplier | 0.50 | 0.80 | 0.85 | 1.0 |

Diagram of Dimensions:(unit:mm)



| φ D | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|------|-----------|---------------|-----------|-----------------|-----|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| φ d | 0.5 | | | 0.6 | | 0.8 | |
| α | D=16 | | D=18 | | D>18 | | |
| | D<16 | L:25~35.5 | L<25 and L≥40 | L:25~31.5 | L<25 and L≥35.5 | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|--|
| 10 | 47 | 5x11 | 100 |
| 10 | 68 | 5x11 | 130 |
| 10 | 100 | 6.3x11 | 190 |
| 10 | 150 | 6.3x11 | 220 |
| 10 | 220 | 6.3x11 | 270 |
| 10 | 330 | 6.3x11 | 334 |
| 10 | 330 | 8x11.5 | 390 |
| 10 | 470 | 8x11.5 | 458 |
| 10 | 470 | 10x12.5 | 540 |
| 10 | 1000 | 8x20 | 878 |
| 10 | 1000 | 10x12.5 | 810 |
| 10 | 1000 | 10x16 | 900 |
| 10 | 2200 | 13x16 | 1401 |
| 10 | 2200 | 13x20 | 1540 |
| 10 | 3300 | 13x20 | 1533 |
| 10 | 3300 | 16x25 | 1900 |
| 16 | 33 | 5x11 | 115 |
| 16 | 47 | 5x11 | 145 |
| 16 | 68 | 6.3x11 | 200 |
| 16 | 100 | 6.3x11 | 210 |
| 16 | 100 | 8x11.5 | 245 |
| 16 | 150 | 6.3x11 | 257 |
| 16 | 150 | 8x11.5 | 300 |
| 16 | 220 | 6.3x11 | 360 |
| 16 | 220 | 8x11.5 | 420 |
| 16 | 220 | 10x12.5 | 495 |
| 16 | 330 | 8x11.5 | 433 |
| 16 | 330 | 8x16 | 500 |
| 16 | 470 | 8x11.5 | 558 |
| 16 | 470 | 10x12.5 | 657 |
| 16 | 470 | 10x16 | 730 |
| 16 | 1000 | 10x20 | 1012 |
| 16 | 1000 | 13x20 | 1173 |
| 16 | 2200 | 13x20 | 1689 |
| 16 | 2200 | 13x25 | 1862 |
| 16 | 2200 | 16x25 | 2093 |
| 25 | 22 | 5x11 | 100 |
| 25 | 33 | 5x11 | 130 |
| 25 | 47 | 6.3x11 | 160 |
| 25 | 68 | 6.3x11 | 197 |
| 25 | 68 | 8x11.5 | 230 |
| 25 | 100 | 6.3x11 | 280 |
| 25 | 100 | 8x11.5 | 327 |
| 25 | 150 | 8x11.5 | 390 |
| 25 | 150 | 10x12.5 | 460 |
| 25 | 220 | 8x11.5 | 443 |
| 25 | 220 | 10x16 | 580 |
| 25 | 330 | 8x16 | 644 |
| 25 | 330 | 10x12.5 | 657 |
| 25 | 330 | 10x16 | 730 |
| 25 | 330 | 10x20 | 805 |
| 25 | 470 | 10x16 | 861 |
| 25 | 470 | 10x20 | 950 |
| 25 | 1000 | 13x20 | 1408 |
| 25 | 1000 | 13x25 | 1552 |
| 25 | 2200 | 16x25 | 2169 |
| 25 | 2200 | 16x31.5 | 2400 |
| 35 | 10 | 5x11 | 65 |
| 35 | 22 | 5x11 | 125 |
| 35 | 33 | 5x11 | 160 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|--|
| 35 | 33 | 6.3x11 | 178 |
| 35 | 47 | 5x11 | 180 |
| 35 | 47 | 6.3x11 | 206 |
| 35 | 47 | 8x11.5 | 240 |
| 35 | 68 | 6.3x11 | 231 |
| 35 | 68 | 8x11.5 | 270 |
| 35 | 100 | 8x11.5 | 331 |
| 35 | 100 | 10x12.5 | 390 |
| 35 | 150 | 8x11.5 | 483 |
| 35 | 150 | 8x16 | 558 |
| 35 | 150 | 10x16 | 632 |
| 35 | 220 | 8x16 | 610 |
| 35 | 220 | 10x16 | 689 |
| 35 | 220 | 10x20 | 760 |
| 35 | 330 | 10x16 | 810 |
| 35 | 330 | 10x20 | 893 |
| 35 | 330 | 13x20 | 1035 |
| 35 | 470 | 10x16 | 781 |
| 35 | 470 | 10x20 | 861 |
| 35 | 470 | 13x20 | 998 |
| 35 | 470 | 13x25 | 1100 |
| 35 | 820 | 10x25 | 1300 |
| 35 | 1000 | 13x20 | 1409 |
| 35 | 1000 | 13x25 | 1554 |
| 35 | 1000 | 16x25 | 1746 |
| 35 | 1000 | 16x31.5 | 1932 |
| 50 | 6.8 | 5x11 | 75 |
| 50 | 10 | 5x11 | 97 |
| 50 | 22 | 6.3x11 | 130 |
| 50 | 33 | 6.3x11 | 210 |
| 50 | 33 | 8x11.5 | 241 |
| 50 | 47 | 6.3x11 | 246 |
| 50 | 47 | 8x11.5 | 287 |
| 50 | 47 | 10x12.5 | 300 |
| 50 | 68 | 8x11.5 | 302 |
| 50 | 68 | 10x12.5 | 356 |
| 50 | 100 | 8x11.5 | 382 |
| 50 | 100 | 10x16 | 500 |
| 50 | 150 | 10x12.5 | 610 |
| 50 | 150 | 10x16 | 677 |
| 50 | 150 | 10x20 | 747 |
| 50 | 220 | 10x16 | 764 |
| 50 | 220 | 10x20 | 843 |
| 50 | 220 | 13x20 | 977 |
| 50 | 330 | 13x20 | 1043 |
| 50 | 330 | 13x25 | 1150 |
| 50 | 470 | 13x20 | 1253 |
| 50 | 470 | 16x20 | 1441 |
| 50 | 470 | 16x25 | 1552 |
| 50 | 1000 | 16x25 | 1771 |
| 50 | 1000 | 16x31.5 | 1960 |
| 50 | 1000 | 18x31.5 | 2093 |
| 160 | 10 | 10x16 | 330 |
| 160 | 22 | 10x20 | 510 |
| 160 | 33 | 10x20 | 660 |
| 160 | 33 | 13x20 | 760 |
| 160 | 47 | 10x20 | 760 |
| 160 | 47 | 13x20 | 870 |
| 160 | 68 | 13x20 | 1190 |
| 160 | 68 | 13x25 | 1350 |

| WV (Vdc) | Cap (µF) | Size (mm) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|--|
| 160 | 82 | 13x20 | 1280 |
| 160 | 100 | 13x25 | 1430 |
| 160 | 100 | 16x20 | 1430 |
| 160 | 100 | 18x20 | 1530 |
| 160 | 150 | 16x20 | 1900 |
| 160 | 150 | 18x25 | 2180 |
| 160 | 220 | 16x25 | 2380 |
| 160 | 220 | 18x25 | 2540 |
| 160 | 330 | 18x31.5 | 3140 |
| 200 | 10 | 10x16 | 330 |
| 200 | 10 | 10x20 | 360 |
| 200 | 22 | 10x20 | 510 |
| 200 | 33 | 10x20 | 660 |
| 200 | 33 | 13x20 | 760 |
| 200 | 47 | 13x20 | 990 |
| 200 | 68 | 13x20 | 1310 |
| 200 | 82 | 16x20 | 1390 |
| 200 | 100 | 16x20 | 1430 |
| 200 | 100 | 18x20 | 1530 |
| 200 | 150 | 16x25 | 1900 |
| 200 | 150 | 18x25 | 2030 |
| 200 | 220 | 18x25 | 2370 |
| 200 | 220 | 18x31.5 | 2620 |
| 200 | 330 | 18x35.5 | 3230 |
| 250 | 10 | 10x20 | 360 |
| 250 | 22 | 10x20 | 510 |
| 250 | 22 | 13x20 | 590 |
| 250 | 33 | 13x20 | 810 |
| 250 | 33 | 13x25 | 890 |
| 250 | 47 | 13x20 | 990 |
| 250 | 47 | 16x20 | 1130 |
| 250 | 68 | 16x20 | 1310 |
| 250 | 68 | 18x20 | 1400 |
| 250 | 82 | 16x20 | 1390 |
| 250 | 100 | 16x25 | 1540 |
| 250 | 100 | 18x25 | 1640 |
| 250 | 150 | 18x25 | 1950 |
| 250 | 150 | 18x31.5 | 2150 |
| 250 | 220 | 18x31.5 | 3140 |
| 350 | 6.8 | 10x16 | 290 |
| 350 | 6.8 | 10x20 | 310 |
| 350 | 10 | 10x20 | 360 |
| 350 | 10 | 13x20 | 410 |
| 350 | 22 | 13x20 | 660 |
| 350 | 22 | 13x25 | 720 |
| 350 | 33 | 16x20 | 910 |
| 350 | 47 | 16x20 | 1090 |

| WV (Vdc) | Cap (µF) | Size (mm) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|--|
| 350 | 47 | 18x20 | 1160 |
| 350 | 68 | 16x25 | 1410 |
| 350 | 68 | 18x20 | 1380 |
| 350 | 68 | 18x25 | 1480 |
| 350 | 82 | 18x25 | 1540 |
| 350 | 100 | 18x25 | 1580 |
| 350 | 120 | 18x31.5 | 1870 |
| 350 | 150 | 18x35.5 | 2170 |
| 400 | 6.8 | 10x12.5 | 260 |
| 400 | 6.8 | 10x16 | 290 |
| 400 | 6.8 | 10x20 | 310 |
| 400 | 10 | 10x16 | 330 |
| 400 | 10 | 10x20 | 360 |
| 400 | 10 | 13x20 | 410 |
| 400 | 15 | 13x20 | 560 |
| 400 | 22 | 13x20 | 770 |
| 400 | 22 | 16x20 | 880 |
| 400 | 22 | 16x25 | 950 |
| 400 | 33 | 16x20 | 910 |
| 400 | 33 | 18x20 | 970 |
| 400 | 47 | 16x25 | 1190 |
| 400 | 47 | 18x20 | 1190 |
| 400 | 47 | 18x25 | 1270 |
| 400 | 68 | 18x25 | 1480 |
| 400 | 68 | 18x31.5 | 1630 |
| 400 | 82 | 18x25 | 1530 |
| 400 | 100 | 18x31.5 | 1730 |
| 400 | 120 | 18x35.5 | 1950 |
| 400 | 150 | 18x40 | 2220 |
| 450 | 6.8 | 10x20 | 290 |
| 450 | 6.8 | 13x20 | 330 |
| 450 | 10 | 13x20 | 460 |
| 450 | 10 | 13x25 | 500 |
| 450 | 15 | 13x20 | 550 |
| 450 | 15 | 13x25 | 610 |
| 450 | 22 | 13x25 | 710 |
| 450 | 22 | 16x20 | 760 |
| 450 | 22 | 16x25 | 790 |
| 450 | 33 | 16x25 | 990 |
| 450 | 33 | 18x20 | 990 |
| 450 | 33 | 18x25 | 1060 |
| 450 | 47 | 18x25 | 1210 |
| 450 | 47 | 18x31.5 | 1330 |
| 450 | 68 | 18x31.5 | 1580 |
| 450 | 82 | 18x35.5 | 1790 |
| 450 | 100 | 18x40 | 1810 |

TH Series High Temperature

Features

- ◆ The series has guaranteed operating life of 1000~3000 hours at 125°C widest operating temperature range, -40 to +125°C
- ◆ Applications : High reliability equipment, filtering circuit of switching power supply,
- ◆ RoHS Compliant



Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -40 to +125°C | -25 to +125°C |
| Rated Voltage Range | 10 to 400 VDC | 450 VDC |
| Capacitance Range | 0.47 to 8200 µF | 1 to 47 µF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | 10~100V | 160~450V |
| | I ≤ 0.01CV or 3uA | CV ≤ 1000 I ≤ 0.1CV+40(uA) |
| | After 2 minute whichever is greater measured with rated working voltage applied | CV > 1000 I ≤ 0.04CV+100(uA) After 1 minute withrated working voltage applied. |
| Dissipation Factor (tan δ · at 20°C · 120Hz) | Working Voltage(VDC) | 10 16 25 35 50 63 80 100 160 200 250 350 400 450 |
| | D. F.(%) max. | 18 15 13 12 10 8 8 7 12 12 12 15 15 20 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | |
| | Working Voltage(VDC) | 10 16 25 35 50 63 100 160~250 350~400 450 |
| | Z-25°C / Z+20°C | 3 2 2 2 2 2 2 3 6 6 |
| Endurance | Test conditions | |
| | Duration time : 1000~3000Hrs Ambient temperature : +125°C Applied voltage : Rated DC working voltage After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤ 300% of the initial specified value Leakage current : ≤ The initial specified value | |
| Shelf Life | Test conditions | |
| | Duration time : 1000Hrs Ambient temperature : +125°C Applied voltage : None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

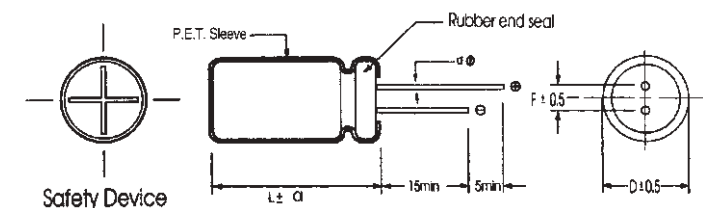
| D φ | Life hours |
|----------|------------|
| < 8 φ | 1000 |
| 8 φ 10 φ | 2000 |
| ≥ 13 φ | 3000 |

Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP ≤ 10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP ≤ 100 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.8 | 1 | 1.16 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.8 | 1 | 1.11 | 1.17 | 1.25 | 1.28 |

Diagram of Dimensions:(unit:mm)



| φ D | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|-----------|-----|-------------------|-----|-----------|-----|---------------------|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| φ d | 0.5 | | | 0.6 | | 0.8 | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 |
| | L:25~35.5 | | L < 25 and L ≥ 40 | | L:25~31.5 | | L < 25 and L ≥ 35.5 |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 |

Case Size

| WV (Vdc) | Cap (µF) | Size (mm) | Rated Ripple current (mA _{rms} /125°C /120Hz) |
|----------|----------|-----------|--|
| 10 | 47 | 5x11 | 92 |
| 10 | 56 | 5x11 | 100 |
| 10 | 100 | 5x11 | 130 |
| 10 | 100 | 6.3x11 | 145 |
| 10 | 120 | 6.3x11 | 160 |
| 10 | 330 | 8x11.5 | 350 |
| 10 | 330 | 10x12.5 | 410 |
| 10 | 470 | 8x11.5 | 430 |
| 10 | 470 | 8x16 | 500 |
| 10 | 470 | 10x12.5 | 505 |
| 10 | 470 | 10x16 | 525 |
| 10 | 560 | 10x12.5 | 530 |
| 10 | 680 | 8x20 | 640 |
| 10 | 680 | 10x16 | 660 |
| 10 | 1000 | 10x16 | 870 |
| 10 | 1000 | 10x20 | 960 |
| 10 | 1200 | 10x20 | 1000 |
| 10 | 1500 | 10x20 | 1120 |
| 16 | 22 | 5x11 | 66 |
| 16 | 33 | 6.3x11 | 91 |
| 16 | 47 | 5x11 | 97 |
| 16 | 47 | 6.3x11 | 110 |
| 16 | 100 | 6.3x11 | 175 |
| 16 | 100 | 8x11.5 | 206 |
| 16 | 220 | 8x11.5 | 340 |
| 16 | 220 | 10x12.5 | 400 |
| 16 | 330 | 8x11.5 | 400 |
| 16 | 330 | 8x16 | 460 |
| 16 | 330 | 10x12.5 | 470 |
| 16 | 330 | 10x16 | 525 |
| 16 | 470 | 8x11.5 | 500 |
| 16 | 470 | 8x20 | 640 |
| 16 | 470 | 10x12.5 | 590 |
| 16 | 470 | 10x16 | 650 |
| 16 | 470 | 10x20 | 720 |
| 16 | 680 | 10x20 | 760 |
| 16 | 820 | 10x16 | 740 |
| 16 | 820 | 10x25 | 900 |
| 16 | 1000 | 10x20 | 860 |
| 16 | 1000 | 10x25 | 950 |
| 16 | 1000 | 13x20 | 1000 |
| 25 | 22 | 6.3x11 | 70 |
| 25 | 33 | 5x11 | 88 |
| 25 | 33 | 6.3x11 | 100 |
| 25 | 47 | 5x11 | 97 |
| 25 | 47 | 6.3x11 | 110 |
| 25 | 47 | 8x11.5 | 130 |
| 25 | 56 | 6.3x11 | 120 |
| 25 | 100 | 8x11.5 | 210 |
| 25 | 100 | 10x12.5 | 250 |
| 25 | 120 | 8x11.5 | 220 |
| 25 | 150 | 8x11.5 | 260 |
| 25 | 180 | 8x11.5 | 290 |
| 25 | 220 | 8x11.5 | 360 |
| 25 | 220 | 8x16 | 415 |
| 25 | 220 | 10x12.5 | 420 |
| 25 | 220 | 10x16 | 470 |
| 25 | 270 | 8x20 | 470 |
| 25 | 270 | 10x12.5 | 435 |
| 25 | 330 | 8x16 | 510 |

| WV (Vdc) | Cap (µF) | Size (mm) | Rated Ripple current (mA _{rms} /125°C /120Hz) |
|----------|----------|-----------|--|
| 25 | 330 | 10x12.5 | 520 |
| 25 | 330 | 10x16 | 570 |
| 25 | 330 | 10x20 | 631 |
| 25 | 390 | 10x16 | 650 |
| 25 | 470 | 8x20 | 620 |
| 25 | 470 | 10x16 | 640 |
| 25 | 470 | 10x20 | 700 |
| 25 | 470 | 10x25 | 770 |
| 25 | 470 | 13x20 | 810 |
| 25 | 560 | 10x20 | 680 |
| 25 | 560 | 10x25 | 750 |
| 25 | 680 | 10x20 | 740 |
| 25 | 1000 | 13x20 | 880 |
| 25 | 1000 | 13x25 | 970 |
| 25 | 1000 | 16x25 | 1100 |
| 25 | 1200 | 10x20 | 1010 |
| 25 | 1500 | 10x25 | 1220 |
| 25 | 1800 | 13x20 | 1350 |
| 25 | 2700 | 13x25 | 1710 |
| 25 | 3300 | 13x30 | 2070 |
| 25 | 5600 | 18x25 | 2730 |
| 25 | 6800 | 16x35.5 | 3300 |
| 25 | 8200 | 16x40 | 3750 |
| 35 | 22 | 5x11 | 72 |
| 35 | 22 | 6.3x11 | 82 |
| 35 | 33 | 8x11.5 | 108 |
| 35 | 47 | 6.3x11 | 110 |
| 35 | 47 | 8x11.5 | 130 |
| 35 | 47 | 10x12.5 | 158 |
| 35 | 56 | 6.3x11 | 130 |
| 35 | 100 | 8x11.5 | 200 |
| 35 | 100 | 10x12.5 | 230 |
| 35 | 100 | 10x16 | 262 |
| 35 | 120 | 8x11.5 | 300 |
| 35 | 120 | 8x16 | 350 |
| 35 | 150 | 10x12.5 | 360 |
| 35 | 180 | 8x20 | 410 |
| 35 | 180 | 10x12.5 | 380 |
| 35 | 220 | 10x12.5 | 440 |
| 35 | 220 | 10x16 | 490 |
| 35 | 220 | 10x20 | 540 |
| 35 | 270 | 10x16 | 500 |
| 35 | 270 | 10x20 | 550 |
| 35 | 330 | 10x16 | 560 |
| 35 | 330 | 10x25 | 680 |
| 35 | 330 | 13x20 | 718 |
| 35 | 390 | 10x20 | 590 |
| 35 | 470 | 10x20 | 700 |
| 35 | 470 | 13x20 | 810 |
| 35 | 470 | 13x25 | 900 |
| 35 | 560 | 10x20 | 580 |
| 35 | 560 | 13x16 | 610 |
| 35 | 680 | 10x20 | 800 |
| 35 | 820 | 10x25 | 980 |
| 35 | 1000 | 13x25 | 1140 |
| 35 | 1000 | 16x25 | 1280 |
| 35 | 1200 | 10x30 | 1290 |
| 35 | 1500 | 13x25 | 1368 |
| 35 | 2200 | 13x30 | 1660 |
| 35 | 2700 | 13x40 | 2350 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /125°C /120Hz) |
|----------|----------|-----------|--|
| 35 | 3300 | 16x31.5 | 2480 |
| 35 | 3300 | 18x25 | 2400 |
| 35 | 4700 | 16x40 | 3000 |
| 50 | 2.2 | 8x11.5 | 25 |
| 50 | 3.3 | 8x11.5 | 30 |
| 50 | 4.7 | 5x11 | 32 |
| 50 | 4.7 | 8x11.5 | 43 |
| 50 | 10 | 5x11 | 42 |
| 50 | 10 | 6.3x11 | 48 |
| 50 | 10 | 8x11.5 | 56 |
| 50 | 22 | 5x11 | 66 |
| 50 | 22 | 6.3x11 | 75 |
| 50 | 22 | 8x11.5 | 86 |
| 50 | 33 | 8x11.5 | 118 |
| 50 | 47 | 6.3x11 | 120 |
| 50 | 47 | 8x11.5 | 140 |
| 50 | 47 | 10x12.5 | 164 |
| 50 | 56 | 8x11.5 | 150 |
| 50 | 68 | 8x11.5 | 160 |
| 50 | 82 | 8x11.5 | 170 |
| 50 | 100 | 10x12.5 | 230 |
| 50 | 100 | 10x16 | 250 |
| 50 | 100 | 10x20 | 277 |
| 50 | 120 | 10x16 | 290 |
| 50 | 180 | 10x20 | 400 |
| 50 | 220 | 10x20 | 510 |
| 50 | 220 | 10x25 | 560 |
| 50 | 220 | 13x20 | 587 |
| 50 | 270 | 10x20 | 610 |
| 50 | 330 | 10x20 | 700 |
| 50 | 330 | 13x20 | 810 |
| 50 | 330 | 13x25 | 900 |
| 50 | 470 | 13x25 | 900 |
| 50 | 470 | 16x25 | 1000 |
| 50 | 560 | 10x30 | 950 |
| 50 | 680 | 13x25 | 1050 |
| 50 | 1000 | 13x30 | 1390 |
| 50 | 1200 | 13x35 | 1510 |
| 50 | 1200 | 18x20 | 1450 |
| 50 | 1500 | 13x40 | 1960 |
| 50 | 1800 | 18x25 | 1960 |
| 50 | 2200 | 18x31.5 | 2500 |
| 50 | 2700 | 18x35.5 | 2750 |
| 50 | 3300 | 18x40 | 2950 |
| 63 | 4.7 | 6.3x11 | 38 |
| 63 | 10 | 8x11.5 | 58 |
| 63 | 22 | 8x11.5 | 93 |
| 63 | 33 | 8x11.5 | 115 |
| 63 | 33 | 10x12.5 | 132 |
| 63 | 47 | 10x12.5 | 155 |
| 63 | 47 | 10x16 | 172 |
| 63 | 100 | 10x16 | 260 |
| 63 | 180 | 10x20 | 400 |
| 63 | 220 | 10x25 | 520 |
| 63 | 220 | 13x25 | 595 |
| 63 | 330 | 13x25 | 880 |
| 63 | 330 | 16x25 | 1000 |
| 63 | 390 | 13x20 | 800 |
| 63 | 680 | 13x30 | 1290 |
| 63 | 820 | 13x35 | 1420 |
| 63 | 820 | 18x21 | 1360 |
| 63 | 1200 | 18x25 | 1620 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /125°C /120Hz) |
|----------|----------|-----------|--|
| 63 | 1500 | 18x31.5 | 1980 |
| 63 | 1800 | 16x40 | 2260 |
| 63 | 2200 | 18x40 | 2680 |
| 80 | 22 | 8x11.5 | 120 |
| 80 | 33 | 10x12.5 | 170 |
| 80 | 47 | 10x12.5 | 200 |
| 80 | 100 | 10x20 | 370 |
| 80 | 330 | 13x25 | 870 |
| 80 | 390 | 16x20 | 900 |
| 80 | 560 | 13x35 | 1100 |
| 80 | 560 | 16x25 | 1060 |
| 80 | 560 | 18x21 | 1050 |
| 80 | 680 | 16x31.5 | 1300 |
| 100 | 0.47 | 6.3x11 | 14 |
| 100 | 1 | 6.3x11 | 24 |
| 100 | 2.2 | 6.3x11 | 31 |
| 100 | 3.3 | 6.3x11 | 36 |
| 100 | 4.7 | 6.3x11 | 38 |
| 100 | 4.7 | 8x11.5 | 48 |
| 100 | 10 | 8x11.5 | 60 |
| 100 | 10 | 10x12.5 | 70 |
| 100 | 22 | 8x11.5 | 76 |
| 100 | 22 | 10x12.5 | 90 |
| 100 | 22 | 10x16 | 100 |
| 100 | 33 | 10x12.5 | 130 |
| 100 | 33 | 10x16 | 140 |
| 100 | 33 | 10x20 | 158 |
| 100 | 47 | 10x16 | 150 |
| 100 | 47 | 10x25 | 175 |
| 100 | 47 | 13x20 | 185 |
| 100 | 100 | 13x25 | 320 |
| 100 | 100 | 16x25 | 350 |
| 100 | 330 | 13x35 | 890 |
| 100 | 330 | 16x25 | 860 |
| 100 | 330 | 18x21 | 850 |
| 100 | 390 | 13x40 | 1050 |
| 100 | 390 | 16x31.5 | 1050 |
| 100 | 560 | 18x31.5 | 1290 |
| 100 | 680 | 18x35.5 | 1480 |
| 100 | 820 | 18x40 | 1850 |
| 160 | 1 | 6.3x11 | 23 |
| 160 | 2.2 | 6.3x11 | 35 |
| 160 | 3.3 | 6.3x11 | 37 |
| 160 | 3.3 | 8x11.5 | 41 |
| 160 | 4.7 | 8x11.5 | 52 |
| 160 | 6.8 | 10x12.5 | 70 |
| 160 | 10 | 8x11.5 | 70 |
| 160 | 10 | 10x12.5 | 82 |
| 160 | 22 | 10x16 | 115 |
| 160 | 22 | 10x20 | 128 |
| 160 | 33 | 13x20 | 200 |
| 160 | 47 | 13x20 | 240 |
| 160 | 47 | 13x25 | 260 |
| 160 | 82 | 10x30 | 340 |
| 160 | 100 | 10x35 | 380 |
| 160 | 100 | 13x25 | 390 |
| 160 | 100 | 16x25 | 430 |
| 160 | 120 | 10x40 | 450 |
| 160 | 150 | 13x30 | 500 |
| 160 | 180 | 13x35 | 600 |
| 160 | 180 | 18x20 | 550 |
| 160 | 220 | 16x31.5 | 690 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/125°C /120Hz) |
|----------|----------|-----------|---|
| 160 | 330 | 18x35.5 | 900 |
| 200 | 1 | 6.3x11 | 23 |
| 200 | 2.2 | 6.3x11 | 35 |
| 200 | 3.3 | 8x11.5 | 48 |
| 200 | 4.7 | 8x11.5 | 50 |
| 200 | 4.7 | 10x12.5 | 60 |
| 200 | 6.8 | 10x12.5 | 70 |
| 200 | 10 | 10x12.5 | 80 |
| 200 | 22 | 10x20 | 140 |
| 200 | 22 | 10x25 | 150 |
| 200 | 22 | 13x20 | 160 |
| 200 | 33 | 13x20 | 200 |
| 200 | 33 | 13x25 | 220 |
| 200 | 47 | 13x20 | 245 |
| 200 | 47 | 13x25 | 270 |
| 200 | 47 | 16x25 | 300 |
| 200 | 56 | 13x20 | 260 |
| 200 | 82 | 13x25 | 360 |
| 200 | 100 | 13x30 | 430 |
| 200 | 100 | 16x20 | 400 |
| 200 | 100 | 16x25 | 440 |
| 200 | 100 | 16x31.5 | 490 |
| 200 | 150 | 13x40 | 600 |
| 200 | 150 | 16x25 | 530 |
| 200 | 180 | 18x25 | 650 |
| 200 | 220 | 18x31.5 | 850 |
| 200 | 330 | 18x35.5 | 1100 |
| 250 | 1 | 6.3x11 | 23 |
| 250 | 2.2 | 6.3x11 | 35 |
| 250 | 2.2 | 8x11.5 | 40 |
| 250 | 3.3 | 8x11.5 | 50 |
| 250 | 3.3 | 10x12.5 | 53 |
| 250 | 4.7 | 10x12.5 | 60 |
| 250 | 4.7 | 10x16 | 68 |
| 250 | 6.8 | 10x16 | 75 |
| 250 | 10 | 10x16 | 83 |
| 250 | 22 | 13x20 | 160 |
| 250 | 22 | 13x25 | 170 |
| 250 | 33 | 13x25 | 220 |
| 250 | 33 | 16x25 | 240 |
| 250 | 39 | 10x30 | 230 |
| 250 | 47 | 10x35 | 280 |
| 250 | 47 | 16x25 | 300 |
| 250 | 47 | 16x31.5 | 330 |
| 250 | 56 | 10x40 | 300 |
| 250 | 68 | 13x30 | 330 |
| 250 | 82 | 13x35 | 380 |
| 250 | 82 | 18x20 | 350 |
| 250 | 100 | 13x40 | 490 |
| 250 | 120 | 18x25 | 460 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/125°C /120Hz) |
|----------|----------|-----------|---|
| 250 | 220 | 18x35.5 | 850 |
| 350 | 1 | 8x11.5 | 26 |
| 350 | 2.2 | 8x11.5 | 40 |
| 350 | 2.2 | 10x12.5 | 47 |
| 350 | 3.3 | 10x12.5 | 55 |
| 350 | 3.3 | 10x16 | 60 |
| 350 | 4.7 | 10x16 | 68 |
| 350 | 4.7 | 10x20 | 75 |
| 350 | 5.6 | 10x20 | 78 |
| 350 | 6.8 | 13x20 | 85 |
| 350 | 10 | 10x25 | 105 |
| 350 | 10 | 13x20 | 110 |
| 350 | 22 | 13x25 | 180 |
| 350 | 22 | 16x25 | 200 |
| 350 | 27 | 10x30 | 180 |
| 350 | 33 | 10x35 | 220 |
| 350 | 33 | 16x25 | 230 |
| 350 | 33 | 16x31.5 | 260 |
| 350 | 47 | 13x30 | 280 |
| 350 | 47 | 16x31.5 | 320 |
| 350 | 47 | 16x35.5 | 340 |
| 350 | 56 | 13x35 | 330 |
| 350 | 56 | 16x25 | 320 |
| 350 | 56 | 18x20 | 310 |
| 350 | 68 | 13x40 | 390 |
| 400 | 1 | 10x12.5 | 30 |
| 400 | 2.2 | 10x16 | 50 |
| 400 | 3.3 | 10x16 | 60 |
| 400 | 4.7 | 10x16 | 70 |
| 400 | 4.7 | 10x20 | 80 |
| 400 | 5.6 | 10x20 | 85 |
| 400 | 6.8 | 13x20 | 90 |
| 400 | 10 | 13x20 | 110 |
| 400 | 22 | 13x25 | 180 |
| 400 | 27 | 13x25 | 190 |
| 400 | 33 | 16x20 | 220 |
| 400 | 33 | 16x25 | 240 |
| 400 | 47 | 16x25 | 290 |
| 400 | 47 | 16x31.5 | 320 |
| 450 | 1 | 10x12.5 | 30 |
| 450 | 2.2 | 10x16 | 50 |
| 450 | 3.3 | 10x16 | 60 |
| 450 | 4.7 | 10x20 | 75 |
| 450 | 5.6 | 13x20 | 85 |
| 450 | 6.8 | 13x20 | 94 |
| 450 | 10 | 13x25 | 130 |
| 450 | 22 | 16x25 | 210 |
| 450 | 33 | 16x31.5 | 290 |
| 450 | 47 | 18x31.5 | 370 |

TE Series High Temperature

Features

- ◆ The series has guaranteed operation life of 1000~3000 hours at 130°C.
- ◆ Applications: High reliability equipment, filtering circuit of switching power supply, and industrial control equipment.
- ◆ RoHS Compliant



Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | |
|--|---|----------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| Operating Temperature Range | -40 to +130°C | -25 to +130°C | | | | | | | | | | | | |
| Rated Voltage Range | 10 to 400 VDC | 450 VDC | | | | | | | | | | | | |
| Capacitance Range | 2.2 to 4700 µF | 1 to 100 µF | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | 10 to 100VDC | 160 to 450VDC | | | | | | | | | | | | |
| | $I \leq 0.01CV$ or 3µA | $CV \leq 1000$ | | | | | | | | | | | | |
| | After 2 minute whichever is greater measured with rated working voltage applied | $I \leq 0.1CV+40(\mu A)$ | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | CV > 1000 | $I \leq 0.04CV+100(\mu A)$ | | | | | | | | | | | | |
| | After 1 minute with rated working voltage applied. | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | |
| | Working Voltage(VDC) | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 350 | 400 | 450 |
| | Z-25°C / Z+20°C | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 5 | 6 |
| Endurance | Test conditions | | | | | | | | | | | | | |
| | Duration time :as right | | | | | | | | | | | | | |
| | Ambient temperature :+130°C | | | | | | | | | | | | | |
| Shelf Life | Applied voltage :Rated DC working voltage | | | | | | | | | | | | | |
| | After test requirement at +20°C | | | | | | | | | | | | | |
| | Capacitance change : with ±30% of the initial measured value | | | | | | | | | | | | | |
| | Dissipation factor :≤ 300% of the initial specified value | | | | | | | | | | | | | |
| | Leakage current :≤ The initial specified value | | | | | | | | | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | |

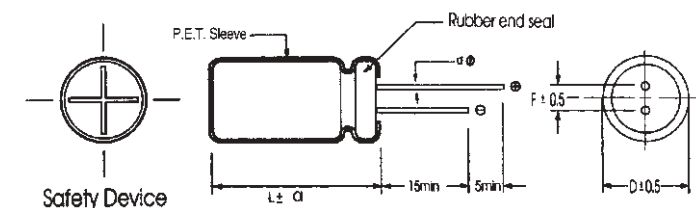
Radial

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 1K | 10K | 50K~100K |
|-----------------------|--------|------|------|------|----------|
| CAP < 10 | 0.35 | 0.42 | 0.60 | 0.80 | 1.00 |
| 10~33 | 0.45 | 0.55 | 0.75 | 0.90 | 1.00 |
| 47~330 | 0.6 | 0.7 | 0.85 | 0.95 | 1.00 |
| 470~1500 | 0.65 | 0.75 | 0.90 | 0.98 | 1.00 |
| 1500 < CAP | 0.75 | 0.8 | 0.95 | 1.00 | 1.00 |

| CAP(µF)\Frequency(Hz) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|------|------|------|------|----------|
| CAP < 33 | 0.40 | 0.60 | 0.75 | 0.90 | 1.00 |
| CAP ≥ 33 | 0.45 | 0.65 | 0.80 | 0.95 | 1.00 |

Diagram of Dimensions:(unit:mm)



| φ D | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|-----------|-----|-------------------|-----|-----------|-----|
| F | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| φ d | 0.5 | | 0.6 | | 0.8 | |
| α | D < 16 | | D = 16 | | D = 18 | |
| | L:25~35.5 | | L < 25 and L ≥ 40 | | L:25~31.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/130°C /120Hz) | Rated Ripple current (mAmps/130°C /100KHz) | WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/130°C /120Hz) | Rated Ripple current (mAmps/130°C /100KHz) |
|----------|----------|-----------|---|--|----------|----------|-----------|---|--|
| 10 | 220 | 8x11.5 | 252 | 360 | 50 | 100 | 10x12.5 | 325 | 465 |
| 10 | 330 | 8x11.5 | 333 | 475 | 50 | 100 | 10x16 | 360 | 515 |
| 10 | 330 | 10x12.5 | 350 | 500 | 50 | 220 | 10x20 | 606 | 865 |
| 10 | 470 | 10x12.5 | 503 | 670 | 50 | 220 | 13x20 | 700 | 1000 |
| 10 | 470 | 10x16 | 540 | 720 | 50 | 330 | 13x20 | 746 | 1065 |
| 10 | 1000 | 10x20 | 881 | 1175 | 50 | 330 | 13x25 | 823 | 1175 |
| 10 | 1500 | 13x20 | 1121 | 1495 | 50 | 470 | 16x20 | 930 | 1240 |
| 10 | 2200 | 13x25 | 1352 | 1690 | 50 | 470 | 16x25 | 1001 | 1335 |
| 10 | 3300 | 16x25 | 1820 | 2275 | 50 | 1000 | 16x31.5 | 1849 | 2465 |
| 10 | 4700 | 16x31.5 | 2212 | 2765 | 50 | 2200 | 18x40 | 2452 | 3065 |
| 16 | 220 | 8x11.5 | 252 | 360 | 63 | 33 | 8x11.5 | 140 | 255 |
| 16 | 220 | 10x12.5 | 263 | 375 | 63 | 47 | 10x12.5 | 200 | 285 |
| 16 | 330 | 8x11.5 | 277 | 395 | 63 | 100 | 10x16 | 290 | 415 |
| 16 | 330 | 10x16 | 361 | 515 | 63 | 220 | 13x20 | 592 | 845 |
| 16 | 470 | 10x12.5 | 491 | 655 | 63 | 330 | 13x25 | 802 | 1145 |
| 16 | 470 | 10x20 | 600 | 800 | 63 | 470 | 16x25 | 1091 | 1455 |
| 16 | 1000 | 10x20 | 881 | 1175 | 63 | 1000 | 16x31.5 | 1399 | 1865 |
| 16 | 1000 | 13x20 | 930 | 1240 | 63 | 1500 | 18x40 | 2051 | 2735 |
| 16 | 1500 | 13x20 | 1136 | 1515 | 100 | 4.7 | 8x11.5 | 48 | 115 |
| 16 | 1500 | 13x25 | 1249 | 1665 | 100 | 10 | 8x11.5 | 72 | 130 |
| 16 | 2200 | 13x25 | 1352 | 1690 | 100 | 22 | 8x11.5 | 105 | 190 |
| 16 | 2200 | 16x25 | 1500 | 1875 | 100 | 33 | 10x12.5 | 151 | 275 |
| 16 | 3300 | 16x31.5 | 2152 | 2690 | 100 | 47 | 10x16 | 200 | 285 |
| 16 | 4700 | 16x35.5 | 2352 | 2940 | 100 | 100 | 13x20 | 382 | 545 |
| 25 | 220 | 8x11.5 | 252 | 360 | 100 | 220 | 16x25 | 700 | 1000 |
| 25 | 220 | 10x16 | 333 | 475 | 100 | 330 | 16x31.5 | 942 | 1345 |
| 25 | 330 | 10x12.5 | 441 | 630 | 100 | 470 | 18x31.5 | 1200 | 1600 |
| 25 | 330 | 10x20 | 543 | 775 | 160 | 3.3 | 6.3x11 | 26 | 65 |
| 25 | 470 | 10x16 | 566 | 755 | 160 | 4.7 | 6.3x11 | 28 | 70 |
| 25 | 470 | 13x20 | 720 | 960 | 160 | 4.7 | 8x11.5 | 34 | 85 |
| 25 | 1000 | 13x20 | 930 | 1240 | 160 | 5.6 | 8x11.5 | 40 | 100 |
| 25 | 1000 | 16x25 | 1099 | 1465 | 160 | 6.8 | 8x11.5 | 44 | 110 |
| 25 | 1500 | 16x25 | 1399 | 1865 | 160 | 6.8 | 8x16 | 52 | 130 |
| 25 | 1500 | 16x31.5 | 1549 | 2065 | 160 | 10 | 8x16 | 58 | 145 |
| 25 | 2200 | 16x31.5 | 1904 | 2380 | 160 | 15 | 8x16 | 76 | 190 |
| 25 | 2200 | 16x35.5 | 2012 | 2515 | 160 | 22 | 10x16 | 124 | 310 |
| 25 | 3300 | 16x35.5 | 2156 | 2695 | 160 | 33 | 10x20 | 162 | 360 |
| 25 | 3300 | 18x35.5 | 2300 | 2875 | 160 | 47 | 13x20 | 207 | 460 |
| 35 | 100 | 8x11.5 | 322 | 460 | 160 | 47 | 13x25 | 263 | 585 |
| 35 | 100 | 10x16 | 420 | 600 | 160 | 100 | 16x25 | 369 | 820 |
| 35 | 220 | 10x12.5 | 427 | 610 | 160 | 150 | 16x31.5 | 423 | 940 |
| 35 | 220 | 10x20 | 522 | 745 | 200 | 3.3 | 6.3x11 | 28 | 70 |
| 35 | 330 | 10x16 | 553 | 790 | 200 | 4.7 | 6.3x11 | 30 | 75 |
| 35 | 330 | 13x20 | 700 | 1000 | 200 | 4.7 | 8x11.5 | 34 | 85 |
| 35 | 470 | 10x20 | 690 | 920 | 200 | 5.6 | 8x11.5 | 40 | 100 |
| 35 | 470 | 13x25 | 881 | 1175 | 200 | 5.6 | 8x16 | 48 | 120 |
| 35 | 1000 | 13x25 | 926 | 1235 | 200 | 6.8 | 8x11.5 | 46 | 115 |
| 35 | 1000 | 16x31.5 | 1151 | 1535 | 200 | 6.8 | 8x16 | 54 | 135 |
| 35 | 1500 | 16x31.5 | 1755 | 2340 | 200 | 10 | 8x16 | 64 | 160 |
| 35 | 1500 | 16x35.5 | 1849 | 2465 | 200 | 10 | 8x20 | 72 | 180 |
| 35 | 2200 | 16x35.5 | 2156 | 2695 | 200 | 15 | 8x16 | 76 | 190 |
| 35 | 2200 | 18x35.5 | 2300 | 2875 | 200 | 15 | 8x20 | 84 | 210 |
| 50 | 10 | 6.3x11 | 77 | 140 | 200 | 22 | 8x20 | 124 | 310 |
| 50 | 22 | 6.3x11 | 110 | 200 | 200 | 22 | 10x16 | 124 | 310 |
| 50 | 22 | 8x11.5 | 132 | 240 | 200 | 22 | 10x20 | 128 | 320 |
| 50 | 33 | 8x11.5 | 157 | 285 | 200 | 33 | 10x20 | 162 | 360 |
| 50 | 47 | 8x11.5 | 193 | 275 | 200 | 33 | 13x20 | 184 | 410 |
| 50 | 47 | 10x12.5 | 220 | 315 | 200 | 47 | 13x20 | 207 | 460 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /130°C /120Hz) | Rated Ripple current (mA _{rms} /130°C /100KHz) |
|----------|----------|-----------|--|---|
| 200 | 47 | 13x25 | 232 | 515 |
| 200 | 68 | 16x20 | 263 | 585 |
| 200 | 68 | 16x25 | 284 | 630 |
| 200 | 100 | 13x30 | 304 | 675 |
| 200 | 100 | 16x25 | 369 | 820 |
| 200 | 150 | 13x40 | 396 | 880 |
| 200 | 150 | 16x35.5 | 425 | 945 |
| 250 | 3.3 | 6.3x11 | 30 | 75 |
| 250 | 4.7 | 8x11.5 | 44 | 110 |
| 250 | 5.6 | 8x11.5 | 44 | 110 |
| 250 | 6.8 | 8x16 | 54 | 135 |
| 250 | 8.2 | 8x16 | 66 | 165 |
| 250 | 10 | 8x16 | 72 | 180 |
| 250 | 15 | 8x20 | 88 | 220 |
| 250 | 22 | 10x16 | 120 | 300 |
| 250 | 33 | 13x20 | 203 | 450 |
| 250 | 47 | 13x20 | 214 | 475 |
| 250 | 68 | 13x30 | 288 | 640 |
| 250 | 68 | 16x25 | 288 | 640 |
| 250 | 100 | 13x35 | 320 | 710 |
| 250 | 100 | 16x31.5 | 376 | 835 |
| 250 | 150 | 13x50 | 441 | 980 |
| 250 | 150 | 16x35.5 | 461 | 1025 |
| 350 | 2.2 | 6.3x11 | 24 | 60 |
| 350 | 3.3 | 8x11.5 | 34 | 85 |
| 350 | 4.7 | 8x11.5 | 44 | 110 |
| 350 | 5.6 | 8x16 | 50 | 125 |
| 350 | 6.8 | 8x20 | 60 | 150 |
| 350 | 8.2 | 8x20 | 68 | 170 |
| 350 | 10 | 10x20 | 78 | 195 |
| 350 | 15 | 10x20 | 100 | 250 |
| 350 | 22 | 13x20 | 124 | 310 |
| 350 | 33 | 16x20 | 203 | 450 |
| 350 | 47 | 16x20 | 243 | 540 |
| 350 | 68 | 18x25 | 290 | 645 |
| 350 | 100 | 18x31.5 | 383 | 850 |
| 400 | 2.2 | 6.3x11 | 30 | 75 |
| 400 | 2.2 | 8x11.5 | 34 | 85 |
| 400 | 2.2 | 8x16 | 38 | 95 |
| 400 | 2.7 | 8x16 | 40 | 100 |
| 400 | 3.3 | 8x11.5 | 38 | 95 |
| 400 | 3.3 | 8x16 | 46 | 115 |
| 400 | 3.3 | 8x20 | 50 | 125 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /130°C /120Hz) | Rated Ripple current (mA _{rms} /130°C /100KHz) |
|----------|----------|-----------|--|---|
| 400 | 4.7 | 8x11.5 | 44 | 110 |
| 400 | 4.7 | 8x20 | 50 | 125 |
| 400 | 4.7 | 10x16 | 50 | 125 |
| 400 | 5.6 | 8x20 | 54 | 135 |
| 400 | 5.6 | 10x16 | 54 | 135 |
| 400 | 5.6 | 10x20 | 60 | 150 |
| 400 | 6.8 | 8x20 | 60 | 150 |
| 400 | 6.8 | 10x16 | 60 | 150 |
| 400 | 6.8 | 10x20 | 66 | 165 |
| 400 | 8.2 | 10x16 | 68 | 170 |
| 400 | 8.2 | 10x20 | 76 | 190 |
| 400 | 10 | 10x16 | 76 | 190 |
| 400 | 10 | 10x20 | 80 | 200 |
| 400 | 10 | 10x25 | 86 | 215 |
| 400 | 15 | 13x20 | 104 | 260 |
| 400 | 22 | 13x25 | 138 | 345 |
| 400 | 33 | 16x25 | 207 | 460 |
| 400 | 47 | 13x40 | 234 | 520 |
| 400 | 47 | 16x31.5 | 275 | 610 |
| 400 | 47 | 18x25 | 261 | 579 |
| 400 | 68 | 13x55 | 335 | 745 |
| 400 | 68 | 18x31.5 | 297 | 660 |
| 400 | 100 | 18x40 | 396 | 880 |
| 450 | 1 | 8x11.5 | 26 | 65 |
| 450 | 2.2 | 8x16 | 38 | 95 |
| 450 | 3.3 | 8x16 | 40 | 100 |
| 450 | 4.7 | 8x20 | 50 | 125 |
| 450 | 5.6 | 10x16 | 54 | 135 |
| 450 | 6.8 | 10x20 | 66 | 165 |
| 450 | 8.2 | 10x20 | 76 | 190 |
| 450 | 10 | 10x25 | 86 | 215 |
| 450 | 10 | 13x20 | 86 | 215 |
| 450 | 15 | 13x20 | 104 | 260 |
| 450 | 22 | 10x40 | 140 | 350 |
| 450 | 22 | 16x20 | 138 | 345 |
| 450 | 22 | 16x25 | 154 | 385 |
| 450 | 33 | 10x50 | 203 | 450 |
| 450 | 33 | 16x25 | 218 | 485 |
| 450 | 33 | 16x31.5 | 245 | 545 |
| 450 | 47 | 13x45 | 254 | 565 |
| 450 | 47 | 16x35.5 | 270 | 600 |
| 450 | 68 | 18x31.5 | 297 | 660 |
| 450 | 100 | 18x40 | 396 | 880 |

KS Series 105°C Overvoltage Vent Operation Facility



Features

- ◆ High ripple current capability
- ◆ This series has specification of vent operation in overvoltage situation
- ◆ RoHS Compliant

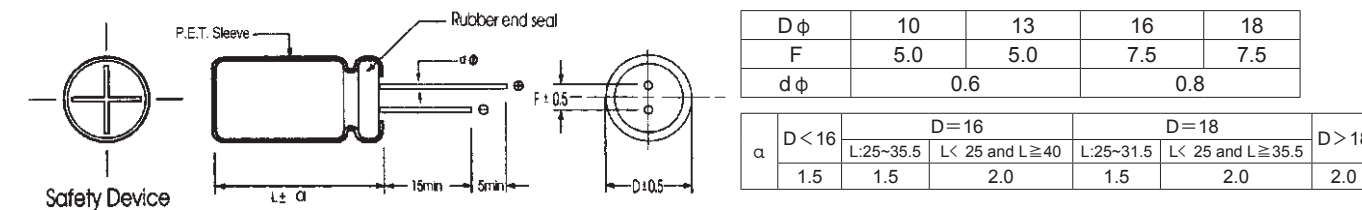
Specifications

| Item | Performance Characteristics | | |
|--|---|---|-----|
| Operating Temperature Range | -25~+105°C | | |
| Rated Voltage Range | 200V · 400V | | |
| capacitance range | 4.7~470µF | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | |
| Leakage Current (+20°C,max.) | I ≤ 0.03 CV (µA) After 1 minute with rated working voltage applied. | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Rated Voltage(VDC) | 200 | 400 |
| | D.F. (%)max. | 15 | 15 |
| Endurance | Test condition | | |
| | Duration time | :2000Hrs | |
| | Ambient temperature | :+105°C | |
| | Applied voltage | :Rated DC working voltage | |
| | After test requirement at +20°C | | |
| | Capacitance change | : ≤ ±20% of the initial measured value | |
| | Dissipation factor | : ≤ 200% of the initial specified value | |
| Leakage current | : ≤ The initial specified value | | |
| Shelf Life | Test condition | | |
| | Duration time | :1000Hrs | |
| | Ambient temperature | :+105°C | |
| | Applied voltage | :None | |
| | After test requirement at +20°C | :Same limits as Endurance. | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | |

Multiplier for Ripple Current vs. Frequency

| VDC | Capacitance(µF) | Frequency(Hz) | | | | | |
|-----|-----------------|---------------|-----|------|------|------|------|
| | | 60(50) | 120 | 400 | 1K | 1K | ≥10K |
| 200 | 22~470 | 0.85 | 1 | 1.1 | 1.25 | 1.25 | 1.5 |
| | 4.7~68 | 0.85 | 1 | 1.05 | 1.2 | 1.2 | 1.4 |
| 400 | 82~150 | 0.85 | 1 | 1.03 | 1.15 | 1.15 | 1.35 |

Diagram of Dimensions:(unit:mm)



Case Size

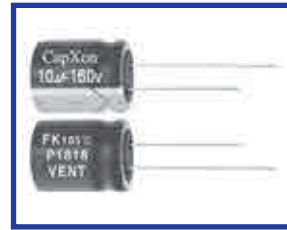
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 200 | 22 | 10x20 | 120 |
| 200 | 33 | 10x25 | 160 |
| 200 | 33 | 13x20 | 160 |
| 200 | 47 | 10x30 | 195 |
| 200 | 47 | 13x20 | 195 |
| 200 | 56 | 13x25 | 210 |
| 200 | 68 | 13x25 | 270 |
| 200 | 68 | 16x20 | 270 |
| 200 | 82 | 13x30 | 310 |
| 200 | 82 | 16x20 | 320 |
| 200 | 82 | 16x25 | 360 |
| 200 | 100 | 16x25 | 400 |
| 200 | 100 | 18x20 | 400 |
| 200 | 120 | 16x25 | 460 |
| 200 | 120 | 16x31.5 | 500 |
| 200 | 120 | 18x25 | 500 |
| 200 | 150 | 16x31.5 | 560 |
| 200 | 150 | 16x35.5 | 590 |
| 200 | 150 | 18x25 | 560 |
| 200 | 180 | 16x35.5 | 600 |
| 200 | 180 | 18x31.5 | 650 |
| 200 | 220 | 18x31.5 | 700 |
| 200 | 220 | 18x35.5 | 740 |
| 200 | 330 | 18x35.5 | 780 |
| 200 | 330 | 18x40 | 840 |
| 200 | 390 | 18x40 | 860 |
| 200 | 390 | 18x45 | 920 |
| 200 | 470 | 18x45 | 1120 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 400 | 4.7 | 10x12.5 | 60 |
| 400 | 10 | 10x16 | 100 |
| 400 | 10 | 10x20 | 125 |
| 400 | 22 | 13x20 | 135 |
| 400 | 22 | 13x25 | 150 |
| 400 | 22 | 16x20 | 150 |
| 400 | 33 | 13x25 | 180 |
| 400 | 33 | 16x20 | 210 |
| 400 | 47 | 16x31.5 | 300 |
| 400 | 47 | 16x35.5 | 320 |
| 400 | 47 | 18x25 | 300 |
| 400 | 47 | 18x31.5 | 320 |
| 400 | 56 | 16x31.5 | 360 |
| 400 | 56 | 18x25 | 350 |
| 400 | 56 | 18x31.5 | 370 |
| 400 | 68 | 16x31.5 | 365 |
| 400 | 68 | 16x35.5 | 380 |
| 400 | 68 | 18x31.5 | 375 |
| 400 | 82 | 16x35.5 | 410 |
| 400 | 82 | 18x31.5 | 410 |
| 400 | 82 | 18x35.5 | 450 |
| 400 | 100 | 16x35.5 | 470 |
| 400 | 100 | 18x31.5 | 470 |
| 400 | 100 | 18x35.5 | 490 |
| 400 | 120 | 18x31.5 | 520 |
| 400 | 120 | 18x35.5 | 540 |
| 400 | 120 | 18x40 | 560 |
| 400 | 150 | 18x35.5 | 770 |
| 400 | 150 | 18x40 | 790 |

FK Series Long Life for 105°C

Features

- ◆ Specially designed for electronic ballast, energy-save lamp and LED driving power
- ◆ Endurance 6000~8000 hrs at 105°C
- ◆ Safety vent construction design.
- ◆ RoHS Compliant



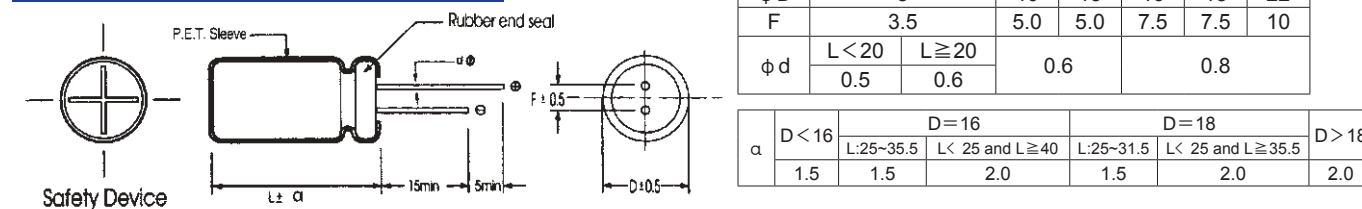
Specifications

| Item | Performance Characteristics | | | | | | | |
|--|---|--|-----|--------------|----------------------|------|---------------------|------|
| Operating Temperature Range | -40 to +105°C(160~450Vdc) -25 to +105°C(500Vdc) | | | | | | | |
| Rated Voltage Range | 160 to 500 VDC | | | | | | | |
| Capacitance Range | 1 to 330 μF | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | |
| Leakage Current (+20°C,max.) | (CV ≤ 1000) | (CV > 1000) | | | | | | |
| | $1 \leq 0.1CV + 40 (\mu A)$ | $1 \leq 0.04CV + 100 (\mu A)$ | | | | | | |
| After 1minute with rated working voltage applied. C: rated Capacitance (μF) · V: working voltage(V) | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Working Voltage(VDC) | 160 200 250 350 400 420 450 500 | | | | | | |
| | D.F.(%)max. | 15 15 15 20 20 20 20 24 | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | |
| | Working Voltage(VDC) | 160 200 250 350 400 420 450 500 | | | | | | |
| | Z-25°C / Z+20°C | 3 3 3 5 5 6 6 6 | | | | | | |
| | Z-40°C / Z+20°C | 6 6 6 6 6 - - - | | | | | | |
| Endurance | Test condition Duration time :As right Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change : with ±20% of the initial measured value Dissipation factor : ≤ 200% of the initial specified value Leakage current : ≤ The initial specified value | <table border="1"> <tr> <th>D φ</th> <th>Life (hours)</th> </tr> <tr> <td>6.3 φ, 8 φ, 10 φ x9L</td> <td>6000</td> </tr> <tr> <td>10 φ x12.5L or more</td> <td>8000</td> </tr> </table> | D φ | Life (hours) | 6.3 φ, 8 φ, 10 φ x9L | 6000 | 10 φ x12.5L or more | 8000 |
| | D φ | Life (hours) | | | | | | |
| 6.3 φ, 8 φ, 10 φ x9L | 6000 | | | | | | | |
| 10 φ x12.5L or more | 8000 | | | | | | | |
| Shelf Life | Test condition Duration time :1000Hrs Ambient temperature :+105°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(μF) | 120 | 1K | 10K | 100KHz |
|-------------------------|------|------|------|--------|
| 1~82 | 1.00 | 1.75 | 2.25 | 2.50 |
| ≥ 100 | 1.00 | 1.67 | 2.05 | 2.25 |

Diagram of Dimensions:(unit:mm)



Radial

Case Size

| WV (Vdc) | Cap (µF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) | Rated Ripple current (mA _{rms} /105°C /100KHz) |
|-------------|-------------|--------------|---|--|
| 160 | 1 | 6.3x11 | 20 | 51 |
| 160 | 1 | 6.3x9 | 18 | 46 |
| 160 | 1.5 | 6.3x11 | 22 | 56 |
| 160 | 1.5 | 6.3x9 | 20 | 51 |
| 160 | 2.2 | 6.3x11 | 28 | 71 |
| 160 | 2.2 | 6.3x9 | 26 | 65 |
| 160 | 3.3 | 6.3x11 | 32 | 81 |
| 160 | 3.3 | 6.3x9 | 29 | 73 |
| 160 | 4.7 | 6.3x11 | 36 | 91 |
| 160 | 4.7 | 6.3x9 | 34 | 86 |
| 160 | 5.6 | 6.3x11 | 38 | 96 |
| 160 | 5.6 | 6.3x9 | 36 | 91 |
| 160 | 5.6 | 8x11.5 | 44 | 110 |
| 160 | 6.8 | 6.3x11 | 44 | 110 |
| 160 | 6.8 | 8x11.5 | 52 | 130 |
| 160 | 6.8 | 8x9 | 44 | 110 |
| 160 | 8.2 | 8x11.5 | 60 | 150 |
| 160 | 8.2 | 8x9 | 56 | 140 |
| 160 | 10 | 8x11.5 | 96 | 240 |
| 160 | 10 | 8x16 | 110 | 280 |
| 160 | 10 | 8x9 | 88 | 220 |
| 160 | 10 | 10x12.5 | 120 | 290 |
| 160 | 15 | 8x16 | 110 | 280 |
| 160 | 15 | 10x9 | 100 | 260 |
| 160 | 22 | 8x20 | 180 | 450 |
| 160 | 22 | 10x12.5 | 160 | 410 |
| 160 | 22 | 10x16 | 180 | 460 |
| 160 | 33 | 10x16 | 230 | 570 |
| 160 | 33 | 10x20 | 250 | 630 |
| 160 | 47 | 10x16 | 300 | 740 |
| 160 | 47 | 10x20 | 300 | 760 |
| 160 | 68 | 13x20 | 470 | 1180 |
| 160 | 82 | 13x20 | 520 | 1290 |
| 160 | 100 | 13x25 | 620 | 1400 |
| 160 | 100 | 16x20 | 630 | 1420 |
| 160 | 150 | 16x25 | 840 | 1880 |
| 160 | 220 | 18x25 | 1090 | 2460 |
| 160 | 270 | 16x31.5 | 1260 | 2830 |
| 160 | 330 | 18x31.5 | 1400 | 3140 |
| 200 | 1 | 6.3x11 | 23 | 57 |
| 200 | 1 | 6.3x9 | 21 | 53 |
| 200 | 1.5 | 6.3x11 | 24 | 61 |
| 200 | 1.5 | 6.3x9 | 23 | 57 |
| 200 | 2.2 | 6.3x11 | 30 | 75 |
| 200 | 2.2 | 6.3x9 | 28 | 69 |
| 200 | 3.3 | 6.3x11 | 39 | 97 |
| 200 | 3.3 | 6.3x9 | 35 | 87 |
| 200 | 4.7 | 6.3x11 | 52 | 130 |
| 200 | 4.7 | 8x9 | 52 | 130 |
| 200 | 5.6 | 6.3x11 | 56 | 140 |
| 200 | 5.6 | 8x11.5 | 64 | 160 |
| 200 | 5.6 | 8x9 | 56 | 140 |
| 200 | 6.8 | 8x11.5 | 76 | 190 |
| 200 | 6.8 | 8x9 | 64 | 160 |
| 200 | 8.2 | 8x11.5 | 84 | 210 |
| 200 | 10 | 8x11.5 | 110 | 270 |
| 200 | 10 | 8x16 | 120 | 310 |
| 200 | 10 | 10x12.5 | 130 | 320 |

| WV (Vdc) | Cap (µF) | Size (mm) | Rated Ripple current (mA _{rms} /105°C /120Hz) | Rated Ripple current (mA _{rms} /105°C /100KHz) |
|-------------|-------------|--------------|---|--|
| 200 | 10 | 10x9 | 110 | 270 |
| 200 | 22 | 8x20 | 220 | 550 |
| 200 | 22 | 10x16 | 220 | 560 |
| 200 | 22 | 10x20 | 250 | 620 |
| 200 | 33 | 10x16 | 260 | 650 |
| 200 | 33 | 10x20 | 280 | 710 |
| 200 | 47 | 13x16 | 360 | 890 |
| 200 | 47 | 13x20 | 390 | 980 |
| 200 | 68 | 13x20 | 470 | 1180 |
| 200 | 68 | 13x25 | 520 | 1300 |
| 200 | 100 | 13x25 | 630 | 1420 |
| 200 | 100 | 16x25 | 680 | 1530 |
| 200 | 150 | 18x25 | 900 | 2020 |
| 200 | 220 | 16x31.5 | 1090 | 2460 |
| 250 | 1 | 6.3x11 | 24 | 59 |
| 250 | 1 | 6.3x9 | 21 | 53 |
| 250 | 1.5 | 6.3x11 | 24 | 61 |
| 250 | 1.5 | 6.3x9 | 23 | 57 |
| 250 | 2.2 | 6.3x11 | 30 | 76 |
| 250 | 2.2 | 6.3x9 | 28 | 69 |
| 250 | 2.2 | 8x11.5 | 38 | 95 |
| 250 | 3.3 | 6.3x11 | 40 | 100 |
| 250 | 3.3 | 6.3x9 | 35 | 87 |
| 250 | 3.3 | 8x11.5 | 56 | 140 |
| 250 | 4.7 | 8x11.5 | 64 | 160 |
| 250 | 4.7 | 8x16 | 72 | 180 |
| 250 | 4.7 | 8x9 | 52 | 130 |
| 250 | 4.7 | 10x12.5 | 76 | 190 |
| 250 | 5.6 | 8x11.5 | 72 | 180 |
| 250 | 5.6 | 8x9 | 64 | 160 |
| 250 | 6.8 | 8x11.5 | 80 | 200 |
| 250 | 6.8 | 8x16 | 92 | 230 |
| 250 | 6.8 | 10x12.5 | 100 | 250 |
| 250 | 8.2 | 8x16 | 88 | 220 |
| 250 | 8.2 | 10x9 | 80 | 200 |
| 250 | 10 | 8x16 | 120 | 290 |
| 250 | 10 | 10x12.5 | 120 | 300 |
| 250 | 15 | 10x16 | 130 | 330 |
| 250 | 22 | 10x16 | 180 | 460 |
| 250 | 22 | 10x20 | 200 | 510 |
| 250 | 33 | 10x20 | 270 | 680 |
| 250 | 33 | 13x16 | 270 | 680 |
| 250 | 33 | 13x20 | 320 | 800 |
| 250 | 47 | 13x20 | 400 | 990 |
| 250 | 47 | 13x25 | 430 | 1080 |
| 250 | 56 | 13x25 | 500 | 1260 |
| 250 | 68 | 16x25 | 560 | 1400 |
| 250 | 100 | 16x25 | 680 | 1540 |
| 250 | 150 | 16x31.5 | 900 | 2020 |
| 250 | 220 | 18x31.5 | 1130 | 2550 |
| 350 | 1 | 6.3x11 | 26 | 66 |
| 350 | 1 | 6.3x9 | 21 | 53 |
| 350 | 1 | 8x11.5 | 31 | 77 |
| 350 | 1.5 | 6.3x11 | 30 | 75 |
| 350 | 1.5 | 6.3x9 | 26 | 66 |
| 350 | 2.2 | 6.3x11 | 38 | 95 |
| 350 | 2.2 | 8x11.5 | 48 | 120 |
| 350 | 2.2 | 8x9 | 35 | 88 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|---|--|
| 350 | 3.3 | 8x11.5 | 56 | 140 |
| 350 | 3.3 | 8x9 | 48 | 120 |
| 350 | 3.3 | 10x12.5 | 64 | 160 |
| 350 | 4.7 | 8x16 | 72 | 180 |
| 350 | 4.7 | 10x12.5 | 76 | 190 |
| 350 | 4.7 | 10x9 | 64 | 160 |
| 350 | 5.6 | 8x16 | 84 | 210 |
| 350 | 5.6 | 10x12.5 | 88 | 220 |
| 350 | 6.8 | 8x20 | 110 | 270 |
| 350 | 6.8 | 10x16 | 110 | 280 |
| 350 | 8.2 | 8x20 | 130 | 320 |
| 350 | 10 | 8x20 | 130 | 320 |
| 350 | 10 | 10x16 | 130 | 330 |
| 350 | 15 | 10x20 | 150 | 370 |
| 350 | 22 | 13x20 | 260 | 650 |
| 350 | 33 | 13x25 | 380 | 940 |
| 350 | 47 | 16x20 | 430 | 1080 |
| 350 | 47 | 16x25 | 460 | 1160 |
| 350 | 68 | 18x20 | 560 | 1400 |
| 350 | 68 | 18x25 | 600 | 1510 |
| 350 | 82 | 18x25 | 610 | 1530 |
| 350 | 100 | 16x31.5 | 720 | 1630 |
| 350 | 150 | 18x35.5 | 960 | 2170 |
| 400 | 1 | 6.3x11 | 30 | 76 |
| 400 | 1 | 6.3x9 | 25 | 63 |
| 400 | 1.5 | 6.3x9 | 30 | 76 |
| 400 | 1.5 | 8x11.5 | 36 | 91 |
| 400 | 2.2 | 6.3x11 | 44 | 110 |
| 400 | 2.2 | 8x11.5 | 48 | 120 |
| 400 | 2.2 | 8x9 | 40 | 100 |
| 400 | 3.3 | 8x11.5 | 60 | 150 |
| 400 | 3.3 | 8x9 | 52 | 130 |
| 400 | 4.7 | 8x11.5 | 80 | 200 |
| 400 | 4.7 | 8x16 | 88 | 220 |
| 400 | 4.7 | 10x12.5 | 92 | 230 |
| 400 | 4.7 | 10x9 | 72 | 180 |
| 400 | 5.6 | 8x16 | 88 | 220 |
| 400 | 5.6 | 10x12.5 | 100 | 250 |
| 400 | 6.8 | 8x16 | 110 | 270 |
| 400 | 6.8 | 10x12.5 | 110 | 280 |
| 400 | 8.2 | 8x16 | 110 | 280 |
| 400 | 8.2 | 10x12.5 | 120 | 290 |
| 400 | 8.2 | 10x16 | 130 | 320 |
| 400 | 10 | 8x20 | 140 | 350 |
| 400 | 10 | 10x16 | 140 | 360 |
| 400 | 10 | 10x20 | 160 | 400 |
| 400 | 15 | 10x20 | 190 | 480 |
| 400 | 15 | 13x16 | 200 | 500 |
| 400 | 22 | 13x20 | 260 | 650 |
| 400 | 33 | 13x25 | 360 | 900 |
| 400 | 33 | 16x20 | 360 | 900 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|---|--|
| 400 | 47 | 16x25 | 470 | 1180 |
| 400 | 56 | 18x25 | 560 | 1400 |
| 400 | 68 | 18x25 | 590 | 1480 |
| 400 | 82 | 16x31.5 | 630 | 1580 |
| 400 | 100 | 18x31.5 | 770 | 1730 |
| 400 | 120 | 18x31.5 | 830 | 1860 |
| 400 | 150 | 18x35.5 | 930 | 2090 |
| 450 | 1 | 6.3x11 | 30 | 76 |
| 450 | 1 | 6.3x9 | 25 | 63 |
| 450 | 1.5 | 8x11.5 | 36 | 91 |
| 450 | 2.2 | 8x11.5 | 48 | 120 |
| 450 | 2.2 | 8x16 | 56 | 140 |
| 450 | 2.2 | 8x9 | 40 | 100 |
| 450 | 2.2 | 10x12.5 | 60 | 150 |
| 450 | 3.3 | 8x11.5 | 64 | 160 |
| 450 | 3.3 | 10x12.5 | 80 | 200 |
| 450 | 3.3 | 10x9 | 68 | 170 |
| 450 | 4.7 | 8x16 | 100 | 250 |
| 450 | 4.7 | 10x12.5 | 100 | 250 |
| 450 | 4.7 | 10x16 | 110 | 270 |
| 450 | 5.6 | 10x16 | 110 | 280 |
| 450 | 6.8 | 8x20 | 120 | 300 |
| 450 | 6.8 | 10x16 | 130 | 320 |
| 450 | 6.8 | 10x20 | 140 | 340 |
| 450 | 8.2 | 10x20 | 140 | 360 |
| 450 | 10 | 10x20 | 160 | 390 |
| 450 | 15 | 13x20 | 220 | 550 |
| 450 | 22 | 13x25 | 290 | 730 |
| 450 | 22 | 16x20 | 290 | 730 |
| 450 | 33 | 13x25 | 360 | 900 |
| 450 | 33 | 16x25 | 390 | 980 |
| 450 | 47 | 16x25 | 470 | 1180 |
| 450 | 47 | 18x25 | 500 | 1260 |
| 450 | 68 | 16x31.5 | 630 | 1580 |
| 450 | 68 | 18x25 | 590 | 1480 |
| 450 | 82 | 18x31.5 | 680 | 1700 |
| 450 | 100 | 18x35.5 | 800 | 1790 |
| 500 | 4.7 | 10x20 | 88 | 220 |
| 500 | 5.6 | 10x20 | 92 | 230 |
| 500 | 6.8 | 10x20 | 130 | 320 |
| 500 | 8.2 | 10x20 | 130 | 320 |
| 500 | 10 | 13x20 | 140 | 360 |
| 500 | 15 | 13x25 | 180 | 450 |
| 500 | 22 | 16x25 | 230 | 580 |
| 500 | 33 | 18x25 | 390 | 980 |
| 500 | 47 | 16x31.5 | 500 | 1260 |
| 500 | 56 | 18x31.5 | 570 | 1420 |
| 500 | 68 | 18x35.5 | 630 | 1580 |
| 500 | 82 | 18x40 | 680 | 1700 |
| 500 | 100 | 18x45 | 800 | 1800 |
| 500 | 120 | 22x45 | 840 | 1900 |

FL Series Long Life 105°C

Features

- ◆ Specially designed for electronic ballast , energy-save lamp and LED driving power
- ◆ Endurance 8000~12000 hrs at 105°C
- ◆ Safety vent construction design.
- ◆ RoHS Compliant

FK long life → FL



Specifications

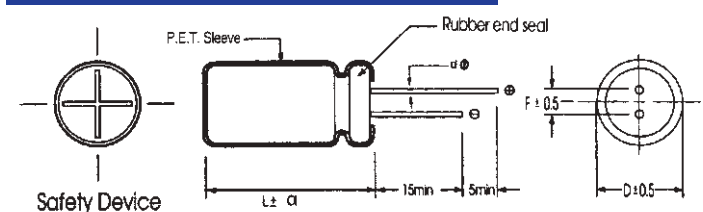
| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--|----------------------|------------------|--------------------|--|------|-------|--------|-----------------------|-----|-----------------|----|----|----|----|----|----|----|----|-----------------|---|---|---|---|---|---|---|---|
| Operating Temperature Range | -40 to +105°C(160~450Vdc) | -25 to +105°C(500Vdc) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 160 to 500 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 1.0 to 680 µ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | <table border="1"> <tr> <td>(CV ≤ 1000)</td> <td>(CV > 1000)</td> </tr> <tr> <td>1 ≤ 0.1CV+40(µA)</td> <td>1 ≤ 0.04CV+100(µA)</td> </tr> </table> | (CV ≤ 1000) | (CV > 1000) | 1 ≤ 0.1CV+40(µA) | 1 ≤ 0.04CV+100(µA) | After 1minute with rated working voltage applied. C: rated Capacitance (µF) · V: working voltage(V) | | | | | | | | | | | | | | | | | | | | | | | |
| (CV ≤ 1000) | (CV > 1000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 ≤ 0.1CV+40(µA) | 1 ≤ 0.04CV+100(µA) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>160</td> <td>200</td> <td>250</td> <td>350</td> <td>400</td> <td>420</td> <td>450</td> <td>500</td> </tr> <tr> <td>D.F.(%)max.</td> <td>15</td> <td>15</td> <td>15</td> <td>20</td> <td>20</td> <td>20</td> <td>20</td> <td>24</td> </tr> </table> | | Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 420 | 450 | 500 | D.F.(%)max. | 15 | 15 | 15 | 20 | 20 | 20 | 20 | 24 | | | | | | | | | |
| Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 420 | 450 | 500 | | | | | | | | | | | | | | | | | | | | | |
| D.F.(%)max. | 15 | 15 | 15 | 20 | 20 | 20 | 20 | 24 | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | <p>Impedance ratio max</p> <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>160</td> <td>200</td> <td>250</td> <td>350</td> <td>400</td> <td>420</td> <td>450</td> <td>500</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>3</td> <td>3</td> <td>3</td> <td>5</td> <td>5</td> <td>6</td> <td>6</td> <td>6</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>-</td> <td>-</td> <td>-</td> </tr> </table> | | Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 420 | 450 | 500 | Z-25°C / Z+20°C | 3 | 3 | 3 | 5 | 5 | 6 | 6 | 6 | Z-40°C / Z+20°C | 6 | 6 | 6 | 6 | 6 | - | - | - |
| Working Voltage(VDC) | 160 | 200 | 250 | 350 | 400 | 420 | 450 | 500 | | | | | | | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 3 | 3 | 3 | 5 | 5 | 6 | 6 | 6 | | | | | | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 6 | 6 | 6 | 6 | 6 | - | - | - | | | | | | | | | | | | | | | | | | | | | |
| Endurance | <p>Test condition</p> <p>Duration time :As right</p> <p>Ambient temperature :+105°C</p> <p>Applied voltage :Rated DC working voltage</p> <p>After test requirement at +20°C</p> <p>Capacitance change : with ±20% of the initial measured value</p> <p>Dissipation factor : ≤ 200% of the initial specified value</p> <p>Leakage current : ≤ The initial specified value</p> | <table border="1"> <tr> <td>D φ</td> <td>Life (hours)</td> </tr> <tr> <td>6.3 φ , 8 φ</td> <td>8000</td> </tr> <tr> <td>10 φ</td> <td>10000</td> </tr> <tr> <td>≥ 13 φ</td> <td>12000 (500V:10000)</td> </tr> </table> | D φ | Life (hours) | 6.3 φ , 8 φ | 8000 | 10 φ | 10000 | ≥ 13 φ | 12000 (500V:10000) | | | | | | | | | | | | | | | | | | | |
| D φ | Life (hours) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.3 φ , 8 φ | 8000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 φ | 10000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ≥ 13 φ | 12000 (500V:10000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | <p>Test condition</p> <p>Duration time :1000Hrs</p> <p>Ambient temperature :+105°C</p> <p>Applied voltage :None</p> <p>After test requirement at +20°C:Same limits as Endurance.</p> <p>Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) \ CAP(µF) | 120 | 1K | 10K | 100KHz |
|-------------------------|------|------|------|--------|
| 1~82 | 1.00 | 1.75 | 2.25 | 2.50 |
| ≥ 100 | 1.00 | 1.67 | 2.05 | 2.25 |

Diagram of Dimensions:(unit:mm)



| φ D | 8 | 10 | 13 | 16 | 18 | 20 | 22 |
|-----|-----------|-------------------|-----------|---------------------|-----|--------|----|
| F | 3.5 | | 5.0 | 5.0 | 7.5 | 7.5 | 10 |
| φ d | L < 20 | L ≥ 20 | 0.6 | | 0.8 | | |
| | 0.5 | 0.6 | | | | | |
| α | D < 16 | D=16 | | D=18 | | D > 18 | |
| | L:25~35.5 | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|---|--|
| 450 | 1 | 8x9 | 26 | 65 |
| 450 | 1 | 8x11.5 | 33 | 83 |
| 450 | 1.5 | 8x11.5 | 37 | 92 |
| 450 | 1.5 | 10x9 | 37 | 93 |
| 450 | 1.8 | 8x11.5 | 39 | 97 |
| 450 | 1.8 | 10x9 | 39 | 98 |
| 450 | 2.2 | 8x16 | 56 | 141 |
| 450 | 3.3 | 8x16 | 61 | 153 |
| 450 | 4.7 | 10x16 | 92 | 230 |
| 450 | 5.6 | 10x16 | 100 | 260 |
| 450 | 6.8 | 10x16 | 130 | 320 |
| 450 | 6.8 | 10x20 | 140 | 350 |
| 450 | 8.2 | 10x20 | 140 | 350 |
| 450 | 10 | 10x20 | 140 | 360 |
| 450 | 10 | 10x25 | 160 | 400 |
| 450 | 10 | 13x16 | 150 | 380 |
| 450 | 15 | 10x25 | 190 | 470 |
| 450 | 15 | 13x20 | 200 | 500 |
| 450 | 18 | 13x20 | 260 | 640 |
| 450 | 22 | 13x25 | 290 | 720 |
| 450 | 22 | 16x20 | 300 | 750 |
| 450 | 22 | 18x20 | 320 | 790 |
| 450 | 27 | 13x25 | 340 | 850 |
| 450 | 33 | 16x20 | 390 | 970 |
| 450 | 33 | 16x25 | 420 | 1050 |
| 450 | 33 | 16x31.5 | 460 | 1160 |
| 450 | 33 | 18x20 | 420 | 1040 |
| 450 | 33 | 18x25 | 450 | 1120 |

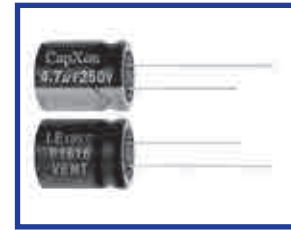
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) | Rated Ripple current (mAmps/105°C /100KHz) |
|----------|----------|-----------|---|--|
| 450 | 39 | 18x20 | 440 | 1110 |
| 450 | 47 | 16x25 | 500 | 1260 |
| 450 | 47 | 16x31.5 | 560 | 1390 |
| 450 | 47 | 18x25 | 540 | 1340 |
| 450 | 47 | 18x31.5 | 590 | 1480 |
| 450 | 56 | 16x31.5 | 590 | 1470 |
| 450 | 56 | 18x25 | 560 | 1400 |
| 450 | 56 | 18x31.5 | 630 | 1570 |
| 450 | 68 | 16x35.5 | 660 | 1650 |
| 450 | 68 | 18x31.5 | 660 | 1660 |
| 450 | 82 | 16x40 | 750 | 1880 |
| 450 | 82 | 18x31.5 | 720 | 1790 |
| 450 | 82 | 18x35.5 | 750 | 1880 |
| 450 | 100 | 18x35.5 | 840 | 1890 |
| 450 | 100 | 18x40 | 900 | 2020 |
| 450 | 120 | 18x45 | 950 | 2130 |
| 450 | 150 | 18x50 | 1070 | 2400 |
| 500 | 10 | 13x20 | 130 | 330 |
| 500 | 12 | 13x20 | 140 | 350 |
| 500 | 15 | 13x25 | 180 | 450 |
| 500 | 15 | 16x20 | 180 | 450 |
| 500 | 22 | 16x25 | 230 | 570 |
| 500 | 22 | 18x20 | 220 | 560 |
| 500 | 33 | 16x31.5 | 290 | 720 |
| 500 | 33 | 18x25 | 280 | 700 |
| 500 | 47 | 18x31.5 | 360 | 890 |
| 500 | 56 | 18x35.5 | 390 | 970 |
| 500 | 68 | 18x40 | 420 | 1060 |

LE Series 105°C 12000~20000 hours

Features

- ◆ Ultra Long life
- ◆ For LED lighting
- ◆ ROHS compliant

FL long life LE



Specifications

| Item | Performance Characteristics | | | |
|---|---------------------------------|---|------------|-----|
| Operating Temperature Range | -40~+105°C | | | |
| Rated Voltage Range | 160~450 ≥VDC | | | |
| Capacitance Range | 1 to 68 µF | | | |
| Capacitance Tolerance | ±20%(120Hz, +20°C) | | | |
| Leakage Current (+20°C, max.) | (CV ≤ 1000) | (CV > 1000) | | |
| | 1 ≤ 0.1CV + 40(µA) | 1 ≤ 0.04CV + 100(µA) | | |
| After 1 minute with rated working voltage applied. C: rated Capacitance (µF) · V: working voltage(V) | | | | |
| Dissipation Factor (tan δ · at 20°C · 120Hz) | Less than the value under table | | | |
| | Cap(µF) / W.v.(V) | 160~450 | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | |
| | Working voltage(V) | < 250 | 250~400 | 450 |
| | Z-25°C / Z+20°C | 3 | 6 | 8 |
| Z-40°C / Z+20°C | 8 | 10 | 12 | |
| Endurance | Test condition | :As right | | |
| | Duration time | 6.3X11, 8X9, 10X9 | 12000hours | |
| Shelf Life | Test condition | :1000 Hrs | | |
| | Duration time | 8X11.5, 10X12.5 | 15000hours | |
| Endurance | Ambient temperature | :+105°C | | |
| | Applied voltage | :Rated DC working voltage | | |
| Endurance | After test requirement at +20°C | 10X16 or more | 20000hours | |
| | Capacitance change | : Within ±30% of the initial measured value | | |
| | Dissipation factor | : Not more than 300% of the initial specified value | | |
| | Leakage current | : Not more than The initial specified value | | |
| Shelf Life | Ambient temperature | :+105°C | | |
| | Applied voltage | :None | | |
| After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | |

Radial

Multiplier for Ripple Current vs. Frequency

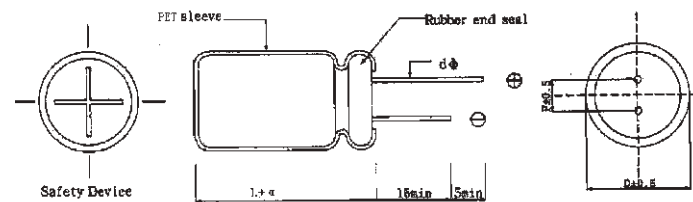
160~400V.DC

| Coefficient | Frequency(Hz) | | | |
|-------------|---------------|-----|-----|------|
| | 120 | 1K | 10K | 100K |
| | 1~5.6 µF | 1.0 | 1.6 | 1.8 |
| 6.8~18 µF | 1.0 | 1.5 | 1.7 | 1.9 |
| 22~33 µF | 1.0 | 1.4 | 1.6 | 1.8 |

≥450V.DC

| Coefficient | Frequency(Hz) | | | |
|-------------|---------------|-----|-----|------|
| | 120 | 1K | 10K | 100K |
| | 4.7~15 µF | 0.3 | 0.6 | 0.9 |
| 22~68 µF | 0.4 | 0.7 | 0.9 | 1.0 |

Diagram of Dimensions:(unit:mm)



| Dφ | 6.3 | 8 | 10 | 13 | 16 | 18 |
|----|-----|-----|-----|-----|-----|-----|
| F | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| dφ | 0.5 | | 0.6 | | 0.8 | |

| α | D < 16 | D = 16 | | D = 18 | | D > 18 |
|---|--------|------------|-------------------|------------|---------------------|--------|
| | | L: 25~35.5 | L < 25 and L ≥ 40 | L: 25~31.5 | L < 25 and L ≥ 35.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 |

Case Size

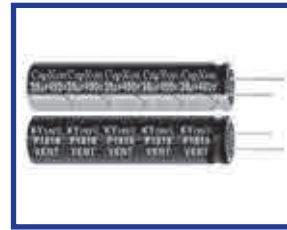
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/105°C /120Hz) | Rated Ripple current (mArms/105°C /100KHz) |
|----------|----------|-----------|---|--|
| 160 | 5.6 | 6.3x11 | 53 | 106 |
| 160 | 10 | 8x9 | 71 | 135 |
| 160 | 15 | 8x11.5 | 93 | 177 |
| 160 | 15 | 10x9 | 96 | 182 |
| 160 | 22 | 10x12.5 | 122 | 40 |
| 160 | 33 | 10x16 | 159 | 59 |
| 200 | 2.2 | 6.3x11 | 37 | 74 |
| 200 | 3.3 | 6.3x11 | 43 | 86 |
| 200 | 4.7 | 6.3x11 | 50 | 100 |
| 200 | 5.6 | 8x9 | 57 | 114 |
| 200 | 6.8 | 8x9 | 63 | 120 |
| 200 | 8.2 | 8x9 | 67 | 127 |
| 200 | 10 | 8x11.5 | 81 | 154 |
| 200 | 12 | 10x9 | 89 | 169 |
| 200 | 18 | 10x12.5 | 114 | 217 |
| 200 | 27 | 10x16 | 150 | 49 |
| 250 | 1.8 | 6.3x11 | 34 | 68 |
| 250 | 2.2 | 6.3x11 | 37 | 74 |
| 250 | 3.3 | 6.3x11 | 43 | 86 |
| 250 | 4.7 | 8x9 | 54 | 108 |
| 250 | 5.6 | 8x11.5 | 63 | 126 |
| 250 | 6.8 | 8x11.5 | 69 | 131 |
| 250 | 8.2 | 10x9 | 77 | 146 |
| 250 | 10 | 10x12.5 | 91 | 173 |
| 250 | 12 | 10x12.5 | 98 | 186 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/105°C /120Hz) | Rated Ripple current (mArms/105°C /100KHz) |
|----------|----------|-----------|---|--|
| 250 | 18 | 10x16 | 128 | 243 |
| 400 | 1 | 6.3x11 | 25 | 50 |
| 400 | 1.2 | 8x9 | 29 | 58 |
| 400 | 1.5 | 8x9 | 31 | 62 |
| 400 | 1.8 | 8x9 | 34 | 68 |
| 400 | 2.2 | 8x9 | 37 | 74 |
| 400 | 2.2 | 8x11.5 | 41 | 82 |
| 400 | 2.7 | 8x11.5 | 44 | 88 |
| 400 | 3.3 | 8x11.5 | 48 | 96 |
| 400 | 3.3 | 10x9 | 49 | 98 |
| 400 | 3.9 | 10x12.5 | 58 | 116 |
| 400 | 4.7 | 10x12.5 | 62 | 124 |
| 400 | 6.8 | 10x16 | 86 | 163 |
| 450 | 4.7 | 10x16 | 55 | 183 |
| 450 | 4.7 | 10x20 | 67 | 223 |
| 450 | 6.8 | 10x20 | 85 | 283 |
| 450 | 8.2 | 10x20 | 85 | 283 |
| 450 | 10 | 13x20 | 136 | 453 |
| 450 | 15 | 13x25 | 181 | 603 |
| 450 | 22 | 13x25 | 241 | 603 |
| 450 | 22 | 16x20 | 293 | 733 |
| 450 | 33 | 16x25 | 321 | 803 |
| 450 | 33 | 18x20 | 313 | 783 |
| 450 | 47 | 18x25 | 481 | 1203 |
| 450 | 68 | 18x31.5 | 521 | 1303 |

KY Series

Features

- ◆ Endurance: 105°C 2000hours
- ◆ Suitable for slim application



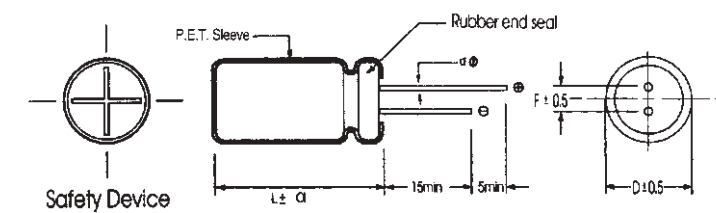
Specifications

| Item | Performance Characteristics |
|---|--|
| Operating Temperature Range | -25~+105°C |
| Rated Voltage Range | 250~450 VDC |
| Capacitance Range | 12~150μF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | $I \leq 3 \sqrt{CV}$ (μA) (After 5 minute with rated working voltage applied.) I= Leakage Current(μA) C= Rated Capacitance V= Rated voltage(V) |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 250 350 400 420 450 |
| | D.F.(%)max. 15 15 15 20 20 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Working voltage(VDC) 250 350~450 Z-25°C / Z+20°C 3 8 |
| Endurance | Test condition Duration time :2000Hrs Ambient temperature :+105°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change :≤ ±20% of the initial measured value Dissipation factor :≤ 200% of the initial specified value Leakage current :≤ The initial specified value |

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 60 | 120 | 400 | 1K | 100K |
|-----------------------|-----|------|------|------|------|
| Coefficient 250~350WV | 0.8 | 1.00 | 1.20 | 1.30 | 1.40 |
| Coefficient 400~450WV | 0.8 | 1.00 | 1.25 | 1.40 | 1.50 |

Diagram of Dimensions:(unit:mm)



| | | | |
|----|-----|-------|-----|
| Dφ | 8 | 10~13 | |
| F | 3.5 | 5.0 | 5.0 |
| dφ | 0.6 | 0.6 | 0.6 |
| α | 1.5 | 2.0 | |

Radial

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/105°C /120Hz) |
|----------|----------|-----------|---|
| 250 | 22 | 8x30 | 200 |
| 250 | 27 | 8x30 | 220 |
| 250 | 33 | 8x30 | 240 |
| 250 | 39 | 8x35 | 270 |
| 250 | 47 | 8x40 | 330 |
| 250 | 56 | 10x35 | 380 |
| 250 | 68 | 10x35 | 435 |
| 250 | 82 | 10x40 | 500 |
| 250 | 100 | 10x45 | 585 |
| 250 | 120 | 13x35 | 620 |
| 250 | 150 | 13x40 | 670 |
| 350 | 15 | 8x30 | 145 |
| 350 | 22 | 8x35 | 185 |
| 350 | 27 | 8x40 | 220 |
| 350 | 33 | 8x40 | 250 |
| 350 | 39 | 10x35 | 300 |
| 350 | 47 | 10x40 | 380 |
| 350 | 56 | 10x45 | 430 |
| 350 | 68 | 13x35 | 480 |
| 350 | 82 | 13x40 | 550 |
| 350 | 100 | 13x45 | 600 |
| 400 | 15 | 8x30 | 170 |
| 400 | 22 | 8x35 | 220 |
| 400 | 27 | 8x40 | 255 |
| 400 | 27 | 10x30 | 255 |
| 400 | 33 | 8x45 | 280 |
| 400 | 33 | 10x30 | 280 |
| 400 | 39 | 8x50 | 330 |
| 400 | 39 | 10x35 | 330 |
| 400 | 47 | 10x40 | 430 |
| 400 | 47 | 13x30 | 430 |
| 400 | 56 | 10x50 | 480 |
| 400 | 56 | 13x30 | 450 |
| 400 | 68 | 10x55 | 550 |
| 400 | 68 | 13x35 | 520 |
| 400 | 68 | 13x40 | 550 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/105°C /120Hz) |
|----------|----------|-----------|---|
| 400 | 82 | 13x40 | 580 |
| 400 | 100 | 13x45 | 620 |
| 400 | 100 | 13x50 | 650 |
| 400 | 120 | 13x55 | 750 |
| 420 | 15 | 8x30 | 150 |
| 420 | 22 | 8x35 | 195 |
| 420 | 27 | 8x40 | 230 |
| 420 | 33 | 8x50 | 300 |
| 420 | 33 | 10x35 | 290 |
| 420 | 39 | 10x40 | 315 |
| 420 | 39 | 13x30 | 315 |
| 420 | 47 | 10x40 | 360 |
| 420 | 47 | 13x30 | 360 |
| 420 | 56 | 10x50 | 440 |
| 420 | 56 | 13x30 | 400 |
| 420 | 68 | 13x35 | 470 |
| 420 | 82 | 13x40 | 550 |
| 420 | 100 | 13x50 | 620 |
| 450 | 12 | 8x30 | 135 |
| 450 | 15 | 8x35 | 150 |
| 450 | 22 | 8x40 | 195 |
| 450 | 22 | 10x30 | 195 |
| 450 | 27 | 8x45 | 230 |
| 450 | 27 | 10x30 | 220 |
| 450 | 33 | 10x35 | 255 |
| 450 | 33 | 10x40 | 280 |
| 450 | 39 | 10x40 | 300 |
| 450 | 39 | 10x45 | 315 |
| 450 | 39 | 10x50 | 330 |
| 450 | 47 | 10x50 | 390 |
| 450 | 56 | 13x35 | 420 |
| 450 | 56 | 13x40 | 450 |
| 450 | 68 | 13x40 | 520 |
| 450 | 68 | 13x45 | 550 |
| 450 | 82 | 13x45 | 570 |

LY Series

Features

- ◆ Endurance: 105°C 5000hours.
- ◆ Suitable for slim application



Specifications

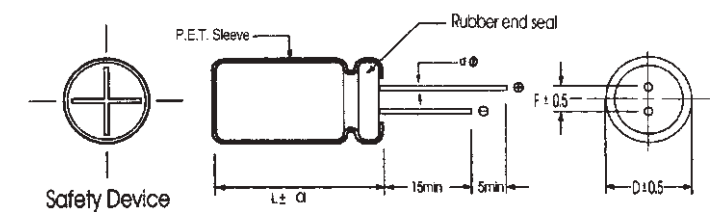
| Item | Performance Characteristics |
|--|--|
| Operating Temperature Range | -25~+105°C |
| Rated Voltage Range | 250~450 VDC |
| Capacitance Range | 12~150μF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | $I \leq 3 \sqrt{CV}$ (μA) (After 5 minute with rated working voltage applied.) I= Leakage Current(μA) C= Rated Capacitance V= Rated voltage(V) |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 250 350 400 420 450 |
| | D.F.(%)max. 15 15 15 20 20 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Working voltage(VDC) 250 350~450 Z-25°C / Z+20°C 3 8 |
| Endurance | Test condition Duration time : 5000hrs Ambient temperature : +105°C Applied voltage : Rated DC working voltage After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤200% of the initial specified value Leakage current : ≤The initial specified value |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 60 | 120 | 400 | 1K | 100K |
|-----------------------|-----|------|------|------|------|
| Coefficient 250~350VV | 0.8 | 1.00 | 1.20 | 1.30 | 1.40 |
| Coefficient 400~450VV | 0.8 | 1.00 | 1.25 | 1.40 | 1.50 |

Diagram of Dimensions:(unit:mm)



| | | | |
|-----|-----|-------|-----|
| D φ | 8 | 10~13 | |
| F | 3.5 | 5.0 | 5.0 |
| d φ | 0.6 | 0.6 | 0.6 |
| α | 1.5 | 2.0 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 250 | 22 | 8x30 | 130 |
| 250 | 27 | 8x30 | 150 |
| 250 | 33 | 8x35 | 170 |
| 250 | 39 | 8x40 | 200 |
| 250 | 47 | 8x45 | 220 |
| 250 | 56 | 10x35 | 260 |
| 250 | 56 | 10x40 | 300 |
| 250 | 68 | 10x40 | 350 |
| 250 | 82 | 10x45 | 480 |
| 250 | 100 | 10x50 | 550 |
| 250 | 120 | 13x40 | 570 |
| 250 | 150 | 13x45 | 620 |
| 350 | 15 | 8x30 | 110 |
| 350 | 22 | 8x35 | 150 |
| 350 | 27 | 8x40 | 165 |
| 350 | 33 | 8x45 | 195 |
| 350 | 39 | 10x40 | 280 |
| 350 | 47 | 10x45 | 330 |
| 350 | 56 | 10x50 | 380 |
| 350 | 68 | 13x35 | 425 |
| 350 | 68 | 13x40 | 450 |
| 350 | 82 | 13x40 | 500 |
| 350 | 100 | 13x50 | 520 |
| 400 | 15 | 8x30 | 120 |
| 400 | 22 | 8x35 | 160 |
| 400 | 27 | 8x40 | 195 |
| 400 | 27 | 10x30 | 195 |
| 400 | 33 | 8x45 | 250 |
| 400 | 33 | 10x30 | 250 |
| 400 | 39 | 8x50 | 280 |
| 400 | 39 | 10x40 | 300 |
| 400 | 47 | 10x45 | 350 |
| 400 | 47 | 13x30 | 330 |
| 400 | 56 | 10x50 | 400 |
| 400 | 56 | 13x30 | 380 |
| 400 | 56 | 13x35 | 420 |
| 400 | 68 | 13x35 | 440 |

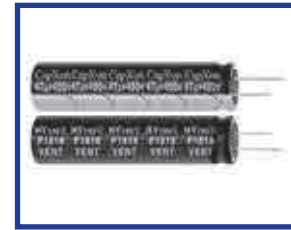
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 400 | 68 | 13x40 | 460 |
| 400 | 82 | 13x45 | 520 |
| 400 | 100 | 13x50 | 580 |
| 400 | 120 | 13x60 | 680 |
| 420 | 15 | 8x30 | 100 |
| 420 | 22 | 8x40 | 180 |
| 420 | 27 | 8x45 | 200 |
| 420 | 33 | 10x35 | 230 |
| 420 | 39 | 10x45 | 275 |
| 420 | 39 | 13x30 | 275 |
| 420 | 47 | 10x45 | 330 |
| 420 | 47 | 13x35 | 360 |
| 420 | 56 | 10x55 | 420 |
| 420 | 56 | 13x35 | 410 |
| 420 | 68 | 13x40 | 450 |
| 420 | 82 | 13x45 | 500 |
| 420 | 100 | 13x50 | 600 |
| 450 | 12 | 8x30 | 110 |
| 450 | 15 | 8x35 | 120 |
| 450 | 22 | 8x45 | 160 |
| 450 | 22 | 10x30 | 150 |
| 450 | 27 | 8x50 | 190 |
| 450 | 27 | 10x35 | 180 |
| 450 | 33 | 10x40 | 220 |
| 450 | 33 | 10x45 | 235 |
| 450 | 33 | 10x50 | 250 |
| 450 | 39 | 10x45 | 260 |
| 450 | 39 | 10x50 | 290 |
| 450 | 39 | 13x35 | 290 |
| 450 | 47 | 10x55 | 350 |
| 450 | 47 | 13x35 | 350 |
| 450 | 56 | 13x35 | 400 |
| 450 | 56 | 13x40 | 425 |
| 450 | 68 | 13x45 | 470 |
| 450 | 68 | 13x50 | 500 |
| 450 | 82 | 13x50 | 530 |

HY Series

Features

- ◆ Endurance: 105°C 10000hours.
- ◆ Suitable for slim application
- ◆ High ripple current

LY Long life, high ripple current → **HY**



Specifications

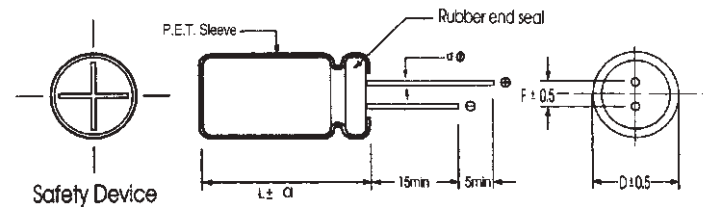
| Item | Performance Characteristics | | |
|--|---|---------|---------|
| Operating Temperature Range | -25 to +105°C | | |
| Rated Voltage Range | 250~450VDC | | |
| Capacitance Range | 12 ~ 120 μF | | |
| Capacitance Tolerance | ± 20% (120Hz, +20°C) | | |
| Leakage Current (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) (After 5 minute with rated working voltage applied.) I= Leakage Current(μA) C= Rated Capacitance V= Rated voltage(V) | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 250~400 | 420~450 |
| | D.F.(%)max. | 20 | 25 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | |
| | Working voltage(VDC) | 250 | 350~450 |
| Endurance | Z-25°C / Z+20°C | 3 | 8 |
| | Test condition Duration time : 10000hrs Ambient temperature : +105°C Applied voltage : Rated DC working voltage After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤ 200% of the initial specified value Leakage current : ≤ The initial specified value | | |

Radial

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 60 | 120 | 400 | 1K | 100K | |
|---------------|-----------|-----|------|------|------|------|
| Coefficient | 250~350WV | 0.8 | 1.00 | 1.20 | 1.30 | 1.40 |
| | 400~450WV | 0.8 | 1.00 | 1.25 | 1.40 | 1.50 |

Diagram of Dimensions:(unit:mm)



| | | | | |
|-----|-----|-------|------|----|
| D φ | 8 | 10~13 | 14.5 | 15 |
| F | 3.5 | 5.0 | 7.5 | 25 |
| d φ | 0.6 | 0.6 | 0.8 | 28 |
| α | 1.5 | | 2.0 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 250 | 22 | 8x35 | 140 |
| 250 | 27 | 8x40 | 165 |
| 250 | 27 | 10x30 | 165 |
| 250 | 33 | 10x30 | 180 |
| 250 | 39 | 10x35 | 210 |
| 250 | 47 | 10x40 | 280 |
| 250 | 47 | 13x30 | 260 |
| 250 | 56 | 10x45 | 330 |
| 250 | 56 | 13x35 | 330 |
| 250 | 68 | 10x50 | 380 |
| 250 | 68 | 13x35 | 370 |
| 250 | 82 | 10x60 | 490 |
| 250 | 82 | 13x40 | 465 |
| 250 | 100 | 13x45 | 500 |
| 250 | 120 | 13x50 | 580 |
| 350 | 12 | 8x30 | 100 |
| 350 | 15 | 8x35 | 130 |
| 350 | 22 | 8x40 | 165 |
| 350 | 27 | 10x30 | 185 |
| 350 | 33 | 10x35 | 200 |
| 350 | 39 | 10x40 | 285 |
| 350 | 39 | 13x30 | 285 |
| 350 | 46 | 13x35 | 360 |
| 350 | 47 | 10x45 | 340 |
| 350 | 47 | 13x30 | 330 |
| 350 | 56 | 10x50 | 380 |
| 350 | 68 | 10x60 | 450 |
| 350 | 68 | 13x40 | 430 |
| 350 | 82 | 13x45 | 520 |
| 350 | 100 | 13x50 | 580 |
| 400 | 12 | 8x30 | 130 |
| 400 | 15 | 8x35 | 180 |
| 400 | 22 | 8x45 | 230 |
| 400 | 27 | 10x30 | 240 |
| 400 | 33 | 10x35 | 290 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/105°C /120Hz) |
|----------|----------|-----------|---|
| 400 | 39 | 10x40 | 400 |
| 400 | 39 | 13x30 | 400 |
| 400 | 47 | 10x45 | 450 |
| 400 | 47 | 13x30 | 440 |
| 400 | 56 | 10x50 | 520 |
| 400 | 56 | 13x35 | 500 |
| 400 | 68 | 13x40 | 580 |
| 400 | 82 | 13x45 | 650 |
| 400 | 100 | 13x50 | 680 |
| 420 | 12 | 8x30 | 140 |
| 420 | 15 | 8x35 | 170 |
| 420 | 22 | 8x50 | 250 |
| 420 | 27 | 10x35 | 270 |
| 420 | 33 | 10x40 | 370 |
| 420 | 39 | 10x45 | 410 |
| 420 | 39 | 13x30 | 390 |
| 420 | 47 | 10x50 | 420 |
| 420 | 47 | 13x35 | 450 |
| 420 | 56 | 10x60 | 530 |
| 420 | 56 | 13x40 | 520 |
| 420 | 68 | 13x45 | 580 |
| 420 | 82 | 13x50 | 660 |
| 450 | 12 | 8x30 | 150 |
| 450 | 15 | 8x40 | 190 |
| 450 | 22 | 10x30 | 220 |
| 450 | 27 | 10x40 | 280 |
| 450 | 33 | 10x40 | 360 |
| 450 | 33 | 13x30 | 370 |
| 450 | 39 | 10x50 | 410 |
| 450 | 39 | 13x35 | 420 |
| 450 | 47 | 10x50 | 420 |
| 450 | 47 | 13x40 | 480 |
| 450 | 56 | 13x45 | 530 |
| 450 | 68 | 13x50 | 620 |
| 450 | 82 | 13x55 | 680 |

NP Series Non-polarized 85°C

Features

- ◆ NP Series for crossover networks of high-pitched, mean and low-pitched sounds in high-fidelity sound systems.
- ◆ The series offers excellent frequency characteristics and minimal capacitance deviation with frequency.
- ◆ RoHS Compliant



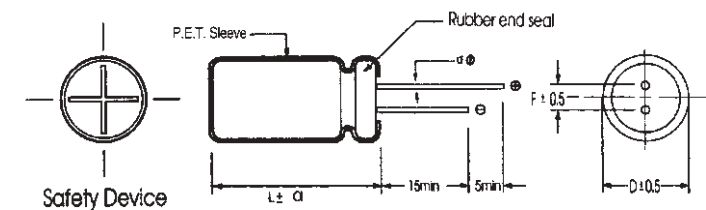
Specifications

| Item | Performance Characteristics | |
|---|---|---------------------------------------|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 250 VDC |
| Capacitance Range | 0.47 to 3300 μ F | 0.47 to 47 μ F |
| Capacitance Tolerance | $\pm 20\%$ (120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | $I \leq 0.03$ CV or 3 (μ A) After 1 minute whichever is greater measured with rated working voltage applied. | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 160 200 250 |
| | D.F. (%)max. | 25 25 20 15 15 13 10 10 15 15 20 |
| Low Temperature Characteristics (at 120Hz) | For Capacitance > 1000 uF, add 2% per another 1000 uF | |
| | Impedance ratio max | |
| | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | Z-25°C / Z+20°C | 4 3 2 2 2 2 2 2 |
| | Z-40°C / Z+20°C | 8 6 4 4 3 3 3 3 |
| Endurance | Working Voltage(VDC) | 160 200 250 |
| | Z-25°C / Z+20°C | 2 2 3 |
| Shelf Life | For Capacitance > 1000 uF, add 0.5 per another 1000 uF for -25°C / +20°C add 1 per another 1000 uF for -40°C / +20°C | |
| | Test conditions Duration time : 2000Hrs Ambient temperature : +85°C Applied voltage : Rated DC working voltage Each 250 hours, we will reserve the terminal and test the characteristics. After test requirements at +20°C Capacitance change : $\leq \pm 20\%$ of the initial measured value Dissipation factor : $\leq 150\%$ of the initial specified value Leakage current : \leq The initial specified value | |
| Shelf Life | Test conditions Duration time : 1000Hrs Ambient temperature : +85°C Applied voltage : None After test requirements at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Multiplier for Ripple Current vs. Frequency

| CAP(uF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP \leq 10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP \leq 100 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP \leq 1000 | 0.8 | 1 | 1.16 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.8 | 1 | 1.11 | 1.17 | 1.25 | 1.28 |

Diagram of Dimensions:(unit:mm)



| D ϕ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|----------|--------|-----|------------|------------------------|------------|--------------------------|--------|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| d ϕ | 0.5 | | L < 20 | L \geq 20 | 0.6 | | 0.8 |
| | | | 0.5 | 0.6 | | | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 |
| | | | L: 25~35.5 | L < 25 and L \geq 40 | L: 25~31.5 | L < 25 and L \geq 35.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 |

Non-polarized type

Case Size

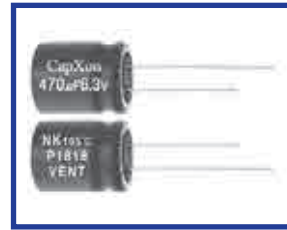
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 100 | 6.3x11 | 120 |
| 6.3 | 220 | 6.3x11 | 175 |
| 6.3 | 330 | 8x11.5 | 250 |
| 6.3 | 470 | 10x12.5 | 330 |
| 6.3 | 1000 | 10x20 | 650 |
| 6.3 | 2200 | 13x20 | 850 |
| 6.3 | 3300 | 16x25 | 970 |
| 10 | 22 | 5x11 | 55 |
| 10 | 33 | 5x11 | 66 |
| 10 | 47 | 5x11 | 82 |
| 10 | 100 | 6.3x11 | 125 |
| 10 | 220 | 8x11.5 | 205 |
| 10 | 330 | 10x12.5 | 270 |
| 10 | 330 | 10x16 | 300 |
| 10 | 470 | 10x16 | 388 |
| 10 | 1000 | 13x20 | 700 |
| 10 | 2200 | 16x25 | 1000 |
| 10 | 3300 | 18x35.5 | 1300 |
| 16 | 22 | 5x11 | 57 |
| 16 | 33 | 5x11 | 75 |
| 16 | 47 | 6.3x11 | 97 |
| 16 | 100 | 8x11.5 | 162 |
| 16 | 220 | 10x12.5 | 270 |
| 16 | 330 | 10x16 | 350 |
| 16 | 470 | 10x20 | 455 |
| 16 | 1000 | 13x20 | 730 |
| 16 | 1000 | 13x25 | 800 |
| 16 | 2200 | 16x31.5 | 1100 |
| 25 | 10 | 5x11 | 34 |
| 25 | 22 | 6.3x11 | 65 |
| 25 | 33 | 6.3x11 | 86 |
| 25 | 47 | 6.3x11 | 100 |
| 25 | 100 | 8x11.5 | 175 |
| 25 | 220 | 10x12.5 | 295 |
| 25 | 220 | 10x16 | 310 |
| 25 | 330 | 10x20 | 440 |
| 25 | 470 | 13x20 | 530 |
| 35 | 10 | 5x11 | 43 |
| 35 | 22 | 6.3x11 | 75 |
| 35 | 33 | 8x11.5 | 105 |
| 35 | 47 | 8x11.5 | 120 |
| 35 | 100 | 10x12.5 | 210 |
| 35 | 100 | 10x16 | 230 |
| 35 | 220 | 10x20 | 400 |
| 35 | 330 | 13x20 | 495 |
| 35 | 470 | 13x25 | 655 |
| 50 | 0.47 | 5x11 | 11 |
| 50 | 1 | 5x11 | 17 |
| 50 | 2.2 | 5x11 | 25 |
| 50 | 3.3 | 5x11 | 27 |
| 50 | 4.7 | 5x11 | 34 |
| 50 | 10 | 6.3x11 | 52 |
| 50 | 22 | 8x11.5 | 92 |
| 50 | 33 | 8x11.5 | 109 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 50 | 47 | 10x12.5 | 150 |
| 50 | 100 | 10x20 | 265 |
| 50 | 220 | 13x20 | 475 |
| 50 | 330 | 13x25 | 560 |
| 63 | 0.47 | 5x11 | 12 |
| 63 | 1 | 5x11 | 18 |
| 63 | 2.2 | 5x11 | 26 |
| 63 | 3.3 | 6.3x11 | 28 |
| 63 | 4.7 | 6.3x11 | 34 |
| 63 | 10 | 6.3x11 | 57 |
| 63 | 22 | 8x11.5 | 97 |
| 63 | 33 | 10x12.5 | 140 |
| 63 | 47 | 10x16 | 180 |
| 63 | 100 | 13x20 | 320 |
| 63 | 220 | 13x25 | 510 |
| 100 | 0.47 | 5x11 | 14 |
| 100 | 1 | 5x11 | 21 |
| 100 | 2.2 | 5x11 | 34 |
| 100 | 3.3 | 6.3x11 | 39 |
| 100 | 4.7 | 8x11.5 | 47 |
| 100 | 10 | 8x11.5 | 71 |
| 100 | 22 | 10x16 | 140 |
| 100 | 33 | 10x16 | 190 |
| 100 | 33 | 10x20 | 220 |
| 100 | 47 | 10x20 | 195 |
| 100 | 47 | 13x20 | 240 |
| 100 | 100 | 16x25 | 425 |
| 100 | 220 | 16x25 | 520 |
| 100 | 220 | 16x31.5 | 550 |
| 160 | 0.47 | 5x11 | 17 |
| 160 | 1 | 6.3x11 | 25 |
| 160 | 2.2 | 8x11.5 | 38 |
| 160 | 3.3 | 8x11.5 | 43 |
| 160 | 4.7 | 10x12.5 | 52 |
| 160 | 10 | 10x16 | 89 |
| 160 | 22 | 13x20 | 155 |
| 160 | 33 | 13x20 | 230 |
| 160 | 47 | 13x25 | 250 |
| 200 | 0.47 | 6.3x11 | 21 |
| 200 | 1 | 8x11.5 | 28 |
| 200 | 2.2 | 8x11.5 | 42 |
| 200 | 3.3 | 10x12.5 | 46 |
| 200 | 4.7 | 10x16 | 56 |
| 200 | 10 | 10x20 | 95 |
| 200 | 22 | 13x20 | 180 |
| 200 | 33 | 13x25 | 250 |
| 250 | 0.47 | 6.3x11 | 28 |
| 250 | 1 | 8x11.5 | 32 |
| 250 | 2.2 | 10x12.5 | 48 |
| 250 | 3.3 | 10x16 | 57 |
| 250 | 4.7 | 10x20 | 88 |
| 250 | 10 | 10x20 | 130 |
| 250 | 22 | 13x25 | 224 |
| 250 | 33 | 16x25 | 305 |

NK Series Non-polarized 105°C

Features

- ◆ NK Series for crossover networks of high-pitched, mean and low-pitched sounds in high-fidelity sound systems.
- ◆ The series offers excellent frequency characteristics and minimal capacitance deviation with frequency.
- ◆ RoHS Compliant



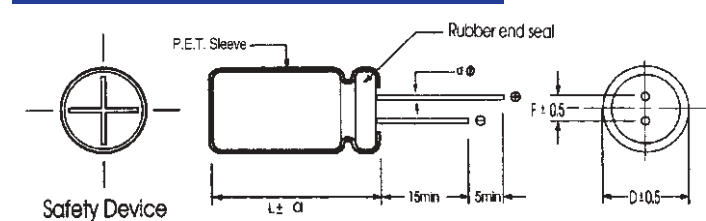
Specifications

| Item | Performance Characteristics | |
|---|---|---------------------------------------|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C |
| Rated Voltage Range | 6.3 to 100 VDC | 160 to 250 VDC |
| Capacitance Range | 0.47 to 3300 µF | 0.47 to 47 µF |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | |
| Leakage Current (+20°C,max.) | I ≤ 0.03 CV or 3(µA) After 1 minute whichever is greater measured with rated working voltage applied. | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 160 200 250 |
| | D.F. (%)max. | 25 25 20 15 15 13 10 10 15 15 20 |
| Low Temperature Characteristics (at 120Hz) | For Capacitance > 1000 uF, add 2% per another 1000 uF | |
| | Impedance ratio max | |
| | Working Voltage(VDC) | 6.3 10 16 25 35 50 63 100 |
| | Z-25°C/Z+20°C | 4 3 2 2 2 2 2 2 |
| Endurance | Z-40°C/Z+20°C | |
| | 8 6 4 3 3 3 3 3 | |
| | Working Voltage(VDC) | 160 200 250 |
| | Z-25°C/Z+20°C | 2 2 3 |
| Shelf Life | For Capacitance > 1000 uF, add 0.5 per another 1000 uF for -25°C/+20°C add 1 per another 1000 uF for -40°C/+20°C | |
| | Test conditions Duration time : 2000Hrs Ambient temperature : +105°C Applied voltage : Rated DC working voltage Each 250 hours, we will reserve the terminal and test the characteristics. After test requirement at +20°C Capacitance change : ≤ ±20% of the initial measured value Dissipation factor : ≤ 150% of the initial specified value Leakage current : ≤ The initial specified value | |
| Safety Device | Test conditions Duration time : 1000Hrs Ambient temperature : +105°C Applied voltage : None After test requirement at +20°C: Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP ≤ 10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP ≤ 100 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.8 | 1 | 1.16 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.8 | 1 | 1.11 | 1.17 | 1.25 | 1.28 |

Diagram of Dimensions:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 |
|-----|-----------|-----|-------------------|-----------|---------------------|-----|--------|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| d φ | 0.5 | | L < 20 | L ≥ 20 | 0.6 | | 0.8 |
| | | | 0.5 | 0.6 | | | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 |
| | L:25~35.5 | | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | |

Non-polarized type

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/105°C /120Hz) |
|----------|----------|-----------|--|
| 6.3 | 100 | 5x11 | 99 |
| 6.3 | 220 | 8x11.5 | 149 |
| 6.3 | 330 | 8x11.5 | 190 |
| 6.3 | 470 | 10x12.5 | 280 |
| 6.3 | 1000 | 10x16 | 352 |
| 6.3 | 2200 | 13x20 | 645 |
| 6.3 | 3300 | 16x25 | 950 |
| 10 | 33 | 5x11 | 59 |
| 10 | 47 | 5x11 | 79 |
| 10 | 100 | 6.3x11 | 99 |
| 10 | 220 | 8x11.5 | 157 |
| 10 | 330 | 10x12.5 | 235 |
| 10 | 470 | 10x12.5 | 290 |
| 10 | 1000 | 10x20 | 430 |
| 10 | 2200 | 16x25 | 830 |
| 10 | 3300 | 16x31.5 | 1150 |
| 16 | 22 | 5x11 | 53 |
| 16 | 33 | 5x11 | 62 |
| 16 | 47 | 6.3x11 | 90 |
| 16 | 100 | 6.3x11 | 99 |
| 16 | 100 | 8x11.5 | 123 |
| 16 | 220 | 8x11.5 | 200 |
| 16 | 220 | 10x12.5 | 234 |
| 16 | 330 | 10x12.5 | 255 |
| 16 | 470 | 10x16 | 360 |
| 16 | 1000 | 13x20 | 511 |
| 16 | 2200 | 16x31.5 | 950 |
| 25 | 10 | 5x11 | 34 |
| 25 | 22 | 6.3x11 | 55 |
| 25 | 33 | 6.3x11 | 72 |
| 25 | 47 | 6.3x11 | 96 |
| 25 | 100 | 8x11.5 | 152 |
| 25 | 220 | 10x12.5 | 245 |
| 25 | 330 | 10x16 | 310 |
| 25 | 470 | 13x20 | 420 |
| 35 | 10 | 5x11 | 38 |
| 35 | 22 | 6.3x11 | 65 |
| 35 | 33 | 8x11.5 | 75 |
| 35 | 47 | 8x11.5 | 107 |
| 35 | 100 | 10x12.5 | 198 |
| 35 | 220 | 10x20 | 320 |
| 35 | 330 | 13x20 | 370 |
| 35 | 470 | 13x25 | 495 |
| 50 | 0.47 | 5x11 | 8 |
| 50 | 1 | 5x11 | 12 |
| 50 | 2.2 | 5x11 | 17 |
| 50 | 3.3 | 5x11 | 23 |
| 50 | 4.7 | 5x11 | 30 |
| 50 | 10 | 6.3x11 | 50 |
| 50 | 22 | 8x11.5 | 85 |
| 50 | 33 | 8x11.5 | 89 |
| 50 | 47 | 10x12.5 | 123 |
| 50 | 100 | 10x16 | 198 |
| 50 | 100 | 10x20 | 220 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/105°C /120Hz) |
|----------|----------|-----------|--|
| 50 | 220 | 13x20 | 340 |
| 50 | 220 | 13x25 | 375 |
| 50 | 330 | 16x25 | 500 |
| 63 | 0.47 | 5x11 | 9 |
| 63 | 1 | 5x11 | 14 |
| 63 | 2.2 | 5x11 | 20 |
| 63 | 3.3 | 6.3x11 | 25 |
| 63 | 4.7 | 6.3x11 | 30 |
| 63 | 10 | 6.3x11 | 52 |
| 63 | 22 | 8x11.5 | 88 |
| 63 | 22 | 10x12.5 | 92 |
| 63 | 33 | 10x12.5 | 115 |
| 63 | 47 | 10x16 | 150 |
| 63 | 100 | 13x20 | 295 |
| 63 | 220 | 13x25 | 420 |
| 100 | 0.47 | 5x11 | 10 |
| 100 | 1 | 5x11 | 15 |
| 100 | 2.2 | 5x11 | 20 |
| 100 | 2.2 | 6.3x11 | 22 |
| 100 | 3.3 | 6.3x11 | 28 |
| 100 | 4.7 | 6.3x11 | 32 |
| 100 | 4.7 | 8x11.5 | 36 |
| 100 | 10 | 8x11.5 | 52 |
| 100 | 10 | 10x12.5 | 55 |
| 100 | 22 | 10x16 | 120 |
| 100 | 33 | 10x20 | 175 |
| 100 | 47 | 13x20 | 187 |
| 100 | 100 | 16x25 | 399 |
| 160 | 0.47 | 5x11 | 12 |
| 160 | 1 | 6.3x11 | 18 |
| 160 | 2.2 | 8x11.5 | 28 |
| 160 | 3.3 | 8x11.5 | 37 |
| 160 | 4.7 | 10x12.5 | 45 |
| 160 | 10 | 10x16 | 79 |
| 160 | 22 | 13x20 | 140 |
| 160 | 33 | 13x20 | 200 |
| 160 | 47 | 13x25 | 215 |
| 200 | 0.47 | 6.3x11 | 17 |
| 200 | 1 | 8x11.5 | 21 |
| 200 | 2.2 | 8x11.5 | 32 |
| 200 | 3.3 | 10x12.5 | 40 |
| 200 | 4.7 | 10x16 | 52 |
| 200 | 10 | 10x20 | 86 |
| 200 | 22 | 13x20 | 160 |
| 200 | 33 | 13x25 | 213 |
| 250 | 0.47 | 6.3x11 | 22 |
| 250 | 1 | 8x11.5 | 25 |
| 250 | 2.2 | 10x12.5 | 39 |
| 250 | 3.3 | 10x16 | 43 |
| 250 | 4.7 | 10x20 | 65 |
| 250 | 10 | 10x20 | 109 |
| 250 | 22 | 13x25 | 189 |
| 250 | 33 | 16x25 | 250 |

SW Series 5mm 85°C

Features

- ◆ Design for audio equipment.
- ◆ RoHS Compliant



For Audio Equipment

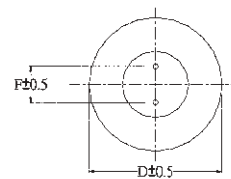
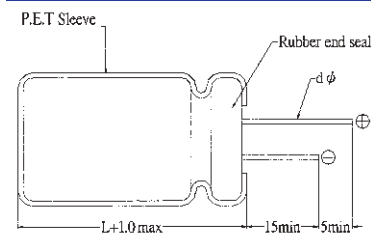
Specifications

| Item | Performance Characteristics |
|---|---|
| Operating Temperature Range | -40~+85°C |
| Rated Voltage Range | 4~50 VDC |
| Capacitance Range | 0.1 to 470 μ F |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | I=0.01 CV or 3 (μ A) (After 2 minute with rated working voltage applied.) |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 4 6.3 10 16 25 35 50 |
| | D.F.(%)max. 35 24 20 16 14 12 10 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Working voltage(VDC) 4 6.3 10 16 25 35 50 |
| | Z-25°C / Z+20°C 7 4 3 2 2 2 2 |
| | Z-40°C / Z+20°C 15 8 6 4 4 3 3 |
| Endurance | Test condition |
| | Duration time :1000 Hrs |
| | Ambient temperature :+85°C |
| | Applied voltage :Rated DC working voltage |
| | After test requirement at +20°C |
| | Capacitance change : ≤ ±20% of the initial measured value |
| Dissipation factor : ≤200% of the initial specified value | |
| Leakage current : ≤The initial specified value | |
| Shelf Life | Test condition |
| | Duration time :1000 Hrs |
| | Ambient temperature :+85°C |
| | Applied voltage :None |
| | After test requirement at +20°C :Same limits as Endurance. |
| Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | |

Multiplier for Ripple Current vs. Frequency

| CAP(μ F)\Frequency(Hz) | 50 | 120 | 300 | 1K | 10K |
|------------------------|------|------|------|------|------|
| Multiplier | 0.70 | 1.00 | 1.17 | 1.36 | 1.50 |

Diagram of Dimension:(unit:mm)



| | | | | |
|-----|------|-----|------|-----|
| D φ | 4 | 5 | 6.3 | 8 |
| F | 1.5 | 2.0 | 2.5 | 3.5 |
| d φ | 0.45 | | 0.50 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 4 | 33 | 4x5 | 30 |
| 4 | 47 | 4x5 | 33 |
| 4 | 100 | 5x5 | 54 |
| 4 | 220 | 6.3x5 | 87 |
| 4 | 330 | 8x5 | 143 |
| 4 | 470 | 8x5 | 185 |
| 6.3 | 22 | 4x5 | 26 |
| 6.3 | 33 | 5x5 | 37 |
| 6.3 | 47 | 5x5 | 42 |
| 6.3 | 100 | 6.3x5 | 67 |
| 6.3 | 220 | 8x5 | 112 |
| 6.3 | 330 | 8x5 | 170 |
| 10 | 22 | 5x5 | 33 |
| 10 | 33 | 5x5 | 40 |
| 10 | 47 | 6.3x5 | 49 |
| 10 | 100 | 8x5 | 80 |
| 10 | 220 | 8x5 | 136 |
| 16 | 10 | 4x5 | 21 |
| 16 | 22 | 5x5 | 36 |
| 16 | 33 | 6.3x5 | 47 |
| 16 | 47 | 6.3x5 | 58 |
| 16 | 100 | 8x5 | 92 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 4.7 | 4x5 | 15 |
| 25 | 10 | 5x5 | 27 |
| 25 | 22 | 6.3x5 | 43 |
| 25 | 33 | 6.3x5 | 52 |
| 25 | 47 | 8x5 | 70 |
| 25 | 100 | 8x5 | 109 |
| 35 | 3.3 | 4x5 | 13 |
| 35 | 4.7 | 4x5 | 18 |
| 35 | 10 | 5x5 | 29 |
| 35 | 22 | 6.3x5 | 46 |
| 35 | 33 | 8x5 | 62 |
| 35 | 47 | 8x5 | 81 |
| 50 | 0.1 | 4x5 | 1.2 |
| 50 | 0.22 | 4x5 | 2.3 |
| 50 | 0.33 | 4x5 | 3 |
| 50 | 0.47 | 4x5 | 3.9 |
| 50 | 1 | 4x5 | 7.3 |
| 50 | 2.2 | 4x5 | 11 |
| 50 | 3.3 | 4x5 | 15 |
| 50 | 4.7 | 5x5 | 20 |
| 50 | 10 | 6.3x5 | 31 |
| 50 | 22 | 8x5 | 52 |
| 50 | 33 | 8x5 | 70 |

SR Series 7mm 85°C

Features

- ◆ Design for audio equipments
- ◆ Lineally suited for very compact audio products
- ◆ RoHS compliance.



For Audio Equipment

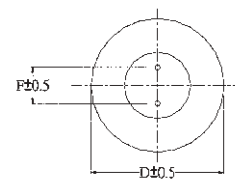
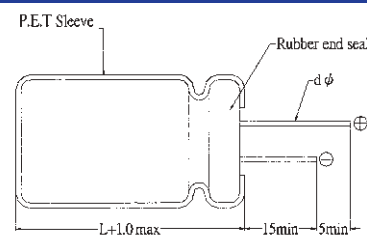
Specifications

| Item | Performance Characteristics |
|---|---|
| Operating Temperature Range | -40~+85°C |
| Rated Voltage Range | 6.3~50 VDC |
| Capacitance Range | 0.1 to 220 μ F |
| Capacitance Tolerance | ±20%(120Hz,+20°C) |
| Leakage Current (+20°C,max.) | I ≤ 0.01CV or 3(μA) After 2 minutes with rated working voltage applied. |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) 6.3 10 16 25 35 50 |
| | D.F.(%)max. 24 20 16 14 12 10 |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max |
| | Working voltage(VDC) 6.3 10 16 25 35 50 |
| | Z-25°C / Z+20°C 4 3 2 2 2 2 |
| Z-40°C / Z+20°C 8 6 4 4 3 3 | |
| Endurance | Test condition |
| | Duration time :1000Hrs |
| | Ambient temperature :+85°C |
| | Applied voltage :Rated DC working voltage |
| | After test requirements at +20°C |
| | Capacitance change :≤ ±20% of the initial measured value |
| Dissipation factor :≤ 200% of the initial specified value | |
| Leakage current :≤ The initial specified value | |
| Shelf Life | Test condition |
| | Duration time :1000Hrs |
| | Ambient temperature :+85°C |
| | Applied voltage :None |
| | After test requirement at +20°C :Same limits as Endurance. |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. |

Multiplier for Ripple Current vs. Frequency

| CAP(μF)\Frequency(Hz) | 50 | 120 | 300 | 1K | 10K |
|-----------------------|------|------|------|------|------|
| CAP≤10 | 0.70 | 1.00 | 1.17 | 1.36 | 1.50 |

Diagram of Dimension:(unit:mm)



| | | | |
|-----|------|-----|------|
| D φ | 4 | 5 | 6.3 |
| F | 1.5 | 2.0 | 2.5 |
| d φ | 0.45 | | 0.50 |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 22 | 4x7 | 34 |
| 6.3 | 33 | 4x7 | 40 |
| 6.3 | 47 | 4x7 | 47 |
| 6.3 | 100 | 5x7 | 76 |
| 6.3 | 220 | 6.3x7 | 124 |
| 10 | 22 | 4x7 | 35 |
| 10 | 33 | 4x7 | 45 |
| 10 | 47 | 5x7 | 59 |
| 10 | 100 | 6.3x7 | 88 |
| 16 | 10 | 4x7 | 28 |
| 16 | 22 | 4x7 | 39 |
| 16 | 33 | 5x7 | 55 |
| 16 | 47 | 5x7 | 65 |
| 16 | 100 | 6.3x7 | 98 |
| 25 | 10 | 4x7 | 29 |
| 25 | 22 | 5x7 | 49 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 25 | 33 | 5x7 | 55 |
| 25 | 47 | 6.3x7 | 71 |
| 35 | 4.7 | 4x7 | 23 |
| 35 | 10 | 4x7 | 31 |
| 35 | 22 | 5x7 | 49 |
| 35 | 33 | 6.3x7 | 65 |
| 50 | 0.1 | 4x7 | 1.1 |
| 50 | 0.22 | 4x7 | 2.6 |
| 50 | 0.33 | 4x7 | 3.5 |
| 50 | 0.47 | 4x7 | 5 |
| 50 | 1 | 4x7 | 10 |
| 50 | 2.2 | 4x7 | 18 |
| 50 | 3.3 | 4x7 | 23 |
| 50 | 4.7 | 4x7 | 26 |
| 50 | 10 | 5x7 | 35 |
| 50 | 22 | 6.3x7 | 58 |

RW Series 85°C

Features

- ◆ Standard for audio equipment.
- ◆ RoHS Compliant



For Audio Equipment

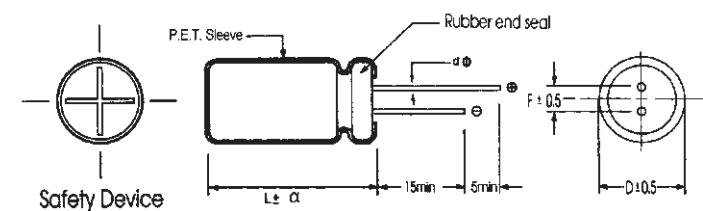
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------|-----|----|----|----|----|----|-----|-----|-----------------|----|----|----|----|----|----|----|---|-----------------|----|----|---|---|---|---|---|---|
| Operating Temperature Range | -40~+85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Voltage Range | 6.3~100 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 0.1 to 33000 µF | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | $I \leq 0.01 CV$ or 3 (µA) (After 1 minute with rated working voltage applied.) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>D.F.(%)max.</td> <td>28</td> <td>24</td> <td>20</td> <td>16</td> <td>14</td> <td>12</td> <td>10</td> <td>8</td> </tr> </table> | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | D.F.(%)max. | 28 | 24 | 20 | 16 | 14 | 12 | 10 | 8 | | | | | | | | | |
| | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | |
| D.F.(%)max. | 28 | 24 | 20 | 16 | 14 | 12 | 10 | 8 | | | | | | | | | | | | | | | | | | | | |
| For capacitance > 1000 µF, add 2% per another 1000 µF. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>Working voltage(VDC)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>Z-25°C / Z+20°C</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>12</td> <td>10</td> <td>8</td> <td>5</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> </table> | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | Z-25°C / Z+20°C | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | Z-40°C / Z+20°C | 12 | 10 | 8 | 5 | 4 | 3 | 3 | 3 |
| | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | |
| Z-25°C / Z+20°C | 5 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | |
| Z-40°C / Z+20°C | 12 | 10 | 8 | 5 | 4 | 3 | 3 | 3 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test condition Duration time :2000 Hrs Ambient temperature :+85°C Applied voltage :Rated DC working voltage After test requirement at +20°C Capacitance change : $\leq \pm 20\%$ of the initial measured value Dissipation factor : $\leq 200\%$ of the initial specified value Leakage current : \leq The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition Duration time :1000 Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C :Same limits as Endurance. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K |
|-----------------------|--------|------|------|------|------|
| CAP≤47 | 0.75 | 1.00 | 1.35 | 1.57 | 1.20 |
| 100 < CAP ≤ 470 | 0.80 | 1.00 | 1.23 | 1.34 | 1.50 |
| 1000 ≤ CAP ≤ 33000 | 0.85 | 1.00 | 1.10 | 1.13 | 1.15 |

Diagram of Dimension:(unit:mm)



| D φ | 5 | 6.3 | 8 | 10 | 13 | 16 | 18 | 22 |
|-----|-----------|-----|-------------------|---------------|-----------|-----|---------------------|-----|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10 |
| d φ | 0.5 | | L < 20 0.5 | L ≥ 20 0.6 | 0.6 | | 0.8 | |
| | 0.5 | | 0.6 | | 0.6 | | 0.8 | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 | |
| | L:25~35.5 | | L < 25 and L ≥ 40 | | L:25~31.5 | | L < 25 and L ≥ 35.5 | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 |

Case Size

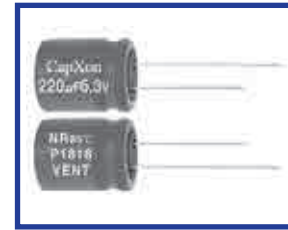
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{RMS} /85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 330 | 6.3x11 | 282 |
| 6.3 | 470 | 6.3x11 | 330 |
| 6.3 | 1000 | 8x11.5 | 560 |
| 6.3 | 2200 | 10x20 | 1015 |
| 6.3 | 3300 | 10x20 | 1245 |
| 6.3 | 4700 | 13x20 | 1435 |
| 6.3 | 6800 | 13x25 | 1600 |
| 6.3 | 10000 | 16x25 | 2000 |
| 6.3 | 15000 | 16x35.5 | 2620 |
| 6.3 | 22000 | 18x40 | 3220 |
| 6.3 | 33000 | 22x50 | 3900 |
| 10 | 100 | 5x11 | 162 |
| 10 | 220 | 6.3x11 | 247 |
| 10 | 330 | 6.3x11 | 300 |
| 10 | 470 | 6.3x11 | 355 |
| 10 | 1000 | 10x12.5 | 600 |
| 10 | 2200 | 10x20 | 1075 |
| 10 | 3300 | 13x20 | 1410 |
| 10 | 4700 | 13x25 | 1800 |
| 10 | 6800 | 16x25 | 2200 |
| 10 | 10000 | 16x35.5 | 2450 |
| 10 | 15000 | 18x35.5 | 2900 |
| 10 | 22000 | 22x40 | 3700 |
| 10 | 33000 | 22x50 | 4300 |
| 16 | 100 | 5x11 | 155 |
| 16 | 220 | 6.3x11 | 265 |
| 16 | 330 | 8x11.5 | 365 |
| 16 | 470 | 8x11.5 | 445 |
| 16 | 1000 | 10x16 | 780 |
| 16 | 2200 | 13x20 | 1300 |
| 16 | 3300 | 13x25 | 1700 |
| 16 | 4700 | 16x25 | 2100 |
| 16 | 6800 | 16x35.5 | 2520 |
| 16 | 10000 | 18x35.5 | 2670 |
| 16 | 15000 | 22x40 | 3400 |
| 16 | 22000 | 22x50 | 4200 |
| 25 | 47 | 5x11 | 117 |
| 25 | 100 | 6.3x11 | 187 |
| 25 | 220 | 8x11.5 | 325 |
| 25 | 330 | 10x12.5 | 415 |
| 25 | 470 | 10x12.5 | 535 |
| 25 | 1000 | 10x20 | 950 |
| 25 | 2200 | 13x25 | 1550 |
| 25 | 3300 | 16x25 | 1675 |
| 25 | 4700 | 16x31.5 | 2380 |
| 25 | 6800 | 18x35.5 | 2650 |
| 25 | 10000 | 22x40 | 3000 |
| 25 | 15000 | 22x50 | 3800 |
| 35 | 33 | 5x11 | 107 |
| 35 | 47 | 5x11 | 125 |
| 35 | 100 | 6.3x11 | 205 |
| 35 | 220 | 10x12.5 | 370 |
| 35 | 330 | 10x12.5 | 475 |
| 35 | 470 | 10x16 | 630 |
| 35 | 1000 | 13x20 | 1120 |
| 35 | 2200 | 16x25 | 1650 |
| 35 | 3300 | 16x35.5 | 2270 |
| 35 | 4700 | 18x35.5 | 2540 |
| 35 | 6800 | 22x40 | 3000 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{RMS} /85°C /120Hz) |
|----------|----------|-----------|---|
| 50 | 0.1 | 5x11 | 2.1 |
| 50 | 0.22 | 5x11 | 2.7 |
| 50 | 0.33 | 5x11 | 4.2 |
| 50 | 0.47 | 5x11 | 6 |
| 50 | 1 | 5x11 | 12 |
| 50 | 2.2 | 5x11 | 24 |
| 50 | 3.3 | 5x11 | 35 |
| 50 | 4.7 | 5x11 | 41 |
| 50 | 10 | 5x11 | 65 |
| 50 | 22 | 5x11 | 97 |
| 50 | 33 | 5x11 | 120 |
| 50 | 47 | 6.3x11 | 150 |
| 50 | 100 | 8x11.5 | 255 |
| 50 | 220 | 10x12.5 | 417 |
| 50 | 330 | 10x16 | 580 |
| 50 | 470 | 13x20 | 770 |
| 50 | 1000 | 13x25 | 1320 |
| 50 | 2200 | 16x35.5 | 2090 |
| 50 | 3300 | 18x35.5 | 2430 |
| 50 | 4700 | 22x40 | 2900 |
| 50 | 6800 | 22x50 | 3500 |
| 63 | 0.1 | 5x11 | 1.5 |
| 63 | 0.22 | 5x11 | 3 |
| 63 | 0.33 | 5x11 | 5 |
| 63 | 0.47 | 5x11 | 7 |
| 63 | 1 | 5x11 | 15 |
| 63 | 2.2 | 5x11 | 28 |
| 63 | 3.3 | 5x11 | 35 |
| 63 | 4.7 | 5x11 | 45 |
| 63 | 10 | 5x11 | 70 |
| 63 | 22 | 5x11 | 107 |
| 63 | 33 | 6.3x11 | 137 |
| 63 | 47 | 6.3x11 | 172 |
| 63 | 100 | 10x12.5 | 300 |
| 63 | 220 | 10x16 | 485 |
| 63 | 330 | 10x20 | 670 |
| 63 | 470 | 13x20 | 880 |
| 63 | 1000 | 16x25 | 1350 |
| 63 | 2200 | 18x35.5 | 2220 |
| 63 | 3300 | 22x40 | 2700 |
| 63 | 4700 | 22x50 | 3400 |
| 100 | 0.1 | 5x11 | 2.1 |
| 100 | 0.22 | 5x11 | 4.7 |
| 100 | 0.33 | 5x11 | 7.5 |
| 100 | 0.47 | 5x11 | 11 |
| 100 | 1 | 5x11 | 21 |
| 100 | 2.2 | 5x11 | 31 |
| 100 | 3.3 | 5x11 | 40 |
| 100 | 4.7 | 5x11 | 46 |
| 100 | 10 | 6.3x11 | 75 |
| 100 | 22 | 6.3x11 | 125 |
| 100 | 33 | 8x11.5 | 165 |
| 100 | 47 | 10x12.5 | 220 |
| 100 | 100 | 10x20 | 370 |
| 100 | 220 | 13x25 | 615 |
| 100 | 330 | 13x25 | 755 |
| 100 | 470 | 16x25 | 1000 |
| 100 | 1000 | 18x40 | 1500 |
| 100 | 2200 | 22x50 | 2400 |

NR Series 85°C

Features

- ◆ Standard non polarity series for using in polarity reversal circuits.
- ◆ Design For audio equipment.
- ◆ RoHS Compliant



For Audio Equipment

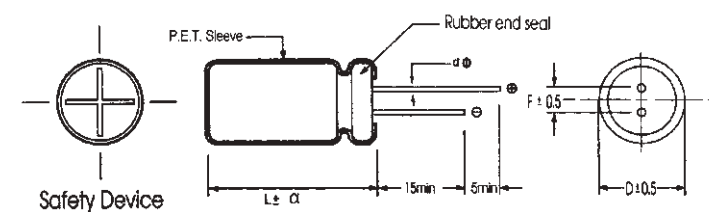
Specifications

| Item | Performance Characteristics | | | | | | | | | |
|--|---|-----|----|----|----|----|----|----|-----|--|
| Operating Temperature Range | -40~+85°C | | | | | | | | | |
| Rated Voltage Range | 6.3~100 VDC | | | | | | | | | |
| Capacitance Range | 0.15 to 1000 µF | | | | | | | | | |
| Capacitance Tolerance | ±20%(120Hz,+20°C) | | | | | | | | | |
| Leakage Current (+20°C,max.) | I ≤ 0.03 CV or 3 (µA) (After 1 minute with rated working voltage applied.) | | | | | | | | | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | Working Voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | |
| | D.F.(%)max. | 24 | 20 | 16 | 16 | 14 | 12 | 10 | 10 | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max (at: 120Hz) | | | | | | | | | |
| | Working voltage(VDC) | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | |
| | Z-25°C / Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | |
| | Z-40°C / Z+20°C | 8 | 6 | 4 | 4 | 3 | 3 | 3 | 3 | |
| Endurance | Test condition Duration time : 2000 Hrs Ambient temperature : +85°C Applied voltage : Rated DC working voltage Each 250 hours,we will reserve the terminal and test the characteristics After test requirement at +20°C Capacitance change : within ≤ ±20% of the initial measured value Dissipation factor : ≤200% of the initial specified value Leakage current : ≤The initial specified value | | | | | | | | | |
| Shelf Life | Test condition Duration time :1000 Hrs Ambient temperature :+85°C Applied voltage :None After test requirement at +20°C:Same limits as Endurance. Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(µF)\Frequency(Hz) | 50(60) | 120 | 400 | 1K | 10K | 50K~100K |
|-----------------------|--------|-----|------|------|------|----------|
| CAP ≤ 10 | 0.8 | 1 | 1.30 | 1.45 | 1.65 | 1.70 |
| 10 < CAP ≤ 100 | 0.8 | 1 | 1.23 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.8 | 1 | 1.16 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.8 | 1 | 1.11 | 1.17 | 1.25 | 1.28 |

Diagram of Dimension:(unit:mm)



| φD | 5 | 6.3 | 8 | 10 | 13 | 16 | |
|----|-----------|-------------------|-----------|---------------------|--------|-----|--------|
| F | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | |
| φd | 0.5 | | | 0.6 | | 0.8 | |
| α | D < 16 | | D = 16 | | D = 18 | | D > 18 |
| | L:25~35.5 | L < 25 and L ≥ 40 | L:25~31.5 | L < 25 and L ≥ 35.5 | | | |
| | 1.5 | 1.5 | 2.0 | 1.5 | 2.0 | 2.0 | |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 6.3 | 33 | 5x11 | 62 |
| 6.3 | 47 | 6.3x11 | 76 |
| 6.3 | 100 | 8x11.5 | 154 |
| 6.3 | 220 | 10x12.5 | 245 |
| 6.3 | 330 | 10x16 | 330 |
| 6.3 | 470 | 10x20 | 360 |
| 6.3 | 1000 | 13x25 | 910 |
| 10 | 22 | 5x11 | 60 |
| 10 | 33 | 6.3x11 | 70 |
| 10 | 47 | 6.3x11 | 95 |
| 10 | 100 | 10x12.5 | 188 |
| 10 | 220 | 10x16 | 294 |
| 10 | 330 | 10x20 | 360 |
| 10 | 470 | 13x20 | 538 |
| 10 | 1000 | 16x25 | 940 |
| 16 | 10 | 5x11 | 43 |
| 16 | 22 | 6.3x11 | 71 |
| 16 | 33 | 6.3x11 | 90 |
| 16 | 47 | 8x11.5 | 122 |
| 16 | 100 | 10x12.5 | 208 |
| 16 | 220 | 10x20 | 360 |
| 16 | 330 | 13x20 | 480 |
| 16 | 470 | 13x25 | 638 |
| 16 | 1000 | 16x31.5 | 1090 |
| 25 | 4.7 | 5x11 | 26 |
| 25 | 10 | 5x11 | 44 |
| 25 | 22 | 6.3x11 | 71 |
| 25 | 33 | 8x11.5 | 110 |
| 25 | 47 | 10x12.5 | 150 |
| 25 | 100 | 10x16 | 250 |
| 25 | 220 | 13x25 | 478 |
| 25 | 330 | 13x25 | 615 |
| 25 | 470 | 16x25 | 720 |
| 35 | 4.7 | 5x11 | 34 |
| 35 | 10 | 6.3x11 | 48 |
| 35 | 22 | 8x11.5 | 96 |
| 35 | 33 | 10x12.5 | 135 |
| 35 | 47 | 10x12.5 | 154 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|
| 35 | 100 | 10x20 | 275 |
| 35 | 220 | 13x25 | 560 |
| 35 | 330 | 16x25 | 670 |
| 50 | 0.47 | 5x11 | 12 |
| 50 | 1 | 5x11 | 18 |
| 50 | 1.8 | 5x11 | 22 |
| 50 | 2.2 | 5x11 | 27 |
| 50 | 3.3 | 5x11 | 29 |
| 50 | 4.7 | 6.3x11 | 42 |
| 50 | 10 | 8x11.5 | 65 |
| 50 | 22 | 10x12.5 | 118 |
| 50 | 33 | 10x16 | 155 |
| 50 | 47 | 10x20 | 200 |
| 50 | 100 | 13x25 | 370 |
| 50 | 220 | 16x25 | 645 |
| 50 | 330 | 16x31.5 | 760 |
| 63 | 0.47 | 6.3x11 | 14 |
| 63 | 1 | 6.3x11 | 22 |
| 63 | 1.8 | 6.3x11 | 26 |
| 63 | 2.2 | 6.3x11 | 33 |
| 63 | 3.3 | 8x11.5 | 36 |
| 63 | 4.7 | 8x11.5 | 44 |
| 63 | 10 | 8x11.5 | 73 |
| 63 | 22 | 10x12.5 | 125 |
| 63 | 33 | 10x16 | 170 |
| 63 | 47 | 10x20 | 215 |
| 63 | 100 | 13x25 | 384 |
| 100 | 0.15 | 6.3x11 | 13 |
| 100 | 0.47 | 6.3x11 | 17 |
| 100 | 1 | 6.3x11 | 25 |
| 100 | 1.8 | 6.3x11 | 32 |
| 100 | 2.2 | 6.3x11 | 39 |
| 100 | 3.3 | 8x11.5 | 49 |
| 100 | 4.7 | 10x12.5 | 60 |
| 100 | 10 | 10x16 | 98 |
| 100 | 22 | 10x20 | 165 |
| 100 | 33 | 13x20 | 275 |

SF Series Snap-in Type for Photo Flash

Features

- ◆ SF Series is for photo flash applications that require not only superior volumetric efficiency, low dissipation factor and low leakage current.
- ◆ These capacitors effectively convert electrostatic energy into light.
- ◆ RoHS Compliant

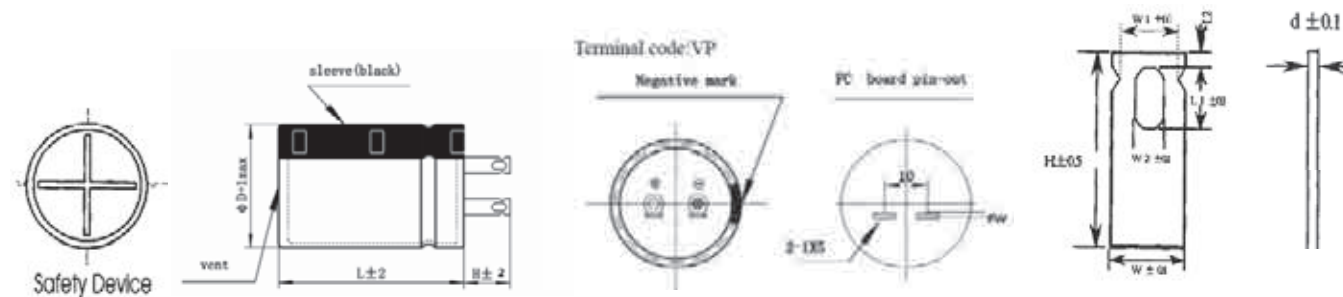


Specifications

| Item | Performance Characteristics | |
|--|---|---|
| Operating Temperature Range | -20 to +55°C | |
| Rated Voltage Range | 330/350 VDC | |
| Capacitance Range | 150 ~ 1500 μF | |
| Capacitance Tolerance | -10% ~ +20% (120Hz, +25°C) | |
| Leakage Current (+20°C, max.) | $I \leq 1 \times C \mu A$ max After 5 minutes | |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | 8% max. | |
| Charge and Discharge | Test conditions | |
| | Duration time | :5000 Times |
| | Ambient temperature | :Room Temperature(5~35°C) |
| | Applied voltage | :Rated voltage |
| | Charge and Discharge Cycles | :30 Sec. |
| | Discharge resistance or via Xe flash tube | :0.7 to 1.0Ω |
| | After test requirements at +25°C | |
| Capacitance change | : ≤ ± 10% of the initial measured value | |
| Dissipation factor | : ≤ 150% of the initial specified value | |
| Leakage current | : ≤ 150% of the initial specified value | |
| Shelf Life | Test conditions | |
| | Duration time | :1000Hrs |
| | Ambient temperature | :+55°C |
| | Applied voltage | :None |
| | After test requirements at +25°C | |
| | Capacitance change | : ≤ ± 10% of the initial measured value |
| | Dissipation factor | : ≤ 150% of the initial specified value |
| Leakage current | : ≤ 150% of the initial specified value | |

For Photo Flash

Diagram of Dimensions:(unit:mm)



| Dφ | H±0.5 | L1±0.1 | L2±0.2 | W±0.2 | W1±0.2 | W2±0.2 | d±0.1 |
|----|-------|--------|--------|-------|--------|--------|-------|
| 25 | 6 | 3.3 | 1.3 | 4 | 3.2 | 1.8 | 0.6 |
| 30 | 6 | 3.3 | 1 | 4.6 | 3.7 | 2 | 0.8 |
| 35 | 6 | 3.3 | 1 | 4.6 | 3.7 | 2 | 0.8 |
| 40 | 6 | 3.3 | 1 | 4.6 | 3.7 | 2 | 0.8 |

Please check with us about individual sizes and dimensions.

RF Series Radial Type for Photo Flash



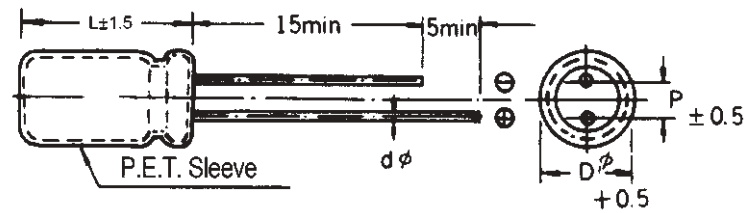
Features

- ◆ RF Series is for photo flash applications that require not only superior volumetric efficiency, low dissipation factor and low leakage current.
- ◆ These capacitors effectively convert electrostatic energy into light.
- ◆ RoHS Compliant

Specifications

| Item | Performance Characteristics |
|--|---|
| Operating Temperature Range | -20 to +55°C |
| Rated Voltage Range | 330/350 VDC |
| Capacitance Range | 100 ~ 450 μ F |
| Capacitance Tolerance | -10% ~ +20% (120Hz, +25°C) |
| Leakage Current (+20°C,max.) | $I \leq 1 \times C \mu A$ max After 5 minutes with rated working voltage applied |
| Dissipation Factor (tan δ , at 20°C , 120Hz) | 8% max. |
| Charge and Discharge | Test conditions Duration time :5000 Times Ambient temperature :Room Temperature(5~35°C) Applied voltage :Rated voltage Charge and Discharge Cycles :30 Sec. Discharge resistance or via Xe flash tube :0.7 to 1.0 Ω After test requirements at +25°C Capacitance change : $\leq \pm 10\%$ of the initial measured value Dissipation factor : $\leq 150\%$ of the initial specified value Leakage current : $\leq 150\%$ of the initial specified value |
| Shelf Life | Test conditions Duration time :1000 Hrs Ambient temperature :+55°C Applied voltage :None |

Diagram of Dimensions:(unit:mm)



| | | | | | | | | |
|----|-----|-----|-----|-----|-----|-----|-----|-----|
| φD | 8 | 10 | 12 | 13 | 14 | 16 | 18 | 20 |
| φd | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| F | 3.5 | 5 | | 7.5 | | | | |

Please check with us about individual sizes and dimensions.

LR Series Snap-in Type 85°C

Features

- ◆ Snap-in design for audio equipment.
- ◆ Aluminum case designed explosion-proof vent. Non solvent-proof type
- ◆ RoHS Compliant



For Audio Equipment

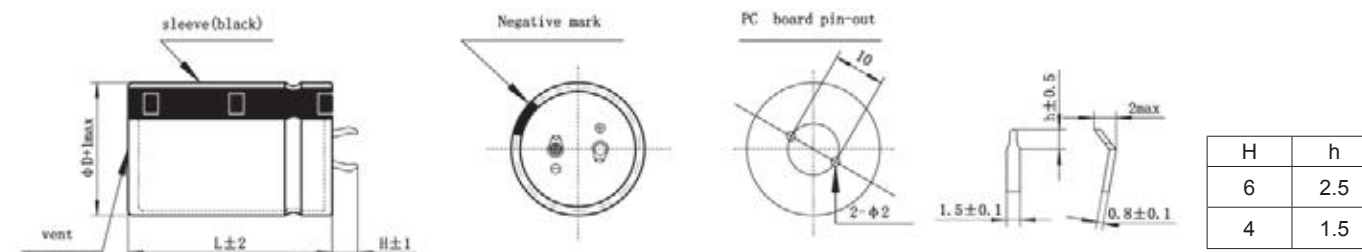
Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|----|----|----|----|-----|-----|-------------------|-------------|----|----|----|----|----|-------------------|----|----------------|----|----|----|----|----|----|---|--------------|----|----|----|----|----|---|---|
| Operating Temperature Range | -40~+85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated voltage Range | 16 to 100 VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Range | 680~33000 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Tolerance | $\pm 20\%$ (120Hz,+20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current (+20°C,max.) | $I \leq 3 \sqrt{CV}$ (μ A) After 5 minute with rated working voltage applied. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C , 120Hz) | Less than the value under table(%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>μ F/Vdc</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>80</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>≤ 8200</td> <td>35</td> <td>30</td> <td>25</td> <td>20</td> <td>20</td> <td>15</td> <td>15</td> </tr> <tr> <td>10000 to 22000</td> <td>40</td> <td>35</td> <td>30</td> <td>30</td> <td>25</td> <td>15</td> <td>-</td> </tr> <tr> <td>≥ 27000</td> <td>40</td> <td>35</td> <td>35</td> <td>30</td> <td>25</td> <td>-</td> <td>-</td> </tr> </tbody> </table> | μ F/Vdc | 16 | 25 | 35 | 50 | 63 | 80 | 100 | ≤ 8200 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 10000 to 22000 | 40 | 35 | 30 | 30 | 25 | 15 | - | ≥ 27000 | 40 | 35 | 35 | 30 | 25 | - | - |
| | μ F/Vdc | 16 | 25 | 35 | 50 | 63 | 80 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ≤ 8200 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10000 to 22000 | 40 | 35 | 30 | 30 | 25 | 15 | - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ≥ 27000 | 40 | 35 | 35 | 30 | 25 | - | - | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low Temperature Characteristics (at 120Hz) | Impedance ratio max | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Rated voltage(V)</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>Z - 25°C / Z+20°C</td> <td>5</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> <td>4</td> </tr> <tr> <td>Z - 40°C / Z+20°C</td> <td>15</td> <td>15</td> <td>12</td> <td>12</td> <td>12</td> <td>12</td> </tr> </tbody> </table> | Rated voltage(V) | 16 | 25 | 35 | 50 | 63 | 100 | Z - 25°C / Z+20°C | 5 | 4 | 4 | 4 | 4 | 4 | Z - 40°C / Z+20°C | 15 | 15 | 12 | 12 | 12 | 12 | | | | | | | | | | | |
| | Rated voltage(V) | 16 | 25 | 35 | 50 | 63 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - 25°C / Z+20°C | 5 | 4 | 4 | 4 | 4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Z - 40°C / Z+20°C | 15 | 15 | 12 | 12 | 12 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Endurance | Test condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Duration time | :2000 Hrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ambient temperature | :+85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Applied voltage | :Rated DC working voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | After test requirement at +20°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance change | : $\leq \pm 25\%$ of the initial measured value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation factor | : $\leq 200\%$ of the initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage current | : \leq The initial specified value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shelf Life | Test condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Duration time | :1000 Hrs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Ambient temperature | :+85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Applied voltage | :None | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | After test requirement at +20°C | :Same limits as Endurance. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Pre-treatment for measurements shall be conducted after application of DC working voltage for 30 minutes. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| CAP(μ F)\Frequency(Hz) | 50(60) | 120 | 1K | 10K | 100K |
|-----------------------------|--------|-----|------|------|------|
| CAP ≤ 100 | 0.80 | 1 | 1.36 | 1.48 | 1.53 |
| 100 < CAP ≤ 1000 | 0.80 | 1 | 1.25 | 1.35 | 1.38 |
| 1000 < CAP | 0.80 | 1 | 1.17 | 1.25 | 1.28 |

Diagram of Dimensions:(unit:mm)



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) | WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA _{rms} /85°C /120Hz) |
|----------|----------|-----------|---|----------|----------|-----------|---|
| 16 | 1200 | 22x20 | 0.95 | 16 | 22000 | 30x20 | 2.90 |
| 16 | 1500 | 25x20 | 1.10 | 16 | 22000 | 30x20 | 3.80 |
| 16 | 1800 | 22x20 | 1.20 | 16 | 22000 | 35x20 | 2.90 |
| 16 | 2200 | 30x20 | 1.35 | 16 | 22000 | 35x20 | 3.80 |
| 16 | 2700 | 25x20 | 1.75 | 16 | 27000 | 25x20 | 3.40 |
| 16 | 3300 | 22x20 | 1.50 | 16 | 27000 | 30x20 | 3.25 |
| 16 | 3300 | 25x20 | 2.00 | 16 | 27000 | 30x20 | 4.25 |
| 16 | 3300 | 35x20 | 1.95 | 16 | 27000 | 35x20 | 3.35 |
| 16 | 3900 | 22x20 | 2.30 | 16 | 27000 | 35x20 | 4.25 |
| 16 | 3900 | 25x20 | 1.55 | 16 | 33000 | 30x20 | 3.70 |
| 16 | 3900 | 25x20 | 2.35 | 16 | 33000 | 35x20 | 3.65 |
| 16 | 3900 | 30x20 | 2.35 | 16 | 33000 | 35x20 | 4.50 |
| 16 | 4700 | 22x20 | 1.35 | 25 | 820 | 22x20 | 0.75 |
| 16 | 4700 | 22x20 | 1.75 | 25 | 1000 | 25x20 | 0.95 |
| 16 | 4700 | 22x20 | 2.75 | 25 | 1500 | 30x20 | 1.30 |
| 16 | 4700 | 25x20 | 2.70 | 25 | 1800 | 25x20 | 1.55 |
| 16 | 4700 | 30x20 | 2.70 | 25 | 2200 | 22x20 | 1.85 |
| 16 | 4700 | 35x20 | 2.60 | 25 | 2200 | 25x20 | 1.50 |
| 16 | 5600 | 25x20 | 2.90 | 25 | 2200 | 25x20 | 1.80 |
| 16 | 5600 | 30x20 | 1.85 | 25 | 2200 | 30x20 | 1.80 |
| 16 | 5600 | 30x20 | 2.90 | 25 | 2200 | 35x20 | 1.75 |
| 16 | 6800 | 22x20 | 2.20 | 25 | 2700 | 22x20 | 1.70 |
| 16 | 6800 | 25x20 | 1.70 | 25 | 2700 | 22x20 | 2.20 |
| 16 | 6800 | 25x20 | 2.15 | 25 | 2700 | 25x20 | 2.15 |
| 16 | 6800 | 25x20 | 3.20 | 25 | 3300 | 22x20 | 1.50 |
| 16 | 6800 | 30x20 | 3.20 | 25 | 3300 | 22x20 | 1.80 |
| 16 | 6800 | 35x20 | 3.15 | 25 | 3300 | 22x20 | 2.50 |
| 16 | 8200 | 22x20 | 1.90 | 25 | 3300 | 25x20 | 2.45 |
| 16 | 8200 | 22x20 | 2.40 | 25 | 3300 | 30x20 | 1.85 |
| 16 | 8200 | 25x20 | 2.30 | 25 | 3300 | 30x20 | 2.40 |
| 16 | 8200 | 30x20 | 3.35 | 25 | 3300 | 35x20 | 2.45 |
| 16 | 8200 | 35x20 | 2.25 | 25 | 3900 | 25x20 | 1.55 |
| 16 | 8200 | 35x20 | 3.30 | 25 | 3900 | 25x20 | 1.10 |
| 16 | 10000 | 22x20 | 2.05 | 25 | 3900 | 25x20 | 2.80 |
| 16 | 10000 | 22x20 | 2.65 | 25 | 3900 | 30x20 | 2.80 |
| 16 | 10000 | 25x20 | 2.00 | 25 | 4700 | 22x20 | 1.70 |
| 16 | 10000 | 25x20 | 2.45 | 25 | 4700 | 22x20 | 2.30 |
| 16 | 10000 | 30x20 | 2.10 | 25 | 4700 | 25x20 | 2.25 |
| 16 | 10000 | 30x20 | 2.50 | 25 | 4700 | 30x20 | 3.25 |
| 16 | 10000 | 35x20 | 3.50 | 25 | 4700 | 35x20 | 2.20 |
| 16 | 12000 | 22x20 | 2.20 | 25 | 4700 | 35x20 | 3.15 |
| 16 | 12000 | 22x20 | 2.75 | 25 | 5600 | 22x20 | 2.50 |
| 16 | 12000 | 25x20 | 2.15 | 25 | 5600 | 25x20 | 2.40 |
| 16 | 12000 | 25x20 | 2.75 | 25 | 5600 | 30x20 | 1.85 |
| 16 | 12000 | 30x20 | 2.72 | 25 | 5600 | 30x20 | 2.50 |
| 16 | 12000 | 35x20 | 2.10 | 25 | 5600 | 30x20 | 3.50 |
| 16 | 12000 | 35x20 | 3.50 | 25 | 5600 | 35x20 | 3.50 |
| 16 | 12000 | 35x20 | 3.70 | 25 | 6800 | 22x20 | 2.20 |
| 16 | 15000 | 22x20 | 2.50 | 25 | 6800 | 22x20 | 2.65 |
| 16 | 15000 | 25x20 | 2.40 | 25 | 6800 | 25x20 | 2.15 |
| 16 | 15000 | 25x20 | 3.10 | 25 | 6800 | 25x20 | 2.65 |
| 16 | 15000 | 30x20 | 2.50 | 25 | 6800 | 30x20 | 2.65 |
| 16 | 15000 | 30x20 | 3.10 | 25 | 6800 | 35x20 | 3.80 |
| 16 | 18000 | 22x20 | 2.80 | 25 | 8200 | 22x20 | 2.35 |
| 16 | 18000 | 25x20 | 2.60 | 25 | 8200 | 25x20 | 2.30 |
| 16 | 18000 | 25x20 | 3.50 | 25 | 8200 | 25x20 | 2.90 |
| 16 | 18000 | 30x20 | 2.65 | 25 | 8200 | 30x20 | 2.85 |
| 16 | 18000 | 30x20 | 3.40 | 25 | 8200 | 35x20 | 2.25 |
| 16 | 18000 | 35x20 | 3.45 | 25 | 8200 | 35x20 | 3.05 |
| 16 | 22000 | 25x20 | 2.95 | 25 | 8200 | 35x20 | 4.00 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/85°C /120Hz) |
|----------|----------|-----------|--|
| 25 | 10000 | 22x20 | 2.65 |
| 25 | 10000 | 25x20 | 2.50 |
| 25 | 10000 | 25x20 | 3.30 |
| 25 | 10000 | 30x20 | 2.65 |
| 25 | 10000 | 30x20 | 3.30 |
| 25 | 10000 | 35x20 | 3.30 |
| 25 | 12000 | 22x20 | 2.90 |
| 25 | 12000 | 25x20 | 2.75 |
| 25 | 12000 | 30x20 | 2.80 |
| 25 | 12000 | 30x20 | 3.55 |
| 25 | 12000 | 35x20 | 2.65 |
| 25 | 12000 | 35x20 | 3.50 |
| 25 | 15000 | 25x20 | 3.15 |
| 25 | 15000 | 30x20 | 3.10 |
| 25 | 15000 | 30x20 | 4.15 |
| 25 | 15000 | 35x20 | 4.00 |
| 25 | 18000 | 25x20 | 3.55 |
| 25 | 18000 | 30x20 | 3.40 |
| 25 | 18000 | 35x20 | 3.50 |
| 25 | 18000 | 35x20 | 4.45 |
| 25 | 22000 | 30x20 | 3.85 |
| 25 | 22000 | 35x20 | 3.85 |
| 25 | 27000 | 35x20 | 4.30 |
| 25 | 33000 | 35x20 | 4.85 |
| 35 | 820 | 25x20 | 0.85 |
| 35 | 1000 | 22x20 | 1.00 |
| 35 | 1200 | 22x20 | 1.30 |
| 35 | 1200 | 22x20 | 1.45 |
| 35 | 1200 | 25x20 | 1.40 |
| 35 | 1200 | 30x20 | 1.40 |
| 35 | 1500 | 22x20 | 1.55 |
| 35 | 1500 | 25x20 | 1.55 |
| 35 | 1800 | 22x20 | 1.55 |
| 35 | 1800 | 22x20 | 1.45 |
| 35 | 1800 | 25x20 | 1.65 |
| 35 | 1800 | 30x20 | 1.75 |
| 35 | 1800 | 35x20 | 1.70 |
| 35 | 2200 | 22x20 | 1.95 |
| 35 | 2200 | 25x20 | 1.95 |
| 35 | 2200 | 30x20 | 1.95 |
| 35 | 2700 | 22x20 | 2.05 |
| 35 | 2700 | 25x20 | 2.00 |
| 35 | 2700 | 25x20 | 2.35 |
| 35 | 2700 | 30x20 | 2.05 |
| 35 | 2700 | 30x20 | 2.30 |
| 35 | 2700 | 35x20 | 2.30 |
| 35 | 3300 | 22x20 | 1.75 |
| 35 | 3300 | 22x20 | 2.25 |
| 35 | 3300 | 25x20 | 2.20 |
| 35 | 3300 | 25x20 | 2.70 |
| 35 | 3300 | 30x20 | 2.70 |
| 35 | 3300 | 35x20 | 2.65 |
| 35 | 3900 | 22x20 | 2.40 |
| 35 | 3900 | 25x20 | 2.30 |
| 35 | 3900 | 30x20 | 1.85 |
| 35 | 3900 | 30x20 | 2.40 |
| 35 | 3900 | 30x20 | 3.00 |
| 35 | 3900 | 35x20 | 2.50 |
| 35 | 3900 | 35x20 | 3.00 |
| 35 | 4700 | 22x20 | 2.20 |
| 35 | 4700 | 22x20 | 2.70 |
| 35 | 4700 | 25x20 | 2.15 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mAmps/85°C /120Hz) |
|----------|----------|-----------|--|
| 35 | 4700 | 30x20 | 2.55 |
| 35 | 4700 | 30x20 | 3.55 |
| 35 | 4700 | 35x20 | 3.55 |
| 35 | 5600 | 22x20 | 2.35 |
| 35 | 5600 | 22x20 | 3.00 |
| 35 | 5600 | 22x20 | 2.60 |
| 35 | 5600 | 25x20 | 2.25 |
| 35 | 5600 | 25x20 | 3.00 |
| 35 | 5600 | 35x20 | 2.25 |
| 35 | 5600 | 35x20 | 2.85 |
| 35 | 5600 | 35x20 | 3.80 |
| 35 | 6800 | 30x20 | 2.60 |
| 35 | 6800 | 30x20 | 3.30 |
| 35 | 6800 | 35x20 | 3.05 |
| 35 | 6800 | 35x20 | 4.15 |
| 35 | 8200 | 22x20 | 2.90 |
| 35 | 8200 | 25x20 | 2.70 |
| 35 | 8200 | 30x20 | 2.75 |
| 35 | 8200 | 30x20 | 3.60 |
| 35 | 8200 | 35x20 | 3.30 |
| 35 | 10000 | 25x20 | 3.05 |
| 35 | 10000 | 30x20 | 3.00 |
| 35 | 10000 | 30x20 | 3.80 |
| 35 | 10000 | 35x20 | 3.20 |
| 35 | 10000 | 35x20 | 3.70 |
| 35 | 12000 | 25x20 | 3.45 |
| 35 | 12000 | 30x20 | 3.30 |
| 35 | 12000 | 35x20 | 3.40 |
| 35 | 12000 | 35x20 | 4.10 |
| 35 | 12000 | 35x20 | 3.80 |
| 35 | 15000 | 30x20 | 3.80 |
| 35 | 15000 | 35x20 | 4.80 |
| 35 | 18000 | 30x20 | 4.30 |
| 35 | 18000 | 35x20 | 4.15 |
| 35 | 22000 | 35x20 | 4.70 |
| 50 | 680 | 22x20 | 1.00 |
| 50 | 820 | 22x20 | 1.00 |
| 50 | 820 | 22x20 | 1.25 |
| 50 | 820 | 25x20 | 1.35 |
| 50 | 1000 | 25x20 | 1.50 |
| 50 | 1500 | 22x20 | 1.55 |
| 50 | 1500 | 22x20 | 1.80 |
| 50 | 1500 | 22x20 | 2.20 |
| 50 | 1500 | 25x20 | 2.15 |
| 50 | 1500 | 30x20 | 1.80 |
| 50 | 1500 | 30x20 | 2.15 |
| 50 | 1800 | 22x20 | 2.45 |
| 50 | 1800 | 25x20 | 1.65 |
| 50 | 1800 | 25x20 | 2.15 |
| 50 | 1800 | 25x20 | 2.45 |
| 50 | 1800 | 35x20 | 2.40 |
| 50 | 2200 | 22x20 | 1.85 |
| 50 | 2200 | 22x20 | 2.35 |
| 50 | 2200 | 25x20 | 2.30 |
| 50 | 2200 | 25x20 | 2.65 |
| 50 | 2200 | 30x20 | 2.60 |
| 50 | 2200 | 35x20 | 2.60 |
| 50 | 2200 | 35x20 | 2.60 |
| 50 | 2700 | 22x20 | 2.45 |
| 50 | 2700 | 25x20 | 2.50 |
| 50 | 2700 | 30x20 | 2.60 |
| 50 | 2700 | 30x20 | 3.00 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 50 | 2700 | 35x20 | 2.95 |
| 50 | 3300 | 22x20 | 2.20 |
| 50 | 3300 | 22x20 | 2.80 |
| 50 | 3300 | 25x20 | 2.80 |
| 50 | 3300 | 30x20 | 2.80 |
| 50 | 3300 | 30x20 | 3.30 |
| 50 | 3300 | 35x20 | 3.25 |
| 50 | 3900 | 22x20 | 2.45 |
| 50 | 3900 | 25x20 | 2.50 |
| 50 | 3900 | 25x20 | 3.00 |
| 50 | 3900 | 30x20 | 2.35 |
| 50 | 3900 | 30x20 | 3.00 |
| 50 | 3900 | 35x20 | 2.45 |
| 50 | 3900 | 35x20 | 3.15 |
| 50 | 3900 | 35x20 | 3.50 |
| 50 | 4700 | 22x20 | 2.60 |
| 50 | 4700 | 25x20 | 2.70 |
| 50 | 4700 | 25x20 | 3.40 |
| 50 | 4700 | 30x20 | 3.30 |
| 50 | 4700 | 35x20 | 3.35 |
| 50 | 4700 | 35x20 | 3.90 |
| 50 | 5600 | 22x20 | 2.90 |
| 50 | 5600 | 25x20 | 2.90 |
| 50 | 5600 | 30x20 | 3.00 |
| 50 | 5600 | 30x20 | 3.60 |
| 50 | 5600 | 35x20 | 2.85 |
| 50 | 5600 | 35x20 | 3.60 |
| 50 | 6800 | 25x20 | 3.30 |
| 50 | 6800 | 30x20 | 3.25 |
| 50 | 6800 | 30x20 | 4.10 |
| 50 | 6800 | 35x20 | 3.95 |
| 50 | 8200 | 30x20 | 3.55 |
| 50 | 8200 | 35x20 | 3.65 |
| 50 | 8200 | 35x20 | 4.40 |
| 50 | 10000 | 30x20 | 4.00 |
| 50 | 10000 | 35x20 | 4.00 |
| 50 | 10000 | 35x20 | 5.50 |
| 50 | 12000 | 35x20 | 4.35 |
| 50 | 15000 | 35x20 | 4.70 |
| 63 | 680 | 22x20 | 1.75 |
| 63 | 820 | 22x20 | 1.30 |
| 63 | 820 | 22x20 | 1.90 |
| 63 | 820 | 25x20 | 1.65 |
| 63 | 820 | 25x20 | 1.85 |
| 63 | 820 | 30x20 | 1.90 |
| 63 | 1000 | 22x20 | 1.85 |
| 63 | 1000 | 22x20 | 2.05 |
| 63 | 1000 | 25x20 | 2.00 |
| 63 | 1200 | 22x20 | 1.95 |
| 63 | 1200 | 22x20 | 2.25 |
| 63 | 1200 | 25x20 | 1.65 |
| 63 | 1200 | 25x20 | 1.90 |
| 63 | 1200 | 30x20 | 1.95 |
| 63 | 1200 | 30x20 | 2.20 |
| 63 | 1200 | 35x20 | 2.30 |
| 63 | 1500 | 22x20 | 1.90 |
| 63 | 1500 | 22x20 | 2.15 |
| 63 | 1500 | 22x20 | 2.60 |
| 63 | 1500 | 25x20 | 2.10 |
| 63 | 1500 | 25x20 | 2.65 |
| 63 | 1800 | 22x20 | 2.00 |
| 63 | 1800 | 22x20 | 2.35 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mArms/85°C /120Hz) |
|----------|----------|-----------|--|
| 63 | 1800 | 22x20 | 2.90 |
| 63 | 1800 | 25x20 | 2.00 |
| 63 | 1800 | 25x20 | 2.90 |
| 63 | 1800 | 30x20 | 2.05 |
| 63 | 1800 | 30x20 | 2.35 |
| 63 | 1800 | 30x20 | 2.90 |
| 63 | 1800 | 35x20 | 2.45 |
| 63 | 1800 | 35x20 | 2.70 |
| 63 | 2200 | 22x20 | 2.20 |
| 63 | 2200 | 22x20 | 2.70 |
| 63 | 2200 | 25x20 | 2.15 |
| 63 | 2200 | 25x20 | 2.75 |
| 63 | 2200 | 25x20 | 3.25 |
| 63 | 2200 | 30x20 | 2.50 |
| 63 | 2200 | 30x20 | 3.20 |
| 63 | 2200 | 35x20 | 2.10 |
| 63 | 2700 | 22x20 | 2.45 |
| 63 | 2700 | 25x20 | 2.35 |
| 63 | 2700 | 25x20 | 2.80 |
| 63 | 2700 | 30x20 | 2.50 |
| 63 | 2700 | 30x20 | 2.75 |
| 63 | 2700 | 30x20 | 3.30 |
| 63 | 2700 | 35x20 | 2.95 |
| 63 | 2700 | 35x20 | 3.65 |
| 63 | 3300 | 22x20 | 2.80 |
| 63 | 3300 | 25x20 | 2.60 |
| 63 | 3300 | 25x20 | 3.20 |
| 63 | 3300 | 30x20 | 2.70 |
| 63 | 3300 | 30x20 | 3.20 |
| 63 | 3300 | 30x20 | 3.80 |
| 63 | 3300 | 35x20 | 3.15 |
| 63 | 3300 | 35x20 | 4.00 |
| 63 | 3900 | 25x20 | 2.85 |
| 63 | 3900 | 30x20 | 2.85 |
| 63 | 3900 | 30x20 | 3.35 |
| 63 | 3900 | 35x20 | 3.35 |
| 63 | 3900 | 35x20 | 4.30 |
| 63 | 4700 | 25x20 | 3.20 |
| 63 | 4700 | 30x20 | 3.10 |
| 63 | 4700 | 30x20 | 3.80 |
| 63 | 4700 | 35x20 | 3.20 |
| 63 | 4700 | 35x20 | 4.50 |
| 63 | 5600 | 30x20 | 3.45 |
| 63 | 5600 | 35x20 | 3.40 |
| 63 | 5600 | 35x20 | 4.35 |
| 63 | 6800 | 30x20 | 3.90 |
| 63 | 6800 | 35x20 | 3.75 |
| 63 | 6800 | 35x20 | 4.60 |
| 63 | 8200 | 35x20 | 4.20 |
| 63 | 10000 | 35x20 | 4.80 |
| 80 | 680 | 22x20 | 2.25 |
| 80 | 680 | 25x20 | 2.15 |
| 80 | 820 | 22x20 | 2.05 |
| 80 | 820 | 22x20 | 2.45 |
| 80 | 820 | 25x20 | 1.65 |
| 80 | 820 | 25x20 | 2.00 |
| 80 | 820 | 25x20 | 2.35 |
| 80 | 820 | 30x20 | 2.05 |
| 80 | 820 | 30x20 | 2.40 |
| 80 | 820 | 35x20 | 2.55 |
| 80 | 1000 | 22x20 | 1.85 |
| 80 | 1000 | 22x20 | 2.20 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 80 | 1000 | 22x20 | 2.60 |
| 80 | 1000 | 25x20 | 2.15 |
| 80 | 1000 | 25x20 | 2.60 |
| 80 | 1000 | 30x20 | 2.60 |
| 80 | 1000 | 35x20 | 2.10 |
| 80 | 1200 | 22x20 | 2.45 |
| 80 | 1200 | 22x20 | 1.95 |
| 80 | 1200 | 25x20 | 2.30 |
| 80 | 1200 | 25x20 | 2.85 |
| 80 | 1200 | 25x20 | 1.90 |
| 80 | 1200 | 30x20 | 2.40 |
| 80 | 1200 | 30x20 | 2.80 |
| 80 | 1200 | 30x20 | 2.00 |
| 80 | 1200 | 35x20 | 2.95 |
| 80 | 1500 | 22x20 | 2.15 |
| 80 | 1500 | 22x20 | 2.60 |
| 80 | 1500 | 25x20 | 2.10 |
| 80 | 1500 | 25x20 | 2.65 |
| 80 | 1500 | 25x20 | 3.30 |
| 80 | 1500 | 30x20 | 2.65 |
| 80 | 1500 | 30x20 | 3.20 |
| 80 | 1500 | 35x20 | 3.25 |
| 80 | 1800 | 22x20 | 2.35 |
| 80 | 1800 | 22x20 | 2.70 |
| 80 | 1800 | 25x20 | 2.85 |
| 80 | 1800 | 30x20 | 2.40 |
| 80 | 1800 | 30x20 | 2.85 |
| 80 | 1800 | 30x20 | 3.55 |
| 80 | 1800 | 35x20 | 2.50 |
| 80 | 1800 | 35x20 | 3.00 |
| 80 | 1800 | 35x20 | 3.50 |
| 80 | 2200 | 25x20 | 2.75 |
| 80 | 2200 | 25x20 | 3.25 |
| 80 | 2200 | 30x20 | 2.55 |
| 80 | 2200 | 30x20 | 3.15 |
| 80 | 2200 | 30x20 | 4.05 |
| 80 | 2200 | 35x20 | 3.25 |
| 80 | 2200 | 35x20 | 3.90 |
| 80 | 2700 | 30x20 | 2.80 |
| 80 | 2700 | 30x20 | 3.60 |
| 80 | 2700 | 35x20 | 3.00 |
| 80 | 2700 | 35x20 | 3.55 |
| 80 | 2700 | 35x20 | 4.45 |
| 80 | 3300 | 25x20 | 3.25 |
| 80 | 3300 | 30x20 | 3.15 |
| 80 | 3300 | 30x20 | 4.10 |
| 80 | 3300 | 35x20 | 3.20 |
| 80 | 3300 | 35x20 | 3.95 |
| 80 | 3300 | 35x20 | 5.05 |
| 80 | 3900 | 30x20 | 3.45 |
| 80 | 3900 | 35x20 | 3.40 |
| 80 | 3900 | 35x20 | 4.35 |
| 80 | 4700 | 30x20 | 3.85 |
| 80 | 4700 | 35x20 | 3.75 |
| 80 | 4700 | 35x20 | 4.85 |
| 80 | 5600 | 35x20 | 4.10 |
| 80 | 6800 | 35x20 | 4.65 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (mA rms/85°C /120Hz) |
|----------|----------|-----------|---|
| 100 | 680 | 22x20 | 1.75 |
| 100 | 680 | 22x20 | 2.15 |
| 100 | 680 | 22x20 | 2.65 |
| 100 | 680 | 25x20 | 2.10 |
| 100 | 680 | 25x20 | 2.70 |
| 100 | 820 | 22x20 | 1.85 |
| 100 | 820 | 22x20 | 2.40 |
| 100 | 820 | 22x20 | 3.00 |
| 100 | 820 | 25x20 | 1.80 |
| 100 | 820 | 25x20 | 3.00 |
| 100 | 820 | 30x20 | 1.90 |
| 100 | 820 | 30x25 | 2.35 |
| 100 | 820 | 35x20 | 2.45 |
| 100 | 820 | 35x25 | 2.85 |
| 100 | 1000 | 22x45 | 2.70 |
| 100 | 1000 | 25x35 | 2.35 |
| 100 | 1000 | 25x40 | 3.10 |
| 100 | 1000 | 25x50 | 2.35 |
| 100 | 1000 | 30x30 | 3.00 |
| 100 | 1000 | 30x35 | 3.30 |
| 100 | 1000 | 35x30 | 3.05 |
| 100 | 1200 | 22x40 | 2.20 |
| 100 | 1200 | 22x50 | 3.00 |
| 100 | 1200 | 25x30 | 2.75 |
| 100 | 1200 | 30x25 | 2.20 |
| 100 | 1200 | 30x30 | 3.05 |
| 100 | 1200 | 30x40 | 3.60 |
| 100 | 1200 | 35x20 | 2.30 |
| 100 | 1200 | 35x25 | 2.90 |
| 100 | 1200 | 35x35 | 3.30 |
| 100 | 1500 | 22x45 | 2.55 |
| 100 | 1500 | 25x35 | 3.60 |
| 100 | 1500 | 25x50 | 3.20 |
| 100 | 1500 | 30x35 | 3.40 |
| 100 | 1500 | 30x50 | 3.90 |
| 100 | 1500 | 35x30 | 3.40 |
| 100 | 1500 | 35x40 | 3.95 |
| 100 | 1800 | 22x50 | 2.85 |
| 100 | 1800 | 25x40 | 2.85 |
| 100 | 1800 | 30x30 | 2.90 |
| 100 | 1800 | 30x40 | 3.70 |
| 100 | 1800 | 35x25 | 2.75 |
| 100 | 1800 | 35x35 | 3.40 |
| 100 | 1800 | 35x45 | 4.15 |
| 100 | 2200 | 25x45 | 3.20 |
| 100 | 2200 | 30x35 | 3.20 |
| 100 | 2200 | 30x50 | 3.95 |
| 100 | 2200 | 35x30 | 3.00 |
| 100 | 2200 | 35x40 | 3.80 |
| 100 | 2200 | 35x50 | 4.75 |
| 100 | 2700 | 30x40 | 3.55 |
| 100 | 2700 | 35x35 | 3.25 |
| 100 | 2700 | 35x45 | 4.30 |
| 100 | 3300 | 30x50 | 3.75 |
| 100 | 3300 | 35x50 | 4.95 |
| 100 | 3900 | 35x40 | 4.30 |
| 100 | 4700 | 35x50 | 4.50 |

LP Series 85°C

Features

Standard capacitors

Applications

- ◆ Switch-mode power supplies in industrial and entertainment electronics
- ◆ Uninterruptible power supplies

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



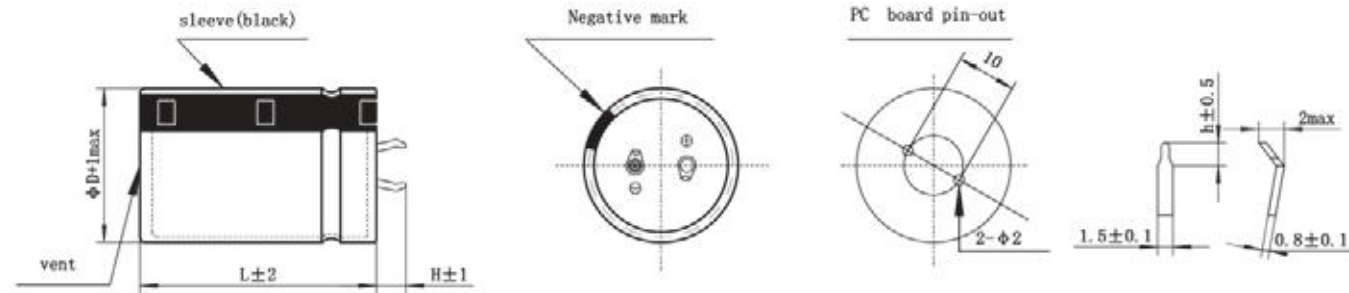
Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|---|---|---|----|----|----|--------|--|---------|---------|-----|---------|---------|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C | | | | | | | | | | |
| Rated voltage V_R | 6.3 to 450 V DC | 500 to 600 V DC | | | | | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | | | | | | |
| Rated capacitance C_R | 22 to 100000 μF | | | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current I_{leak} (+20°C,max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5minutes with rated working voltage applied | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C,120Hz) | Less than the value under table(%) | | | | | | | | | | | |
| | $\mu F/Vdc$ | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~420 | 450~600 |
| | ≤ 8200 | - | 35 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 15 | 20 |
| | 10000 to 22000 | 55 | 40 | 40 | 35 | 30 | 30 | 25 | 15 | - | - | - |
| ≥ 27000 | 60 | 50 | 40 | 35 | 35 | 30 | 25 | - | - | - | - | |
| Self-inductance ESL | approx. 20 nH | | | | | | | | | | | |
| Useful life 85°C; $V_R, I_{AC,R}$ 85°C; $V_R, I_{AC,R}$ | $V_R \leq 100V$: | Requirements: | | | | | | | | | | |
| | $V_R > 100V$: | $V_R \leq 100V$ DC/C $\leq \pm 30\%$ of initial value ESR ≤ 3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | $V_R > 100V$ DC/C $\leq \pm 20\%$ of initial value ESR ≤ 2 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| Voltage Endurance test 85°C; V_R | 2000 h | Post test requirements: | | | | | | | | | | |
| | | $V_R \leq 100V$ DC/C $\leq \pm 15\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | $V_R > 100V$ DC/C $\leq \pm 10\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| Shelf Life 85°C | 1000 h | Post test requirements: | | | | | | | | | | |
| | | $V_R \leq 100V$ DC/C $\leq \pm 15\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | $V_R > 100V$ DC/C $\leq \pm 10\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | |
| | $V_R(V)$ | 6.3 | 10 | 16 | 25 | 35~100 | 160~250 | 315~450 | 500~600 | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 8 | 8 | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 15 | 15 | 15 | 15 | 12 | 7 | 10 | - | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)$ /Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $10 \leq V_R \leq 100$ | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

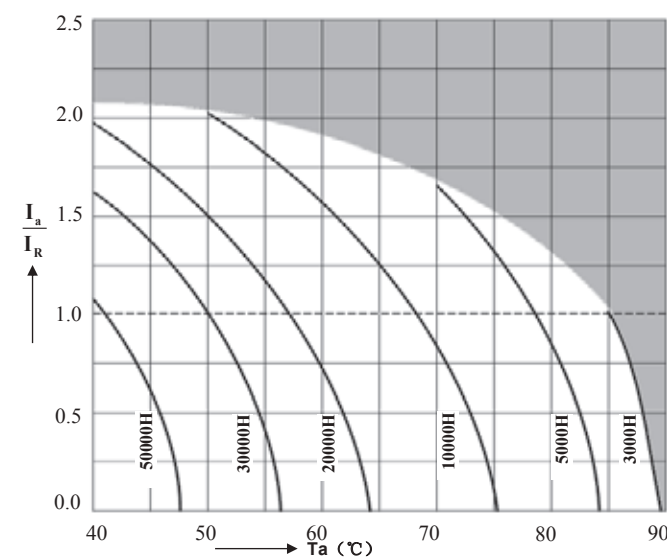
Packing of snap-in



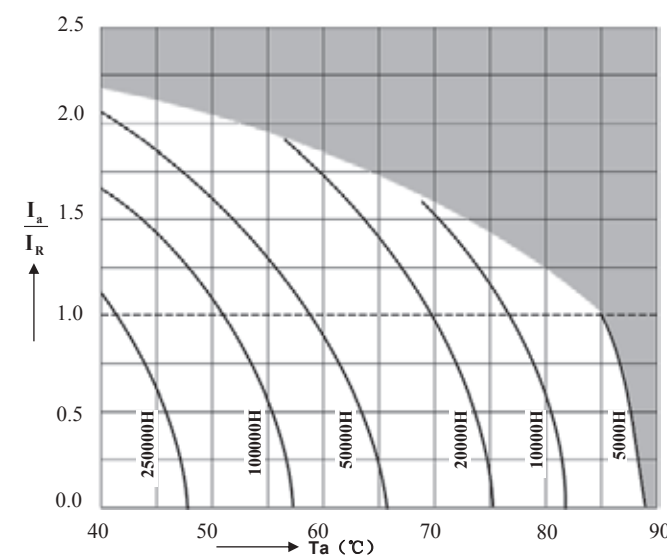
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 150 | 25x45 | 1.27 | 1040 | 1770 |
| 500 | 150 | 30x30 | 1.24 | 1040 | 1770 |
| 500 | 180 | 25x50 | 1.42 | 860 | 1470 |
| 500 | 180 | 30x35 | 1.40 | 860 | 1470 |
| 500 | 220 | 30x40 | 1.65 | 710 | 1210 |
| 500 | 220 | 35x40 | 1.68 | 710 | 1210 |
| 500 | 270 | 30x40 | 1.50 | 580 | 980 |
| 500 | 270 | 35x40 | 1.88 | 580 | 980 |
| 500 | 330 | 30x50 | 1.95 | 470 | 800 |
| 500 | 330 | 35x50 | 2.10 | 470 | 800 |
| 500 | 390 | 35x55 | 2.35 | 400 | 680 |
| 500 | 390 | 40x45 | 2.37 | 400 | 680 |
| 500 | 470 | 35x60 | 2.60 | 330 | 560 |
| 500 | 470 | 40x50 | 2.60 | 330 | 560 |
| 500 | 560 | 35x70 | 2.51 | 280 | 470 |
| 500 | 560 | 40x55 | 2.49 | 280 | 470 |
| 500 | 680 | 40x65 | 2.83 | 230 | 390 |
| 500 | 680 | 45x50 | 2.81 | 230 | 390 |
| 500 | 820 | 40x75 | 3.22 | 190 | 320 |
| 500 | 820 | 45x60 | 3.20 | 190 | 320 |
| 500 | 1000 | 40x85 | 3.66 | 160 | 270 |
| 500 | 1000 | 45x70 | 3.62 | 160 | 270 |
| 500 | 1200 | 45x80 | 4.15 | 130 | 220 |
| 500 | 1500 | 45x100 | 4.90 | 110 | 180 |
| 550 | 47 | 25x25 | 0.52 | 3320 | 5640 |
| 550 | 56 | 25x25 | 0.65 | 2790 | 4740 |
| 550 | 68 | 25x30 | 0.75 | 2290 | 3900 |
| 550 | 82 | 25x35 | 0.85 | 1900 | 3230 |
| 550 | 82 | 30x25 | 0.85 | 1900 | 3230 |
| 550 | 100 | 25x35 | 0.94 | 1560 | 2650 |
| 550 | 100 | 30x30 | 1.05 | 1560 | 2650 |
| 550 | 120 | 25x40 | 1.08 | 1300 | 2210 |
| 550 | 120 | 30x35 | 1.18 | 1300 | 2210 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 550 | 120 | 35x25 | 1.18 | 1300 | 2210 |
| 550 | 150 | 25x50 | 1.28 | 1040 | 1770 |
| 550 | 150 | 30x35 | 1.30 | 1040 | 1770 |
| 550 | 150 | 35x30 | 1.45 | 1040 | 1770 |
| 550 | 180 | 25x55 | 1.48 | 860 | 1470 |
| 550 | 180 | 30x40 | 1.48 | 860 | 1470 |
| 550 | 180 | 35x35 | 1.62 | 860 | 1470 |
| 550 | 220 | 30x50 | 1.85 | 710 | 1210 |
| 550 | 220 | 35x40 | 1.86 | 710 | 1210 |
| 550 | 270 | 30x55 | 2.15 | 580 | 980 |
| 550 | 270 | 35x45 | 2.21 | 580 | 980 |
| 550 | 330 | 35x50 | 2.20 | 470 | 800 |
| 550 | 390 | 35x55 | 2.82 | 400 | 680 |
| 600 | 47 | 25x25 | 0.62 | 3320 | 5640 |
| 600 | 56 | 25x30 | 0.71 | 2790 | 4740 |
| 600 | 68 | 25x35 | 0.77 | 2290 | 3900 |
| 600 | 68 | 30x25 | 0.78 | 2290 | 3900 |
| 600 | 82 | 25x35 | 0.87 | 1900 | 3230 |
| 600 | 82 | 30x30 | 0.92 | 1900 | 3230 |
| 600 | 100 | 25x40 | 1.00 | 1560 | 2650 |
| 600 | 100 | 30x35 | 1.10 | 1560 | 2650 |
| 600 | 100 | 35x25 | 1.10 | 1560 | 2650 |
| 600 | 120 | 25x50 | 1.20 | 1300 | 2210 |
| 600 | 120 | 30x35 | 1.18 | 1300 | 2210 |
| 600 | 120 | 35x30 | 1.30 | 1300 | 2210 |
| 600 | 150 | 25x55 | 1.36 | 1040 | 1770 |
| 600 | 150 | 30x45 | 1.47 | 1040 | 1770 |
| 600 | 150 | 35x35 | 1.52 | 1040 | 1770 |
| 600 | 180 | 30x50 | 1.67 | 860 | 1470 |
| 600 | 180 | 35x40 | 1.71 | 860 | 1470 |
| 600 | 220 | 30x55 | 1.95 | 710 | 1210 |
| 600 | 220 | 35x45 | 1.95 | 710 | 1210 |
| 600 | 270 | 35x50 | 2.25 | 580 | 980 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \leq 100V$



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \geq 160V$

LU Series 85°C 3000H

Features

Standard capacitors

Applications

- ◆ Switch-mode power supplies in industrial and entertainment electronics
- ◆ Uninterruptible power supplies

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

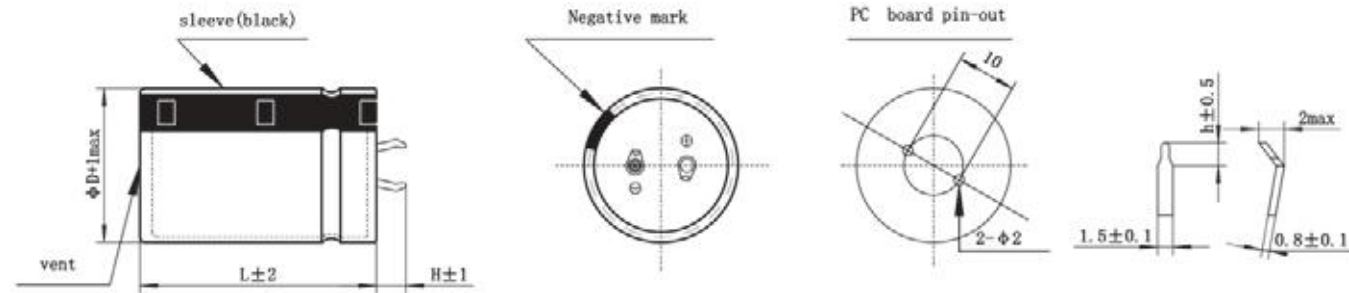
| Item | Performance Characteristics | | | | | | | | | | | |
|---|---|---|----|----|----|--------|---|---------|---------|-----|---------|---------|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C | | | | | | | | | | |
| Rated voltage V _R | 10 to 450 V DC | 500 to 600 V DC | | | | | | | | | | |
| Surge voltage V _S | V _R ≤ 315V 1.15 V _R V _R > 315V 1.10 V _R | | | | | | | | | | | |
| Rated capacitance C _R | 47 to 82000 μF | 47 to 1500 μF | | | | | | | | | | |
| Capacitance tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current I _{leak} (+20°C,max.) | I ≤ 3 √CV (μA) After 5minutes with rated working voltage applied | | | | | | | | | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | | | |
| | μF/Vdc | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~420 | 450~600 |
| | ≤ 8200 | - | 35 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 15 | 20 |
| | 10000 to 22000 | 55 | 40 | 40 | 35 | 30 | 30 | 25 | 15 | - | - | - |
| ≥ 27000 | 60 | 50 | 40 | 35 | 35 | 30 | 25 | - | - | - | - | |
| Self-inductance ESL | approx. 20 nH | | | | | | | | | | | |
| Useful life 85°C; V _R , I _{AC,R} 85°C; V _R , I _{AC,R} | VR ≤ 100V: | Requirements: | | | | | | | | | | |
| | >4000 h | V _R ≤ 100V DC/C ≤ ±30% of initial value ESR ≤ 3 times initial specified limit I _{leak} ≤ initial specified limit | | | | | V _R > 100V DC/C ≤ ±20% of initial value ESR ≤ 2 times initial specified limit I _{leak} ≤ initial specified limit | | | | | |
| Voltage Endurance test 85°C; V _R | 3000 h | Post test requirements: | | | | | | | | | | |
| | | V _R ≤ 100V DC/C ≤ ±15% of initial value ESR ≤ 1.3 times initial specified limit I _{leak} ≤ initial specified limit | | | | | V _R > 100V DC/C ≤ ±10% of initial value ESR ≤ 1.3 times initial specified limit I _{leak} ≤ initial specified limit | | | | | |
| Shelf Life 85°C | 1000 h | Post test requirements: | | | | | | | | | | |
| | | V _R ≤ 100V DC/C ≤ ±15% of initial value ESR ≤ 1.3 times initial specified limit I _{leak} ≤ initial specified limit | | | | | V _R > 100V DC/C ≤ ±10% of initial value ESR ≤ 1.3 times initial specified limit I _{leak} ≤ initial specified limit | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | |
| | V _R (V) | 6.3 | 10 | 16 | 25 | 35~100 | 160~250 | 315~450 | 500~600 | | | |
| | Z _{-25°C} / Z _{20°C} | 5 | 5 | 5 | 4 | 4 | 4 | 8 | 8 | | | |
| Z _{-40°C} / Z _{20°C} | 15 | 15 | 15 | 15 | 12 | 7 | 10 | - | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | |

Snap-in

Multiplier for Ripple Current vs. Frequency

| V _R (V)/Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|----------------------------------|--------|-----|------|------|------|----------|
| 10 ≤ V _R ≤ 100 | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| 160 ≤ V _R ≤ 250 | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| 315 ≤ V _R ≤ 600 | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 10 | 10000 | 20x25 | 2.23 | 36 | 46 |
| 10 | 12000 | 22x25 | 2.90 | 34 | 44 |
| 10 | 15000 | 22x30 | 3.20 | 27 | 35 |
| 10 | 15000 | 25x25 | 3.21 | 27 | 35 |
| 10 | 18000 | 22x35 | 3.22 | 23 | 29 |
| 10 | 18000 | 25x30 | 3.65 | 23 | 29 |
| 10 | 22000 | 22x40 | 3.79 | 19 | 24 |
| 10 | 22000 | 25x30 | 3.75 | 19 | 24 |
| 10 | 22000 | 30x25 | 4.10 | 19 | 24 |
| 10 | 27000 | 25x35 | 4.04 | 19 | 25 |
| 10 | 27000 | 30x30 | 4.06 | 19 | 25 |
| 10 | 33000 | 25x40 | 4.60 | 15 | 20 |
| 10 | 33000 | 30x30 | 4.80 | 15 | 20 |
| 10 | 39000 | 25x45 | 5.29 | 13 | 17 |
| 10 | 39000 | 35x30 | 5.30 | 13 | 17 |
| 10 | 47000 | 25x50 | 5.80 | 11 | 14 |
| 10 | 47000 | 30x40 | 5.82 | 11 | 14 |
| 10 | 47000 | 35x30 | 6.00 | 11 | 14 |
| 10 | 56000 | 30x45 | 6.70 | 9 | 12 |
| 10 | 56000 | 35x35 | 6.80 | 9 | 12 |
| 10 | 68000 | 30x50 | 7.50 | 8 | 10 |
| 10 | 68000 | 35x40 | 7.55 | 8 | 10 |
| 10 | 82000 | 35x45 | 8.70 | 6 | 8 |
| 16 | 8200 | 20x25 | 2.57 | 44 | 57 |
| 16 | 10000 | 22x25 | 2.86 | 36 | 46 |
| 16 | 12000 | 22x25 | 2.89 | 34 | 44 |
| 16 | 15000 | 22x30 | 3.45 | 27 | 35 |
| 16 | 18000 | 25x25 | 3.47 | 23 | 29 |
| 16 | 22000 | 25x30 | 3.94 | 19 | 24 |
| 16 | 27000 | 30x30 | 4.99 | 15 | 20 |
| 16 | 33000 | 30x35 | 5.49 | 12 | 16 |
| 16 | 33000 | 35x25 | 5.21 | 12 | 16 |
| 16 | 39000 | 30x40 | 6.11 | 10 | 14 |
| 16 | 39000 | 35x30 | 6.13 | 10 | 14 |
| 16 | 47000 | 30x45 | 6.95 | 9 | 11 |
| 16 | 56000 | 30x50 | 7.63 | 7 | 10 |
| 16 | 56000 | 35x40 | 7.69 | 7 | 10 |
| 16 | 68000 | 35x45 | 8.45 | 6 | 8 |
| 16 | 82000 | 35x50 | 9.15 | 5 | 7 |
| 25 | 5600 | 20x25 | 2.33 | 55 | 71 |
| 25 | 5600 | 22x25 | 2.40 | 55 | 71 |
| 25 | 6800 | 22x25 | 2.62 | 45 | 59 |
| 25 | 6800 | 25x25 | 2.68 | 45 | 59 |
| 25 | 8200 | 22x30 | 2.91 | 37 | 49 |
| 25 | 8200 | 25x25 | 2.95 | 37 | 49 |
| 25 | 10000 | 22x35 | 3.31 | 31 | 40 |
| 25 | 10000 | 25x25 | 3.18 | 31 | 40 |
| 25 | 12000 | 22x40 | 3.77 | 30 | 39 |
| 25 | 12000 | 25x30 | 3.65 | 30 | 39 |
| 25 | 15000 | 22x45 | 4.08 | 24 | 31 |
| 25 | 15000 | 25x35 | 4.10 | 24 | 31 |
| 25 | 18000 | 25x40 | 4.68 | 20 | 26 |
| 25 | 18000 | 30x30 | 4.71 | 20 | 26 |
| 25 | 22000 | 25x45 | 4.72 | 16 | 21 |
| 25 | 22000 | 30x35 | 4.75 | 16 | 21 |
| 25 | 27000 | 25x50 | 6.02 | 13 | 17 |
| 25 | 27000 | 30x40 | 6.10 | 13 | 17 |
| 25 | 27000 | 35x35 | 6.12 | 13 | 17 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 25 | 33000 | 30x45 | 6.75 | 11 | 14 |
| 25 | 33000 | 35x40 | 6.80 | 11 | 14 |
| 25 | 39000 | 30x50 | 7.40 | 9 | 12 |
| 25 | 39000 | 35x45 | 7.61 | 9 | 12 |
| 25 | 47000 | 35x50 | 8.30 | 8 | 10 |
| 35 | 3300 | 20x25 | 2.14 | 77 | 100 |
| 35 | 3900 | 20x30 | 2.28 | 65 | 85 |
| 35 | 3900 | 22x25 | 2.22 | 65 | 85 |
| 35 | 4700 | 20x35 | 2.46 | 54 | 71 |
| 35 | 4700 | 22x25 | 2.47 | 54 | 71 |
| 35 | 5600 | 22x30 | 2.80 | 46 | 59 |
| 35 | 5600 | 25x25 | 2.82 | 46 | 59 |
| 35 | 6800 | 22x35 | 2.89 | 38 | 49 |
| 35 | 6800 | 25x30 | 2.92 | 38 | 49 |
| 35 | 6800 | 30x25 | 3.09 | 38 | 49 |
| 35 | 8200 | 22x40 | 3.47 | 31 | 40 |
| 35 | 8200 | 25x35 | 3.50 | 31 | 40 |
| 35 | 8200 | 30x25 | 3.51 | 31 | 40 |
| 35 | 10000 | 22x45 | 3.60 | 26 | 33 |
| 35 | 10000 | 25x40 | 3.65 | 26 | 33 |
| 35 | 10000 | 30x30 | 3.67 | 26 | 33 |
| 35 | 10000 | 35x25 | 3.71 | 26 | 33 |
| 35 | 12000 | 25x40 | 4.51 | 26 | 33 |
| 35 | 12000 | 30x35 | 4.55 | 26 | 33 |
| 35 | 12000 | 35x25 | 4.52 | 26 | 33 |
| 35 | 15000 | 25x45 | 4.55 | 20 | 27 |
| 35 | 15000 | 30x40 | 4.80 | 20 | 27 |
| 35 | 15000 | 35x30 | 4.82 | 20 | 27 |
| 35 | 18000 | 25x50 | 4.84 | 17 | 22 |
| 35 | 18000 | 30x40 | 4.87 | 17 | 22 |
| 35 | 18000 | 35x35 | 5.70 | 17 | 22 |
| 35 | 22000 | 30x45 | 6.38 | 14 | 18 |
| 35 | 22000 | 35x40 | 6.40 | 14 | 18 |
| 35 | 27000 | 35x45 | 6.90 | 13 | 17 |
| 35 | 33000 | 35x50 | 7.49 | 11 | 14 |
| 50 | 2200 | 20x25 | 2.07 | 92 | 120 |
| 50 | 2200 | 22x25 | 2.19 | 92 | 120 |
| 50 | 2700 | 20x30 | 2.21 | 76 | 98 |
| 50 | 2700 | 22x25 | 2.21 | 76 | 98 |
| 50 | 3300 | 20x35 | 2.41 | 62 | 80 |
| 50 | 3300 | 22x30 | 2.41 | 62 | 80 |
| 50 | 3300 | 25x25 | 2.41 | 62 | 80 |
| 50 | 3900 | 20x40 | 2.72 | 52 | 68 |
| 50 | 3900 | 22x30 | 2.61 | 52 | 68 |
| 50 | 3900 | 25x25 | 2.56 | 52 | 68 |
| 50 | 4700 | 22x35 | 2.93 | 43 | 56 |
| 50 | 4700 | 25x30 | 3.07 | 43 | 56 |
| 50 | 4700 | 30x25 | 3.01 | 43 | 56 |
| 50 | 5600 | 22x40 | 3.41 | 36 | 47 |
| 50 | 5600 | 25x35 | 3.47 | 36 | 47 |
| 50 | 5600 | 30x25 | 3.37 | 36 | 47 |
| 50 | 6800 | 22x45 | 3.94 | 30 | 39 |
| 50 | 6800 | 25x35 | 3.89 | 30 | 39 |
| 50 | 6800 | 30x30 | 3.86 | 30 | 39 |
| 50 | 6800 | 35x25 | 3.84 | 30 | 39 |
| 50 | 8200 | 25x45 | 4.44 | 25 | 32 |
| 50 | 8200 | 30x35 | 4.47 | 25 | 32 |
| 50 | 8200 | 35x30 | 4.47 | 25 | 32 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 50 | 10000 | 25x50 | 5.02 | 20 | 27 |
| 50 | 10000 | 30x40 | 5.08 | 20 | 27 |
| 50 | 10000 | 35x30 | 5.02 | 20 | 27 |
| 50 | 12000 | 30x45 | 5.60 | 26 | 33 |
| 50 | 12000 | 35x35 | 5.60 | 26 | 33 |
| 50 | 15000 | 30x50 | 6.44 | 20 | 27 |
| 50 | 15000 | 35x45 | 6.56 | 20 | 27 |
| 50 | 18000 | 35x45 | 7.18 | 17 | 22 |
| 63 | 1500 | 20x25 | 1.70 | 140 | 180 |
| 63 | 1500 | 22x25 | 1.75 | 140 | 180 |
| 63 | 1800 | 20x30 | 2.05 | 120 | 150 |
| 63 | 1800 | 22x25 | 2.04 | 120 | 150 |
| 63 | 2200 | 20x35 | 2.40 | 92 | 120 |
| 63 | 2200 | 22x30 | 2.41 | 92 | 120 |
| 63 | 2200 | 25x25 | 2.43 | 92 | 120 |
| 63 | 2700 | 20x40 | 2.53 | 76 | 98 |
| 63 | 2700 | 22x35 | 2.54 | 76 | 98 |
| 63 | 2700 | 25x30 | 2.58 | 76 | 98 |
| 63 | 3300 | 22x35 | 2.72 | 62 | 80 |
| 63 | 3300 | 25x30 | 2.74 | 62 | 80 |
| 63 | 3300 | 30x25 | 2.84 | 62 | 80 |
| 63 | 3900 | 22x40 | 2.95 | 52 | 68 |
| 63 | 3900 | 25x35 | 3.16 | 52 | 68 |
| 63 | 3900 | 30x30 | 3.17 | 52 | 68 |
| 63 | 3900 | 35x25 | 3.19 | 52 | 68 |
| 63 | 4700 | 22x50 | 3.69 | 43 | 56 |
| 63 | 4700 | 25x40 | 3.59 | 43 | 56 |
| 63 | 4700 | 30x30 | 3.70 | 43 | 56 |
| 63 | 4700 | 35x25 | 3.71 | 43 | 56 |
| 63 | 5600 | 25x45 | 3.81 | 36 | 47 |
| 63 | 5600 | 30x35 | 3.85 | 36 | 47 |
| 63 | 5600 | 35x30 | 3.91 | 36 | 47 |
| 63 | 6800 | 25x50 | 4.53 | 30 | 39 |
| 63 | 6800 | 30x40 | 4.61 | 30 | 39 |
| 63 | 6800 | 35x30 | 4.95 | 30 | 39 |
| 63 | 8200 | 30x45 | 5.15 | 25 | 32 |
| 63 | 8200 | 35x35 | 5.18 | 25 | 32 |
| 63 | 10000 | 30x50 | 5.80 | 20 | 27 |
| 63 | 10000 | 35x40 | 5.83 | 20 | 27 |
| 63 | 12000 | 35x45 | 6.47 | 21 | 28 |
| 63 | 15000 | 35x50 | 6.61 | 17 | 22 |
| 80 | 1000 | 20x25 | 1.57 | 150 | 200 |
| 80 | 1200 | 20x30 | 1.80 | 130 | 170 |
| 80 | 1200 | 22x25 | 1.77 | 130 | 170 |
| 80 | 1500 | 20x30 | 2.10 | 100 | 130 |
| 80 | 1500 | 22x30 | 2.12 | 100 | 130 |
| 80 | 1500 | 25x25 | 2.16 | 100 | 130 |
| 80 | 1800 | 20x35 | 2.30 | 85 | 110 |
| 80 | 1800 | 22x30 | 2.31 | 85 | 110 |
| 80 | 1800 | 25x25 | 2.35 | 85 | 110 |
| 80 | 2200 | 20x40 | 2.53 | 70 | 90 |
| 80 | 2200 | 22x35 | 2.56 | 70 | 90 |
| 80 | 2200 | 25x30 | 2.58 | 70 | 90 |
| 80 | 2200 | 30x25 | 2.62 | 70 | 90 |
| 80 | 2700 | 22x40 | 2.93 | 57 | 74 |
| 80 | 2700 | 25x35 | 2.95 | 57 | 74 |
| 80 | 2700 | 30x25 | 2.99 | 57 | 74 |
| 80 | 2700 | 35x25 | 3.02 | 57 | 74 |
| 80 | 3300 | 22x45 | 3.25 | 46 | 60 |
| 80 | 3300 | 25x40 | 3.29 | 46 | 60 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 80 | 3300 | 30x30 | 3.31 | 46 | 60 |
| 80 | 3300 | 35x25 | 3.35 | 46 | 60 |
| 80 | 3900 | 22x50 | 3.62 | 39 | 51 |
| 80 | 3900 | 25x45 | 3.71 | 39 | 51 |
| 80 | 3900 | 30x35 | 3.78 | 39 | 51 |
| 80 | 3900 | 35x30 | 3.91 | 39 | 51 |
| 80 | 4700 | 25x50 | 4.28 | 33 | 42 |
| 80 | 4700 | 30x40 | 4.31 | 33 | 42 |
| 80 | 4700 | 35x30 | 4.45 | 33 | 42 |
| 80 | 5600 | 30x45 | 4.70 | 27 | 36 |
| 80 | 5600 | 35x35 | 4.75 | 27 | 36 |
| 80 | 6800 | 30x50 | 5.27 | 23 | 29 |
| 80 | 6800 | 35x40 | 5.35 | 23 | 29 |
| 80 | 8200 | 35x45 | 5.90 | 19 | 24 |
| 80 | 10000 | 35x50 | 7.05 | 15 | 20 |
| 100 | 680 | 20x25 | 1.68 | 220 | 290 |
| 100 | 680 | 22x25 | 1.71 | 220 | 290 |
| 100 | 820 | 20x30 | 1.91 | 180 | 240 |
| 100 | 820 | 22x25 | 1.90 | 180 | 240 |
| 100 | 1000 | 20x30 | 2.02 | 150 | 200 |
| 100 | 1000 | 22x30 | 2.04 | 150 | 200 |
| 100 | 1000 | 25x25 | 2.10 | 150 | 200 |
| 100 | 1200 | 20x35 | 2.12 | 130 | 170 |
| 100 | 1200 | 22x30 | 2.15 | 130 | 170 |
| 100 | 1200 | 25x25 | 2.18 | 130 | 170 |
| 100 | 1500 | 20x40 | 2.45 | 100 | 130 |
| 100 | 1500 | 22x35 | 2.47 | 100 | 130 |
| 100 | 1500 | 25x30 | 2.50 | 100 | 130 |
| 100 | 1500 | 30x25 | 2.56 | 100 | 130 |
| 100 | 1800 | 22x40 | 2.77 | 85 | 110 |
| 100 | 1800 | 25x35 | 2.81 | 85 | 110 |
| 100 | 1800 | 30x25 | 2.85 | 85 | 110 |
| 100 | 1800 | 35x25 | 2.89 | 85 | 110 |
| 100 | 2200 | 22x45 | 3.15 | 70 | 90 |
| 100 | 2200 | 25x40 | 3.21 | 70 | 90 |
| 100 | 2200 | 30x30 | 3.25 | 70 | 90 |
| 100 | 2200 | 35x25 | 3.28 | 70 | 90 |
| 100 | 2700 | 25x45 | 3.66 | 57 | 74 |
| 100 | 2700 | 30x35 | 3.70 | 57 | 74 |
| 100 | 2700 | 35x30 | 3.77 | 57 | 74 |
| 100 | 3300 | 25x50 | 4.15 | 46 | 60 |
| 100 | 3300 | 30x40 | 4.18 | 46 | 60 |
| 100 | 3300 | 35x35 | 4.21 | 46 | 60 |
| 100 | 3900 | 30x45 | 4.67 | 39 | 51 |
| 100 | 3900 | 35x35 | 4.69 | 39 | 51 |
| 100 | 4700 | 30x50 | 5.26 | 33 | 42 |
| 100 | 4700 | 35x40 | 5.31 | 33 | 42 |
| 100 | 5600 | 35x45 | 5.89 | 27 | 36 |
| 100 | 6800 | 35x50 | 6.01 | 23 | 29 |
| 160 | 220 | 20x25 | 1.11 | 510 | 900 |
| 160 | 270 | 20x25 | 1.12 | 420 | 740 |
| 160 | 270 | 22x25 | 1.27 | 420 | 740 |
| 160 | 330 | 20x30 | 1.28 | 340 | 600 |
| 160 | 330 | 22x25 | 1.55 | 340 | 600 |
| 160 | 390 | 20x30 | 1.63 | 290 | 510 |
| 160 | 390 | 22x25 | 1.65 | 290 | 510 |
| 160 | 390 | 25x20 | 1.67 | 290 | 510 |
| 160 | 470 | 22x30 | 1.90 | 240 | 420 |
| 160 | 470 | 25x25 | 1.92 | 240 | 420 |
| 160 | 560 | 22x30 | 2.15 | 210 | 360 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 160 | 560 | 25x25 | 2.18 | 210 | 360 |
| 160 | 560 | 30x20 | 2.21 | 210 | 360 |
| 160 | 680 | 22x35 | 2.35 | 170 | 290 |
| 160 | 680 | 25x30 | 2.38 | 170 | 290 |
| 160 | 680 | 30x25 | 2.42 | 170 | 290 |
| 160 | 680 | 35x20 | 2.51 | 170 | 290 |
| 160 | 820 | 22x40 | 2.68 | 140 | 240 |
| 160 | 820 | 25x30 | 2.71 | 140 | 240 |
| 160 | 820 | 30x25 | 2.76 | 140 | 240 |
| 160 | 820 | 35x20 | 2.79 | 140 | 240 |
| 160 | 1000 | 22x45 | 3.02 | 110 | 200 |
| 160 | 1000 | 25x35 | 3.03 | 110 | 200 |
| 160 | 1000 | 30x30 | 3.05 | 110 | 200 |
| 160 | 1000 | 35x25 | 3.13 | 110 | 200 |
| 160 | 1200 | 22x45 | 3.25 | 97 | 170 |
| 160 | 1200 | 25x40 | 3.43 | 97 | 170 |
| 160 | 1200 | 30x30 | 3.45 | 97 | 170 |
| 160 | 1200 | 35x25 | 3.48 | 97 | 170 |
| 160 | 1500 | 25x50 | 3.96 | 74 | 130 |
| 160 | 1500 | 30x35 | 4.01 | 74 | 130 |
| 160 | 1500 | 35x30 | 4.03 | 74 | 130 |
| 160 | 1800 | 25x50 | 4.20 | 63 | 110 |
| 160 | 1800 | 30x40 | 4.31 | 63 | 110 |
| 160 | 1800 | 35x35 | 4.38 | 63 | 110 |
| 160 | 2200 | 30x45 | 4.85 | 52 | 90 |
| 160 | 2200 | 35x40 | 4.90 | 52 | 90 |
| 160 | 2700 | 30x50 | 5.45 | 42 | 74 |
| 160 | 2700 | 35x45 | 5.57 | 42 | 74 |
| 160 | 3300 | 35x50 | 6.21 | 34 | 60 |
| 160 | 3300 | 40x50 | 6.34 | 34 | 60 |
| 160 | 3900 | 35x80 | 7.84 | 29 | 51 |
| 160 | 3900 | 40x60 | 7.45 | 29 | 51 |
| 160 | 4700 | 40x80 | 8.79 | 24 | 42 |
| 180 | 220 | 22x20 | 1.18 | 510 | 900 |
| 180 | 270 | 20x25 | 1.29 | 420 | 740 |
| 180 | 330 | 20x30 | 1.77 | 340 | 600 |
| 180 | 330 | 22x25 | 1.79 | 340 | 600 |
| 180 | 330 | 25x20 | 1.81 | 340 | 600 |
| 180 | 390 | 20x30 | 1.84 | 290 | 510 |
| 180 | 470 | 20x30 | 2.08 | 240 | 420 |
| 180 | 470 | 22x25 | 2.08 | 240 | 420 |
| 180 | 470 | 30x20 | 1.88 | 240 | 420 |
| 180 | 560 | 20x35 | 2.25 | 210 | 360 |
| 180 | 560 | 22x30 | 2.26 | 210 | 360 |
| 180 | 560 | 25x25 | 2.27 | 210 | 360 |
| 180 | 680 | 20x40 | 2.50 | 170 | 290 |
| 180 | 680 | 22x35 | 2.51 | 170 | 290 |
| 180 | 680 | 25x30 | 2.53 | 170 | 290 |
| 180 | 680 | 30x25 | 2.55 | 170 | 290 |
| 180 | 680 | 35x20 | 2.57 | 170 | 290 |
| 180 | 820 | 20x45 | 2.75 | 140 | 240 |
| 180 | 820 | 22x40 | 2.86 | 140 | 240 |
| 180 | 820 | 25x35 | 2.87 | 140 | 240 |
| 180 | 820 | 30x25 | 2.89 | 140 | 240 |
| 180 | 1000 | 22x50 | 3.10 | 110 | 200 |
| 180 | 1000 | 25x40 | 3.06 | 110 | 200 |
| 180 | 1000 | 30x30 | 3.11 | 110 | 200 |
| 180 | 1200 | 22x50 | 3.31 | 97 | 170 |
| 180 | 1200 | 25x45 | 3.65 | 97 | 170 |
| 180 | 1200 | 30x35 | 3.67 | 97 | 170 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 180 | 1200 | 35x30 | 3.71 | 97 | 170 |
| 180 | 1500 | 25x50 | 3.83 | 74 | 130 |
| 180 | 1500 | 30x40 | 4.10 | 74 | 130 |
| 180 | 1500 | 35x35 | 4.21 | 74 | 130 |
| 180 | 1800 | 30x45 | 4.55 | 63 | 110 |
| 180 | 1800 | 35x35 | 4.58 | 63 | 110 |
| 180 | 2200 | 30x50 | 4.92 | 52 | 90 |
| 180 | 2200 | 35x40 | 4.96 | 52 | 90 |
| 180 | 2700 | 35x50 | 5.30 | 42 | 74 |
| 200 | 120 | 22x20 | 1.05 | 950 | 1660 |
| 200 | 220 | 22x20 | 1.19 | 510 | 900 |
| 200 | 220 | 22x25 | 1.25 | 510 | 900 |
| 200 | 270 | 22x25 | 1.39 | 420 | 740 |
| 200 | 270 | 25x20 | 1.40 | 420 | 740 |
| 200 | 330 | 22x25 | 1.52 | 340 | 600 |
| 200 | 330 | 25x20 | 1.56 | 340 | 600 |
| 200 | 390 | 22x30 | 1.73 | 290 | 510 |
| 200 | 390 | 25x25 | 1.74 | 290 | 510 |
| 200 | 470 | 22x30 | 1.97 | 240 | 420 |
| 200 | 470 | 25x25 | 1.99 | 240 | 420 |
| 200 | 560 | 22x35 | 2.45 | 210 | 360 |
| 200 | 560 | 25x30 | 2.48 | 210 | 360 |
| 200 | 560 | 30x25 | 2.51 | 210 | 360 |
| 200 | 680 | 22x40 | 2.70 | 170 | 290 |
| 200 | 680 | 25x30 | 2.68 | 170 | 290 |
| 200 | 680 | 30x25 | 2.72 | 170 | 290 |
| 200 | 820 | 22x45 | 2.94 | 140 | 240 |
| 200 | 820 | 25x35 | 2.93 | 140 | 240 |
| 200 | 820 | 30x30 | 2.96 | 140 | 240 |
| 200 | 1000 | 22x50 | 3.28 | 110 | 200 |
| 200 | 1000 | 25x40 | 3.28 | 110 | 200 |
| 200 | 1000 | 30x35 | 3.29 | 110 | 200 |
| 200 | 1000 | 35x30 | 3.30 | 110 | 200 |
| 200 | 1200 | 30x35 | 3.61 | 97 | 170 |
| 200 | 1200 | 35x30 | 3.63 | 97 | 170 |
| 200 | 1500 | 30x45 | 4.13 | 74 | 130 |
| 200 | 1500 | 35x35 | 4.14 | 74 | 130 |
| 200 | 1800 | 30x50 | 4.60 | 63 | 110 |
| 200 | 1800 | 35x40 | 4.61 | 63 | 110 |
| 200 | 2200 | 35x45 | 4.98 | 52 | 90 |
| 200 | 2700 | 35x50 | 5.46 | 42 | 74 |
| 200 | 3300 | 35x60 | 6.30 | 34 | 60 |
| 200 | 3900 | 40x60 | 7.40 | 29 | 51 |
| 200 | 4700 | 40x70 | 6.78 | 24 | 42 |
| 200 | 5600 | 35x100 | 7.37 | 20 | 36 |
| 200 | 6800 | 40x100 | 8.66 | 17 | 29 |
| 220 | 180 | 22x20 | 1.07 | 630 | 1110 |
| 220 | 270 | 25x20 | 1.35 | 420 | 740 |
| 220 | 330 | 22x30 | 1.70 | 340 | 600 |
| 220 | 330 | 25x25 | 1.71 | 340 | 600 |
| 220 | 390 | 22x30 | 1.89 | 290 | 510 |
| 220 | 390 | 25x25 | 1.91 | 290 | 510 |
| 220 | 470 | 22x35 | 2.08 | 240 | 420 |
| 220 | 470 | 25x30 | 2.10 | 240 | 420 |
| 220 | 470 | 30x25 | 2.13 | 240 | 420 |
| 220 | 560 | 22x40 | 2.33 | 210 | 360 |
| 220 | 560 | 25x35 | 2.39 | 210 | 360 |
| 220 | 560 | 30x25 | 2.35 | 210 | 360 |
| 220 | 680 | 22x45 | 2.68 | 170 | 290 |
| 220 | 680 | 25x35 | 2.68 | 170 | 290 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 220 | 680 | 30x30 | 2.69 | 170 | 290 |
| 220 | 820 | 25x45 | 3.01 | 140 | 240 |
| 220 | 820 | 30x35 | 3.02 | 140 | 240 |
| 220 | 820 | 35x30 | 3.03 | 140 | 240 |
| 220 | 1000 | 25x50 | 3.43 | 110 | 200 |
| 220 | 1000 | 30x35 | 3.42 | 110 | 200 |
| 220 | 1200 | 30x40 | 3.88 | 97 | 170 |
| 220 | 1200 | 35x35 | 3.89 | 97 | 170 |
| 220 | 1500 | 30x50 | 4.44 | 74 | 130 |
| 220 | 1500 | 35x40 | 4.45 | 74 | 130 |
| 220 | 1800 | 35x45 | 4.53 | 63 | 110 |
| 220 | 2200 | 35x50 | 4.98 | 52 | 90 |
| 250 | 100 | 22x25 | 0.69 | 1140 | 1990 |
| 250 | 150 | 22x20 | 0.98 | 760 | 1330 |
| 250 | 180 | 22x20 | 1.07 | 630 | 1110 |
| 250 | 220 | 22x25 | 1.26 | 510 | 900 |
| 250 | 220 | 25x20 | 1.27 | 510 | 900 |
| 250 | 270 | 22x25 | 1.51 | 420 | 740 |
| 250 | 330 | 22x30 | 1.75 | 340 | 600 |
| 250 | 330 | 25x25 | 1.76 | 340 | 600 |
| 250 | 390 | 22x35 | 1.91 | 290 | 510 |
| 250 | 390 | 25x30 | 1.92 | 290 | 510 |
| 250 | 390 | 30x25 | 1.93 | 290 | 510 |
| 250 | 470 | 22x35 | 2.15 | 240 | 420 |
| 250 | 470 | 25x35 | 2.16 | 240 | 420 |
| 250 | 470 | 30x25 | 2.16 | 240 | 420 |
| 250 | 560 | 22x40 | 2.48 | 210 | 360 |
| 250 | 560 | 25x35 | 2.49 | 210 | 360 |
| 250 | 560 | 30x25 | 2.49 | 210 | 360 |
| 250 | 680 | 22x50 | 2.71 | 170 | 290 |
| 250 | 680 | 25x40 | 2.71 | 170 | 290 |
| 250 | 680 | 30x30 | 2.71 | 170 | 290 |
| 250 | 820 | 25x45 | 3.01 | 140 | 240 |
| 250 | 820 | 30x35 | 3.02 | 140 | 240 |
| 250 | 820 | 35x30 | 3.03 | 140 | 240 |
| 250 | 1000 | 30x40 | 3.56 | 110 | 200 |
| 250 | 1000 | 35x35 | 3.57 | 110 | 200 |
| 250 | 1200 | 30x45 | 3.99 | 97 | 170 |
| 250 | 1200 | 35x35 | 4.01 | 97 | 170 |
| 250 | 1500 | 35x40 | 4.34 | 74 | 130 |
| 250 | 1800 | 35x50 | 4.56 | 63 | 110 |
| 250 | 2200 | 35x50 | 5.01 | 52 | 90 |
| 250 | 2700 | 40x80 | 6.31 | 42 | 74 |
| 250 | 3300 | 40x80 | 7.01 | 34 | 60 |
| 250 | 3900 | 35x100 | 7.48 | 29 | 51 |
| 250 | 4700 | 40x100 | 8.89 | 24 | 42 |
| 315 | 100 | 22x20 | 0.80 | 1140 | 1990 |
| 315 | 120 | 25x20 | 0.91 | 950 | 1660 |
| 315 | 150 | 22x25 | 1.07 | 760 | 1330 |
| 315 | 150 | 25x20 | 1.08 | 760 | 1330 |
| 315 | 180 | 22x30 | 1.38 | 630 | 1110 |
| 315 | 180 | 25x25 | 1.39 | 630 | 1110 |
| 315 | 220 | 22x30 | 1.47 | 510 | 900 |
| 315 | 220 | 25x25 | 1.47 | 510 | 900 |
| 315 | 220 | 30x20 | 1.48 | 510 | 900 |
| 315 | 270 | 22x35 | 1.70 | 420 | 740 |
| 315 | 270 | 25x30 | 1.71 | 420 | 740 |
| 315 | 270 | 30x25 | 1.72 | 420 | 740 |
| 315 | 270 | 35x20 | 1.73 | 420 | 740 |
| 315 | 330 | 22x40 | 1.99 | 340 | 600 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 315 | 330 | 25x35 | 2.00 | 340 | 600 |
| 315 | 330 | 30x25 | 1.99 | 340 | 600 |
| 315 | 390 | 22x45 | 2.15 | 290 | 510 |
| 315 | 390 | 25x40 | 2.16 | 290 | 510 |
| 315 | 390 | 30x30 | 2.16 | 290 | 510 |
| 315 | 390 | 35x25 | 2.17 | 290 | 510 |
| 315 | 470 | 25x45 | 2.46 | 240 | 420 |
| 315 | 470 | 30x35 | 2.47 | 240 | 420 |
| 315 | 470 | 35x30 | 2.48 | 240 | 420 |
| 315 | 560 | 25x50 | 2.71 | 210 | 360 |
| 315 | 560 | 30x35 | 2.70 | 210 | 360 |
| 315 | 560 | 35x30 | 2.72 | 210 | 360 |
| 315 | 680 | 30x45 | 3.06 | 170 | 290 |
| 315 | 680 | 35x35 | 3.06 | 170 | 290 |
| 315 | 820 | 30x50 | 3.45 | 140 | 240 |
| 315 | 820 | 35x40 | 3.46 | 140 | 240 |
| 315 | 1000 | 35x45 | 3.60 | 110 | 200 |
| 350 | 82 | 22x20 | 0.73 | 1390 | 2430 |
| 350 | 100 | 22x25 | 0.81 | 1140 | 1990 |
| 350 | 120 | 22x25 | 1.05 | 950 | 1660 |
| 350 | 120 | 25x20 | 1.07 | 950 | 1660 |
| 350 | 150 | 22x30 | 1.24 | 760 | 1330 |
| 350 | 150 | 25x25 | 1.25 | 760 | 1330 |
| 350 | 180 | 22x30 | 1.37 | 630 | 1110 |
| 350 | 180 | 25x25 | 1.38 | 630 | 1110 |
| 350 | 180 | 30x20 | 1.39 | 630 | 1110 |
| 350 | 220 | 22x35 | 1.54 | 510 | 900 |
| 350 | 220 | 25x30 | 1.55 | 510 | 900 |
| 350 | 220 | 30x25 | 1.56 | 510 | 900 |
| 350 | 220 | 35x20 | 1.57 | 510 | 900 |
| 350 | 270 | 22x40 | 1.80 | 420 | 740 |
| 350 | 270 | 25x35 | 1.81 | 420 | 740 |
| 350 | 270 | 30x25 | 1.81 | 420 | 740 |
| 350 | 330 | 22x45 | 2.03 | 340 | 600 |
| 350 | 330 | 25x35 | 2.03 | 340 | 600 |
| 350 | 330 | 30x30 | 2.04 | 340 | 600 |
| 350 | 330 | 35x25 | 2.05 | 340 | 600 |
| 350 | 390 | 25x40 | 2.24 | 290 | 510 |
| 350 | 390 | 30x35 | 2.25 | 290 | 510 |
| 350 | 390 | 35x30 | 2.26 | 290 | 510 |
| 350 | 470 | 25x50 | 2.57 | 240 | 420 |
| 350 | 470 | 30x35 | 2.56 | 240 | 420 |
| 350 | 470 | 35x30 | 2.56 | 240 | 420 |
| 350 | 560 | 30x40 | 2.76 | 210 | 360 |
| 350 | 560 | 35x35 | 2.77 | 210 | 360 |
| 350 | 680 | 30x50 | 3.21 | 170 | 290 |
| 350 | 680 | 35x40 | 3.22 | 170 | 290 |
| 350 | 820 | 35x45 | 3.52 | 140 | 240 |
| 350 | 1000 | 35x50 | 3.66 | 110 | 200 |
| 350 | 1200 | 40x65 | 5.71 | 97 | 170 |
| 350 | 1500 | 45x60 | 6.48 | 74 | 130 |
| 350 | 1800 | 45x70 | 7.40 | 63 | 110 |
| 350 | 2200 | 45x80 | 8.08 | 52 | 90 |
| 350 | 2700 | 45x100 | 9.49 | 42 | 74 |
| 400 | 68 | 20x25 | 0.65 | 1670 | 2930 |
| 400 | 68 | 22x20 | 0.65 | 1670 | 2930 |
| 400 | 82 | 22x25 | 0.85 | 1390 | 2430 |
| 400 | 82 | 25x20 | 0.86 | 1390 | 2430 |
| 400 | 100 | 22x25 | 0.99 | 1140 | 1990 |
| 400 | 100 | 25x20 | 1.00 | 1140 | 1990 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 120 | 22x25 | 1.10 | 950 | 1660 |
| 400 | 120 | 25x25 | 1.14 | 950 | 1660 |
| 400 | 150 | 22x30 | 1.25 | 760 | 1330 |
| 400 | 150 | 22x35 | 1.38 | 760 | 1330 |
| 400 | 150 | 25x25 | 1.30 | 760 | 1330 |
| 400 | 150 | 25x30 | 1.40 | 760 | 1330 |
| 400 | 150 | 30x25 | 1.42 | 760 | 1330 |
| 400 | 180 | 22x30 | 1.50 | 630 | 1110 |
| 400 | 180 | 22x35 | 1.55 | 630 | 1110 |
| 400 | 180 | 25x25 | 1.52 | 630 | 1110 |
| 400 | 180 | 25x30 | 1.58 | 630 | 1110 |
| 400 | 180 | 30x25 | 1.60 | 630 | 1110 |
| 400 | 180 | 35x20 | 1.63 | 630 | 1110 |
| 400 | 220 | 22x30 | 1.54 | 510 | 900 |
| 400 | 220 | 22x45 | 1.62 | 510 | 900 |
| 400 | 220 | 25x25 | 1.56 | 510 | 900 |
| 400 | 220 | 25x30 | 1.60 | 510 | 900 |
| 400 | 220 | 25x35 | 1.64 | 510 | 900 |
| 400 | 220 | 30x25 | 1.62 | 510 | 900 |
| 400 | 220 | 30x30 | 1.65 | 510 | 900 |
| 400 | 270 | 22x35 | 1.60 | 420 | 740 |
| 400 | 270 | 22x45 | 1.70 | 420 | 740 |
| 400 | 270 | 25x30 | 1.65 | 420 | 740 |
| 400 | 270 | 25x40 | 1.82 | 420 | 740 |
| 400 | 270 | 30x25 | 1.68 | 420 | 740 |
| 400 | 270 | 30x30 | 1.82 | 420 | 740 |
| 400 | 330 | 22x40 | 1.98 | 340 | 600 |
| 400 | 330 | 22x50 | 2.27 | 340 | 600 |
| 400 | 330 | 25x35 | 2.05 | 340 | 600 |
| 400 | 330 | 25x45 | 2.29 | 340 | 600 |
| 400 | 330 | 30x25 | 2.06 | 340 | 600 |
| 400 | 330 | 30x35 | 2.31 | 340 | 600 |
| 400 | 330 | 35x25 | 2.30 | 340 | 600 |
| 400 | 330 | 35x30 | 2.40 | 340 | 600 |
| 400 | 390 | 22x50 | 2.29 | 290 | 510 |
| 400 | 390 | 25x45 | 2.36 | 290 | 510 |
| 400 | 390 | 30x30 | 2.30 | 290 | 510 |
| 400 | 390 | 30x40 | 2.46 | 290 | 510 |
| 400 | 390 | 35x25 | 2.38 | 290 | 510 |
| 400 | 390 | 35x35 | 2.50 | 290 | 510 |
| 400 | 470 | 25x50 | 2.45 | 240 | 420 |
| 400 | 470 | 30x35 | 2.42 | 240 | 420 |
| 400 | 470 | 30x45 | 2.66 | 240 | 420 |
| 400 | 470 | 35x25 | 2.40 | 240 | 420 |
| 400 | 470 | 35x30 | 2.60 | 240 | 420 |
| 400 | 470 | 35x35 | 2.71 | 240 | 420 |
| 400 | 560 | 25x55 | 3.08 | 210 | 360 |
| 400 | 560 | 30x50 | 3.19 | 210 | 360 |
| 400 | 560 | 35x30 | 3.03 | 210 | 360 |
| 400 | 560 | 35x40 | 3.44 | 210 | 360 |
| 400 | 680 | 25x60 | 3.28 | 170 | 290 |
| 400 | 680 | 30x45 | 3.25 | 170 | 290 |
| 400 | 680 | 30x55 | 3.28 | 170 | 290 |
| 400 | 680 | 35x50 | 3.45 | 170 | 290 |
| 400 | 820 | 30x60 | 3.42 | 140 | 240 |
| 400 | 820 | 35x45 | 3.42 | 140 | 240 |
| 400 | 820 | 35x50 | 3.50 | 140 | 240 |
| 400 | 1000 | 35x50 | 3.60 | 110 | 200 |
| 400 | 1000 | 35x55 | 3.85 | 110 | 200 |
| 400 | 1000 | 40x65 | 5.15 | 110 | 200 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 1200 | 35x65 | 4.68 | 97 | 170 |
| 400 | 1200 | 40x60 | 4.71 | 97 | 170 |
| 400 | 1500 | 35x80 | 5.55 | 74 | 130 |
| 400 | 1500 | 40x70 | 4.61 | 74 | 130 |
| 400 | 1800 | 40x80 | 6.60 | 63 | 110 |
| 400 | 2200 | 45x95 | 8.70 | 52 | 90 |
| 420 | 47 | 22x20 | 0.54 | 3220 | 5640 |
| 420 | 56 | 22x20 | 0.60 | 2710 | 4740 |
| 420 | 68 | 25x20 | 0.68 | 2230 | 3900 |
| 420 | 82 | 20x25 | 0.83 | 1850 | 3230 |
| 420 | 82 | 22x25 | 0.85 | 1850 | 3230 |
| 420 | 82 | 25x20 | 0.85 | 1850 | 3230 |
| 420 | 100 | 22x25 | 0.97 | 1510 | 2650 |
| 420 | 100 | 22x30 | 0.98 | 1510 | 2650 |
| 420 | 100 | 25x25 | 0.98 | 1510 | 2650 |
| 420 | 120 | 20x30 | 1.05 | 1260 | 2210 |
| 420 | 120 | 22x25 | 1.02 | 1260 | 2210 |
| 420 | 120 | 22x30 | 1.07 | 1260 | 2210 |
| 420 | 120 | 25x25 | 1.08 | 1260 | 2210 |
| 420 | 120 | 30x20 | 1.10 | 1260 | 2210 |
| 420 | 150 | 22x25 | 1.11 | 1010 | 1770 |
| 420 | 150 | 22x35 | 1.21 | 1010 | 1770 |
| 420 | 150 | 25x30 | 1.26 | 1010 | 1770 |
| 420 | 150 | 35x20 | 1.32 | 1010 | 1770 |
| 420 | 180 | 22x30 | 1.32 | 840 | 1470 |
| 420 | 180 | 22x40 | 1.33 | 840 | 1470 |
| 420 | 180 | 25x25 | 1.33 | 840 | 1470 |
| 420 | 180 | 25x35 | 1.46 | 840 | 1470 |
| 420 | 180 | 30x25 | 1.48 | 840 | 1470 |
| 420 | 180 | 35x20 | 1.48 | 840 | 1470 |
| 420 | 220 | 22x35 | 1.42 | 690 | 1210 |
| 420 | 220 | 22x45 | 1.60 | 690 | 1210 |
| 420 | 220 | 25x30 | 1.47 | 690 | 1210 |
| 420 | 220 | 25x35 | 1.58 | 690 | 1210 |
| 420 | 220 | 30x25 | 1.59 | 690 | 1210 |
| 420 | 220 | 30x30 | 1.65 | 690 | 1210 |
| 420 | 220 | 35x25 | 1.60 | 690 | 1210 |
| 420 | 270 | 22x45 | 1.75 | 560 | 980 |
| 420 | 270 | 25x30 | 1.68 | 560 | 980 |
| 420 | 270 | 25x40 | 1.98 | 560 | 980 |
| 420 | 270 | 30x25 | 1.70 | 560 | 980 |
| 420 | 270 | 30x35 | 1.92 | 560 | 980 |
| 420 | 270 | 35x30 | 1.94 | 560 | 980 |
| 420 | 330 | 25x40 | 1.95 | 460 | 800 |
| 420 | 330 | 25x50 | 2.28 | 460 | 800 |
| 420 | 330 | 30x30 | 1.98 | 460 | 800 |
| 420 | 330 | 30x35 | 2.20 | 460 | 800 |
| 420 | 330 | 35x25 | 2.17 | 460 | 800 |
| 420 | 330 | 35x35 | 2.37 | 460 | 800 |
| 420 | 390 | 25x50 | 2.30 | 390 | 680 |
| 420 | 390 | 30x30 | 2.10 | 390 | 680 |
| 420 | 390 | 30x40 | 2.32 | 390 | 680 |
| 420 | 390 | 35x25 | 2.20 | 390 | 680 |
| 420 | 390 | 35x35 | 2.68 | 390 | 680 |
| 420 | 470 | 30x35 | 2.47 | 320 | 560 |
| 420 | 470 | 30x45 | 2.72 | 320 | 560 |
| 420 | 470 | 35x30 | 2.63 | 320 | 560 |
| 420 | 470 | 35x40 | 2.75 | 320 | 560 |
| 420 | 560 | 25x55 | 2.82 | 270 | 470 |
| 420 | 560 | 30x40 | 2.70 | 270 | 470 |

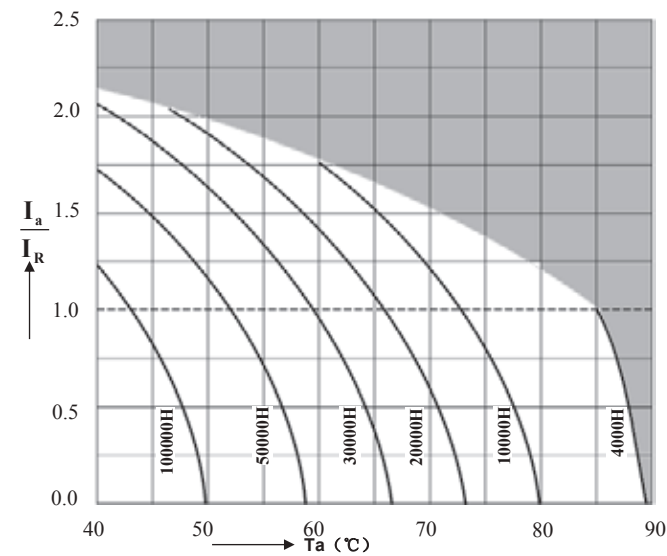
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 420 | 560 | 30x50 | 2.85 | 270 | 470 |
| 420 | 560 | 35x35 | 2.70 | 270 | 470 |
| 420 | 560 | 35x45 | 2.95 | 270 | 470 |
| 420 | 680 | 30x50 | 2.90 | 220 | 390 |
| 420 | 680 | 35x40 | 3.15 | 220 | 390 |
| 420 | 680 | 35x50 | 3.20 | 220 | 390 |
| 420 | 820 | 30x55 | 3.40 | 180 | 320 |
| 420 | 820 | 35x45 | 3.45 | 180 | 320 |
| 420 | 820 | 35x55 | 3.72 | 180 | 320 |
| 420 | 820 | 40x45 | 3.72 | 180 | 320 |
| 420 | 1000 | 35x50 | 3.78 | 150 | 270 |
| 420 | 1000 | 35x65 | 4.50 | 150 | 270 |
| 420 | 1000 | 40x50 | 4.30 | 150 | 270 |
| 420 | 1200 | 35x60 | 3.90 | 130 | 220 |
| 420 | 1200 | 35x70 | 4.95 | 130 | 220 |
| 420 | 1200 | 40x55 | 4.60 | 130 | 220 |
| 420 | 1500 | 40x70 | 5.98 | 100 | 180 |
| 420 | 1800 | 40x80 | 6.90 | 86 | 150 |
| 450 | 47 | 22x20 | 0.55 | 3220 | 5640 |
| 450 | 56 | 20x25 | 0.61 | 2710 | 4740 |
| 450 | 56 | 22x20 | 0.59 | 2710 | 4740 |
| 450 | 68 | 20x25 | 0.62 | 2230 | 3900 |
| 450 | 68 | 22x25 | 0.71 | 2230 | 3900 |
| 450 | 68 | 25x20 | 0.72 | 2230 | 3900 |
| 450 | 82 | 20x30 | 0.87 | 1850 | 3230 |
| 450 | 82 | 22x25 | 0.86 | 1850 | 3230 |
| 450 | 82 | 25x20 | 0.88 | 1850 | 3230 |
| 450 | 100 | 20x35 | 0.91 | 1510 | 2650 |
| 450 | 100 | 22x30 | 0.95 | 1510 | 2650 |
| 450 | 100 | 25x25 | 0.97 | 1510 | 2650 |
| 450 | 120 | 22x30 | 1.05 | 1260 | 2210 |
| 450 | 120 | 25x25 | 1.07 | 1260 | 2210 |
| 450 | 150 | 22x35 | 1.29 | 1010 | 1770 |
| 450 | 150 | 25x30 | 1.31 | 1010 | 1770 |
| 450 | 150 | 30x25 | 1.34 | 1010 | 1770 |
| 450 | 150 | 35x20 | 1.36 | 1010 | 1770 |
| 450 | 180 | 22x35 | 1.38 | 840 | 1470 |
| 450 | 180 | 25x30 | 1.40 | 840 | 1470 |
| 450 | 180 | 30x25 | 1.44 | 840 | 1470 |
| 450 | 180 | 30x30 | 1.45 | 840 | 1470 |
| 450 | 180 | 35x25 | 1.47 | 840 | 1470 |
| 450 | 220 | 22x40 | 1.87 | 690 | 1210 |
| 450 | 220 | 25x35 | 1.89 | 690 | 1210 |
| 450 | 220 | 30x30 | 1.91 | 690 | 1210 |
| 450 | 220 | 35x25 | 1.92 | 690 | 1210 |
| 450 | 270 | 25x35 | 2.12 | 560 | 980 |
| 450 | 270 | 30x30 | 2.15 | 560 | 980 |
| 450 | 270 | 35x25 | 2.19 | 560 | 980 |
| 450 | 330 | 25x40 | 2.41 | 460 | 800 |
| 450 | 330 | 30x35 | 2.48 | 460 | 800 |
| 450 | 330 | 35x30 | 2.53 | 460 | 800 |
| 450 | 330 | 35x35 | 2.63 | 460 | 800 |
| 450 | 390 | 25x45 | 2.67 | 390 | 680 |
| 450 | 390 | 30x35 | 2.70 | 390 | 680 |
| 450 | 390 | 35x30 | 2.75 | 390 | 680 |
| 450 | 470 | 25x50 | 2.78 | 320 | 560 |
| 450 | 470 | 30x40 | 2.82 | 320 | 560 |
| 450 | 470 | 30x45 | 2.88 | 320 | 560 |
| 450 | 470 | 35x35 | 2.93 | 320 | 560 |
| 450 | 560 | 30x45 | 3.13 | 270 | 470 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 560 | 30x50 | 3.17 | 270 | 470 |
| 450 | 560 | 35x40 | 3.21 | 270 | 470 |
| 450 | 560 | 40x50 | 3.46 | 270 | 470 |
| 450 | 560 | 45x40 | 3.48 | 270 | 470 |
| 450 | 680 | 30x50 | 3.46 | 220 | 390 |
| 450 | 680 | 35x40 | 3.51 | 220 | 390 |
| 450 | 680 | 35x45 | 3.65 | 220 | 390 |
| 450 | 680 | 40x60 | 3.98 | 220 | 390 |
| 450 | 680 | 45x45 | 4.01 | 220 | 390 |
| 450 | 820 | 30x60 | 3.97 | 180 | 320 |
| 450 | 820 | 35x45 | 3.90 | 180 | 320 |
| 450 | 820 | 35x50 | 4.01 | 180 | 320 |
| 450 | 820 | 45x55 | 4.47 | 180 | 320 |
| 450 | 1000 | 35x55 | 4.01 | 150 | 270 |
| 450 | 1000 | 35x60 | 4.11 | 150 | 270 |
| 450 | 1000 | 40x55 | 4.60 | 150 | 270 |
| 450 | 1000 | 45x60 | 5.08 | 150 | 270 |
| 450 | 1200 | 40x65 | 5.42 | 130 | 220 |
| 450 | 1200 | 45x60 | 5.79 | 130 | 220 |
| 450 | 1500 | 45x85 | 6.84 | 100 | 180 |
| 450 | 1800 | 45x100 | 7.86 | 86 | 150 |
| 450 | 2200 | 45x90 | 8.48 | 69 | 120 |
| 500 | 47 | 22x20 | 0.56 | 3220 | 5640 |
| 500 | 56 | 20x25 | 0.62 | 2710 | 4740 |
| 500 | 56 | 22x25 | 0.63 | 2710 | 4740 |
| 500 | 56 | 25x20 | 0.64 | 2710 | 4740 |
| 500 | 68 | 20x30 | 0.65 | 2230 | 3900 |
| 500 | 68 | 22x25 | 0.63 | 2230 | 3900 |
| 500 | 68 | 22x30 | 0.75 | 2230 | 3900 |
| 500 | 68 | 25x20 | 0.68 | 2230 | 3900 |
| 500 | 68 | 25x25 | 0.78 | 2230 | 3900 |
| 500 | 82 | 20x30 | 0.85 | 1850 | 3230 |
| 500 | 82 | 22x30 | 0.92 | 1850 | 3230 |
| 500 | 82 | 25x25 | 0.95 | 1850 | 3230 |
| 500 | 100 | 22x35 | 1.02 | 1510 | 2650 |
| 500 | 100 | 25x30 | 1.06 | 1510 | 2650 |
| 500 | 100 | 30x20 | 1.04 | 1510 | 2650 |
| 500 | 100 | 30x25 | 1.07 | 1510 | 2650 |
| 500 | 120 | 22x40 | 1.12 | 1260 | 2210 |
| 500 | 120 | 25x30 | 1.08 | 1260 | 2210 |
| 500 | 120 | 25x35 | 1.23 | 1260 | 2210 |
| 500 | 120 | 30x30 | 1.25 | 1260 | 2210 |
| 500 | 120 | 35x25 | 1.28 | 1260 | 2210 |
| 500 | 150 | 22x45 | 1.26 | 1010 | 1770 |
| 500 | 150 | 25x35 | 1.25 | 1010 | 1770 |
| 500 | 150 | 25x40 | 1.28 | 1010 | 1770 |
| 500 | 150 | 30x30 | 1.34 | 1010 | 1770 |
| 500 | 150 | 30x35 | 1.38 | 1010 | 1770 |
| 500 | 150 | 35x25 | 1.36 | 1010 | 1770 |
| 500 | 180 | 22x50 | 1.39 | 840 | 1470 |
| 500 | 180 | 25x40 | 1.30 | 840 | 1470 |
| 500 | 180 | 25x45 | 1.45 | 840 | 1470 |
| 500 | 180 | 30x30 | 1.28 | 840 | 1470 |
| 500 | 180 | 30x35 | 1.47 | 840 | 1470 |
| 500 | 180 | 35x20 | 1.21 | 840 | 1470 |
| 500 | 180 | 35x25 | 1.46 | 840 | 1470 |
| 500 | 220 | 25x50 | 1.52 | 690 | 1210 |
| 500 | 220 | 30x35 | 1.51 | 690 | 1210 |
| 500 | 220 | 30x40 | 1.60 | 690 | 1210 |
| 500 | 220 | 35x30 | 1.62 | 690 | 1210 |

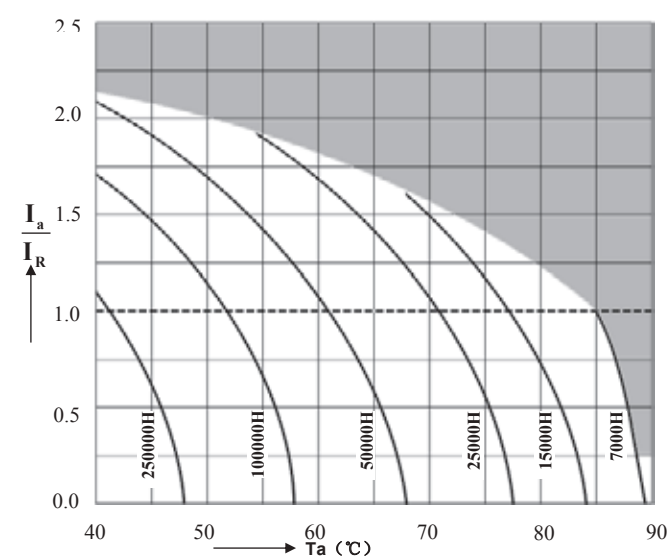
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 270 | 30x40 | 1.77 | 560 | 980 |
| 500 | 270 | 30x45 | 1.98 | 560 | 980 |
| 500 | 270 | 35x35 | 2.02 | 560 | 980 |
| 500 | 330 | 30x50 | 2.25 | 460 | 800 |
| 500 | 330 | 35x35 | 2.03 | 460 | 800 |
| 500 | 330 | 35x40 | 2.27 | 460 | 800 |
| 500 | 390 | 35x45 | 2.45 | 390 | 680 |
| 500 | 470 | 35x50 | 2.76 | 320 | 560 |
| 500 | 560 | 35x60 | 2.90 | 270 | 470 |
| 500 | 560 | 40x50 | 3.31 | 270 | 470 |
| 500 | 680 | 35x70 | 3.82 | 220 | 390 |
| 500 | 680 | 40x55 | 3.79 | 220 | 390 |
| 500 | 820 | 35x80 | 4.56 | 180 | 320 |
| 500 | 820 | 40x60 | 4.33 | 180 | 320 |
| 500 | 1000 | 35x90 | 5.31 | 150 | 270 |
| 500 | 1000 | 40x80 | 5.42 | 150 | 270 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 1500 | 40x100 | 6.56 | 100 | 180 |
| 600 | 150 | 30x45 | 0.95 | 1010 | 1770 |
| 600 | 180 | 30x50 | 1.10 | 840 | 1470 |
| 600 | 220 | 30x60 | 1.22 | 690 | 1210 |
| 600 | 270 | 30x70 | 1.25 | 560 | 980 |
| 600 | 330 | 30x80 | 1.36 | 460 | 800 |
| 600 | 330 | 40x50 | 1.35 | 460 | 800 |
| 600 | 390 | 40x60 | 1.48 | 390 | 680 |
| 600 | 470 | 40x70 | 1.67 | 320 | 560 |
| 600 | 470 | 45x55 | 1.65 | 320 | 560 |
| 600 | 560 | 40x80 | 1.78 | 270 | 470 |
| 600 | 560 | 45x60 | 1.75 | 270 | 470 |
| 600 | 680 | 40x90 | 1.85 | 220 | 390 |
| 600 | 680 | 45x70 | 1.83 | 220 | 390 |
| 600 | 820 | 45x85 | 2.01 | 180 | 320 |
| 600 | 1000 | 45x100 | 2.28 | 150 | 270 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $VR \leq 100V$



depending on ambient temperature T_a versus under ripple current operating conditions $VR \geq 160V$

LD Series 85°C 5000H

Features

Standard capacitors

Applications

- ◆ Switch-mode power supplies in industrial and entertainment electronics
- ◆ Uninterruptible power supplies

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



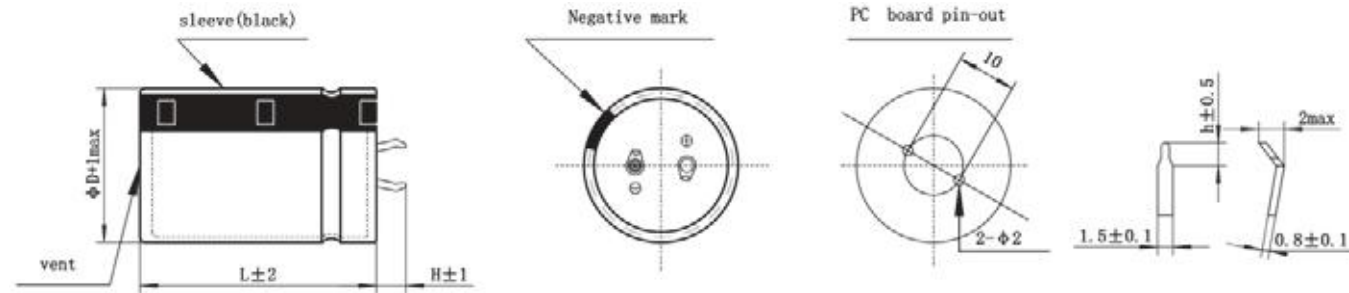
Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|---|---|---|----------------------------------|----|----|----|--------------|---------|----------------------------------|---------|---------|---------|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C | | | | | | | | | | |
| Rated voltage V_R | 10 to 450 V DC | 500 V DC | | | | | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | | | | | | |
| Rated capacitance C_R | 47 to 100000 μF | 47 to 1500 μF | | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current I_{leak} (+20°C.max.) | $I \leq 3 \sqrt{CV}$ (μA)After 5minutes with rated working voltage applied | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | | | |
| | $\mu F/Vdc$ | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~420 | 450~600 |
| | ≤ 8200 | - | 35 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 15 | 20 |
| | 10000 to 22000 | 55 | 40 | 40 | 35 | 30 | 30 | 25 | 15 | - | - | - |
| | ≥ 27000 | 60 | 50 | 40 | 35 | 35 | 30 | 25 | - | - | - | - |
| Self-inductance ESL | approx. 20 nH | | | | | | | | | | | |
| Useful life 85°C; $V_R, I_{AC,R}$ 85°C; $V_R, I_{AC,R}$ | $V_R \leq 100V$: | Requirements: | | | | | | | | | | |
| | $V_R > 100V$: | Requirements: | | | | | | | | | | |
| Voltage Endurance test 85°C; V_R | 5000 h | $V_R \leq 100V$ | | | | | $V_R > 100V$ | | | | | |
| | | DC/C | $\leq \pm 30\%$ of initial value | | | | | DC/C | $\leq \pm 20\%$ of initial value | | | |
| Shelf Life 85°C | 1000 h | $V_R \leq 100V$ | | | | | $V_R > 100V$ | | | | | |
| | | DC/C | $\leq \pm 15\%$ of initial value | | | | | DC/C | $\leq \pm 10\%$ of initial value | | | |
| Vibration Resistance test | | To IEC 60068-2-6, test Fc: | | | | | | | | | | |
| | | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | |
| Characteristics at low temperature | | Max. impedance ratio at 120 Hz | | | | | | | | | | |
| | | $V_R(V)$ | 6.3 | 10 | 16 | 25 | 35~100 | 160~250 | 315~450 | 500~600 | | |
| | | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 5 | 5 | 5 | 4 | 4 | 4 | 8 | 8 | | |
| Sectional specification | | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | |
| | | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 15 | 15 | 15 | 15 | 12 | 7 | 10 | - | | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $10 \leq V_R \leq 100$ | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 10 | 10000 | 22x25 | 2.51 | 36 | 46 |
| 10 | 12000 | 22x25 | 2.71 | 34 | 44 |
| 10 | 15000 | 22x30 | 3.21 | 27 | 35 |
| 10 | 15000 | 25x25 | 3.21 | 27 | 35 |
| 10 | 18000 | 22x35 | 3.61 | 23 | 29 |
| 10 | 18000 | 25x30 | 3.61 | 23 | 29 |
| 10 | 22000 | 22x40 | 4.11 | 19 | 24 |
| 10 | 22000 | 25x35 | 4.11 | 19 | 24 |
| 10 | 22000 | 30x25 | 4.11 | 19 | 24 |
| 10 | 33000 | 22x45 | 4.81 | 15 | 20 |
| 10 | 33000 | 25x40 | 5.21 | 15 | 20 |
| 10 | 33000 | 30x30 | 5.21 | 15 | 20 |
| 10 | 47000 | 22x50 | 6.01 | 11 | 14 |
| 10 | 47000 | 25x45 | 6.31 | 11 | 14 |
| 10 | 47000 | 30x35 | 6.31 | 11 | 14 |
| 10 | 56000 | 30x40 | 7.21 | 9 | 12 |
| 10 | 56000 | 35x35 | 7.51 | 9 | 12 |
| 10 | 68000 | 30x50 | 8.21 | 8 | 10 |
| 10 | 68000 | 35x40 | 8.21 | 8 | 10 |
| 10 | 82000 | 35x50 | 9.31 | 6 | 8 |
| 10 | 100000 | 35x55 | 10.11 | 5 | 7 |
| 16 | 8200 | 22x25 | 2.21 | 44 | 57 |
| 16 | 10000 | 22x30 | 2.61 | 36 | 46 |
| 16 | 10000 | 25x25 | 2.61 | 36 | 46 |
| 16 | 12000 | 22x35 | 2.91 | 34 | 44 |
| 16 | 15000 | 22x40 | 3.31 | 27 | 35 |
| 16 | 15000 | 25x30 | 3.31 | 27 | 35 |
| 16 | 15000 | 30x25 | 3.41 | 27 | 35 |
| 16 | 18000 | 22x45 | 3.81 | 23 | 29 |
| 16 | 18000 | 25x35 | 3.71 | 23 | 29 |
| 16 | 22000 | 22x50 | 4.21 | 19 | 24 |
| 16 | 22000 | 25x40 | 4.21 | 19 | 24 |
| 16 | 22000 | 30x30 | 4.21 | 19 | 24 |
| 16 | 22000 | 35x25 | 4.41 | 19 | 24 |
| 16 | 33000 | 25x45 | 5.21 | 12 | 16 |
| 16 | 33000 | 30x35 | 5.21 | 12 | 16 |
| 16 | 33000 | 35x30 | 5.21 | 12 | 16 |
| 16 | 47000 | 25x50 | 6.31 | 9 | 11 |
| 16 | 47000 | 30x40 | 6.31 | 9 | 11 |
| 16 | 47000 | 35x35 | 6.31 | 9 | 11 |
| 16 | 56000 | 30x45 | 9.81 | 7 | 10 |
| 16 | 56000 | 35x40 | 9.81 | 7 | 10 |
| 16 | 56000 | 40x40 | 9.81 | 7 | 10 |
| 16 | 68000 | 35x50 | 10.81 | 6 | 8 |
| 16 | 68000 | 40x50 | 11.51 | 6 | 8 |
| 16 | 82000 | 35x60 | 11.81 | 5 | 7 |
| 16 | 82000 | 40x50 | 11.81 | 5 | 7 |
| 16 | 100000 | 35x80 | 13.21 | 4 | 6 |
| 16 | 100000 | 40x60 | 13.51 | 4 | 6 |
| 25 | 5600 | 22x25 | 2.01 | 55 | 71 |
| 25 | 6800 | 22x30 | 2.31 | 45 | 59 |
| 25 | 6800 | 25x25 | 2.31 | 45 | 59 |
| 25 | 8200 | 22x35 | 2.61 | 37 | 49 |
| 25 | 10000 | 22x40 | 2.91 | 31 | 40 |
| 25 | 10000 | 25x30 | 2.81 | 31 | 40 |
| 25 | 10000 | 30x25 | 3.01 | 31 | 40 |
| 25 | 12000 | 22x45 | 3.31 | 30 | 39 |
| 25 | 12000 | 25x35 | 3.21 | 30 | 39 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 25 | 12000 | 30x30 | 3.41 | 30 | 39 |
| 25 | 15000 | 25x40 | 3.71 | 24 | 31 |
| 25 | 15000 | 35x25 | 3.91 | 24 | 31 |
| 25 | 18000 | 25x50 | 4.31 | 20 | 26 |
| 25 | 18000 | 30x35 | 4.21 | 20 | 26 |
| 25 | 18000 | 35x30 | 4.41 | 20 | 26 |
| 25 | 22000 | 30x40 | 5.01 | 16 | 21 |
| 25 | 22000 | 35x35 | 5.01 | 16 | 21 |
| 25 | 33000 | 35x40 | 8.11 | 11 | 14 |
| 25 | 33000 | 40x40 | 8.71 | 11 | 14 |
| 25 | 39000 | 35x45 | 9.01 | 9 | 12 |
| 25 | 39000 | 40x40 | 9.61 | 9 | 12 |
| 25 | 47000 | 35x50 | 9.61 | 8 | 10 |
| 25 | 56000 | 35x60 | 10.31 | 6 | 8 |
| 25 | 56000 | 40x50 | 10.81 | 6 | 8 |
| 25 | 68000 | 35x80 | 11.31 | 5 | 7 |
| 25 | 68000 | 40x60 | 11.81 | 5 | 7 |
| 25 | 82000 | 40x80 | 13.51 | 4 | 6 |
| 35 | 3300 | 22x25 | 1.81 | 77 | 100 |
| 35 | 3900 | 22x30 | 2.11 | 65 | 85 |
| 35 | 4700 | 25x25 | 2.21 | 54 | 71 |
| 35 | 5600 | 22x35 | 2.31 | 46 | 59 |
| 35 | 5600 | 25x30 | 2.31 | 46 | 59 |
| 35 | 6800 | 22x40 | 2.91 | 38 | 49 |
| 35 | 6800 | 25x35 | 2.91 | 38 | 49 |
| 35 | 6800 | 30x25 | 2.91 | 38 | 49 |
| 35 | 8200 | 22x50 | 2.81 | 31 | 40 |
| 35 | 8200 | 25x40 | 2.81 | 31 | 40 |
| 35 | 8200 | 30x30 | 2.81 | 31 | 40 |
| 35 | 8200 | 35x25 | 2.91 | 31 | 40 |
| 35 | 10000 | 25x45 | 3.11 | 26 | 33 |
| 35 | 10000 | 30x35 | 3.21 | 26 | 33 |
| 35 | 12000 | 25x50 | 3.51 | 26 | 33 |
| 35 | 12000 | 30x40 | 3.51 | 26 | 33 |
| 35 | 12000 | 35x30 | 3.61 | 26 | 33 |
| 35 | 15000 | 30x45 | 4.11 | 20 | 27 |
| 35 | 15000 | 35x35 | 4.11 | 20 | 27 |
| 35 | 18000 | 30x50 | 4.61 | 17 | 22 |
| 35 | 18000 | 35x40 | 4.71 | 17 | 22 |
| 35 | 22000 | 35x45 | 5.31 | 14 | 18 |
| 35 | 27000 | 35x45 | 8.21 | 13 | 17 |
| 35 | 27000 | 40x40 | 8.21 | 13 | 17 |
| 35 | 33000 | 35x50 | 8.71 | 11 | 14 |
| 35 | 39000 | 35x60 | 10.31 | 9 | 12 |
| 35 | 39000 | 40x50 | 10.31 | 9 | 12 |
| 35 | 47000 | 35x80 | 11.41 | 8 | 10 |
| 35 | 47000 | 40x60 | 10.81 | 8 | 10 |
| 35 | 56000 | 40x70 | 12.11 | 6 | 8 |
| 35 | 68000 | 40x80 | 14.21 | 5 | 7 |
| 50 | 2200 | 22x25 | 1.71 | 92 | 120 |
| 50 | 2700 | 22x30 | 1.91 | 76 | 98 |
| 50 | 2700 | 25x25 | 1.91 | 76 | 98 |
| 50 | 3300 | 25x30 | 1.81 | 62 | 80 |
| 50 | 3900 | 22x35 | 2.11 | 52 | 68 |
| 50 | 3900 | 25x30 | 2.11 | 52 | 68 |
| 50 | 3900 | 30x25 | 2.41 | 52 | 68 |
| 50 | 4700 | 22x40 | 2.41 | 43 | 56 |
| 50 | 4700 | 25x35 | 2.41 | 43 | 56 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 50 | 5600 | 22x50 | 2.51 | 36 | 47 |
| 50 | 5600 | 25x40 | 2.51 | 36 | 47 |
| 50 | 5600 | 30x30 | 2.51 | 36 | 47 |
| 50 | 5600 | 35x25 | 2.61 | 36 | 47 |
| 50 | 6800 | 25x45 | 3.21 | 30 | 39 |
| 50 | 6800 | 30x35 | 3.21 | 30 | 39 |
| 50 | 8200 | 25x50 | 3.01 | 25 | 32 |
| 50 | 8200 | 30x40 | 3.01 | 25 | 32 |
| 50 | 8200 | 35x30 | 3.01 | 25 | 32 |
| 50 | 10000 | 30x45 | 3.41 | 20 | 27 |
| 50 | 10000 | 35x35 | 3.41 | 20 | 27 |
| 50 | 12000 | 30x45 | 3.81 | 26 | 33 |
| 50 | 12000 | 35x35 | 3.81 | 26 | 33 |
| 50 | 15000 | 30x50 | 4.51 | 20 | 27 |
| 50 | 15000 | 35x40 | 7.71 | 20 | 27 |
| 50 | 15000 | 40x40 | 8.11 | 20 | 27 |
| 50 | 18000 | 35x45 | 8.31 | 17 | 22 |
| 50 | 18000 | 40x40 | 8.31 | 17 | 22 |
| 50 | 22000 | 35x50 | 9.11 | 14 | 18 |
| 50 | 22000 | 40x50 | 9.41 | 14 | 18 |
| 50 | 27000 | 35x80 | 11.21 | 11 | 15 |
| 50 | 27000 | 40x60 | 10.81 | 11 | 15 |
| 50 | 33000 | 35x80 | 13.41 | 9 | 12 |
| 50 | 33000 | 40x70 | 13.41 | 9 | 12 |
| 50 | 39000 | 40x80 | 15.51 | 8 | 10 |
| 63 | 1500 | 22x25 | 1.61 | 140 | 180 |
| 63 | 1800 | 22x25 | 1.81 | 120 | 150 |
| 63 | 2200 | 22x30 | 2.01 | 92 | 120 |
| 63 | 2200 | 25x25 | 2.01 | 92 | 120 |
| 63 | 2700 | 22x35 | 2.21 | 76 | 98 |
| 63 | 2700 | 25x30 | 2.31 | 76 | 98 |
| 63 | 3300 | 22x40 | 2.31 | 62 | 80 |
| 63 | 3300 | 25x35 | 2.31 | 62 | 80 |
| 63 | 3300 | 30x25 | 2.31 | 62 | 80 |
| 63 | 3900 | 22x45 | 2.51 | 52 | 68 |
| 63 | 3900 | 25x40 | 2.61 | 52 | 68 |
| 63 | 3900 | 30x30 | 2.61 | 52 | 68 |
| 63 | 3900 | 35x25 | 2.71 | 52 | 68 |
| 63 | 4700 | 30x30 | 2.91 | 43 | 56 |
| 63 | 5600 | 25x45 | 3.11 | 36 | 47 |
| 63 | 5600 | 30x35 | 3.21 | 36 | 47 |
| 63 | 5600 | 35x30 | 3.31 | 36 | 47 |
| 63 | 6800 | 30x40 | 3.61 | 30 | 39 |
| 63 | 6800 | 35x35 | 3.71 | 30 | 39 |
| 63 | 8200 | 30x50 | 3.71 | 25 | 32 |
| 63 | 8200 | 35x40 | 3.81 | 25 | 32 |
| 63 | 10000 | 35x45 | 4.31 | 20 | 27 |
| 63 | 12000 | 35x50 | 4.81 | 21 | 28 |
| 63 | 12000 | 35x50 | 8.71 | 21 | 28 |
| 63 | 12000 | 40x40 | 8.61 | 21 | 28 |
| 63 | 15000 | 35x70 | 10.21 | 17 | 22 |
| 63 | 15000 | 40x50 | 9.51 | 17 | 22 |
| 63 | 18000 | 35x80 | 11.21 | 14 | 18 |
| 63 | 18000 | 40x60 | 10.71 | 14 | 18 |
| 63 | 27000 | 40x80 | 12.71 | 9 | 12 |
| 80 | 1000 | 22x25 | 1.31 | 150 | 200 |
| 80 | 1200 | 22x30 | 1.51 | 130 | 170 |
| 80 | 1500 | 25x25 | 1.71 | 100 | 130 |
| 80 | 1800 | 22x35 | 1.91 | 85 | 110 |
| 80 | 1800 | 25x30 | 1.91 | 85 | 110 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 80 | 2200 | 22x40 | 2.11 | 70 | 90 |
| 80 | 2200 | 25x35 | 2.21 | 70 | 90 |
| 80 | 2200 | 30x25 | 2.21 | 70 | 90 |
| 80 | 2700 | 22x50 | 2.51 | 57 | 74 |
| 80 | 2700 | 25x40 | 2.51 | 57 | 74 |
| 80 | 2700 | 30x30 | 2.51 | 57 | 74 |
| 80 | 2700 | 35x25 | 2.51 | 57 | 74 |
| 80 | 3300 | 25x45 | 2.81 | 46 | 60 |
| 80 | 3300 | 30x35 | 2.81 | 46 | 60 |
| 80 | 3900 | 25x50 | 3.11 | 39 | 51 |
| 80 | 3900 | 30x40 | 3.21 | 39 | 51 |
| 80 | 3900 | 35x30 | 3.21 | 39 | 51 |
| 80 | 4700 | 30x45 | 3.61 | 33 | 42 |
| 80 | 4700 | 35x35 | 3.61 | 33 | 42 |
| 80 | 5600 | 30x50 | 3.81 | 27 | 36 |
| 80 | 5600 | 35x40 | 3.81 | 27 | 36 |
| 80 | 6800 | 35x50 | 4.11 | 23 | 29 |
| 80 | 8200 | 35x50 | 6.91 | 19 | 24 |
| 80 | 10000 | 35x60 | 8.71 | 15 | 20 |
| 80 | 12000 | 35x70 | 9.71 | 13 | 17 |
| 80 | 12000 | 40x50 | 9.01 | 13 | 17 |
| 80 | 15000 | 35x80 | 10.51 | 10 | 13 |
| 80 | 15000 | 40x60 | 10.21 | 10 | 13 |
| 80 | 18000 | 40x80 | 12.31 | 9 | 11 |
| 100 | 680 | 22x25 | 1.11 | 220 | 290 |
| 100 | 820 | 22x30 | 1.21 | 180 | 240 |
| 100 | 1000 | 25x25 | 1.41 | 150 | 200 |
| 100 | 1200 | 22x35 | 1.61 | 130 | 170 |
| 100 | 1200 | 25x30 | 1.61 | 130 | 170 |
| 100 | 1500 | 22x40 | 1.81 | 100 | 130 |
| 100 | 1500 | 25x35 | 1.81 | 100 | 130 |
| 100 | 1500 | 30x25 | 1.81 | 100 | 130 |
| 100 | 1800 | 22x50 | 2.11 | 85 | 110 |
| 100 | 1800 | 25x40 | 2.01 | 85 | 110 |
| 100 | 1800 | 30x30 | 2.11 | 85 | 110 |
| 100 | 1800 | 35x25 | 2.21 | 85 | 110 |
| 100 | 2200 | 25x45 | 2.21 | 70 | 90 |
| 100 | 2200 | 30x35 | 2.31 | 70 | 90 |
| 100 | 2200 | 35x30 | 2.51 | 70 | 90 |
| 100 | 2700 | 25x50 | 2.61 | 57 | 74 |
| 100 | 2700 | 30x40 | 2.71 | 57 | 74 |
| 100 | 3300 | 30x45 | 3.01 | 46 | 60 |
| 100 | 3300 | 35x35 | 3.11 | 46 | 60 |
| 100 | 3900 | 30x45 | 3.41 | 39 | 51 |
| 100 | 3900 | 35x35 | 3.41 | 39 | 51 |
| 100 | 4700 | 35x40 | 4.01 | 33 | 42 |
| 100 | 5600 | 35x45 | 7.01 | 27 | 36 |
| 100 | 5600 | 40x40 | 7.41 | 27 | 36 |
| 100 | 6800 | 35x50 | 8.01 | 23 | 29 |
| 100 | 6800 | 40x50 | 8.91 | 23 | 29 |
| 100 | 8200 | 35x70 | 9.61 | 19 | 24 |
| 100 | 8200 | 40x60 | 9.61 | 19 | 24 |
| 100 | 10000 | 35x80 | 10.41 | 15 | 20 |
| 100 | 10000 | 40x60 | 10.21 | 15 | 20 |
| 100 | 12000 | 40x80 | 12.31 | 13 | 17 |
| 160 | 220 | 22x20 | 1.01 | 500 | 900 |
| 160 | 270 | 22x25 | 1.11 | 410 | 740 |
| 160 | 330 | 22x25 | 1.51 | 330 | 600 |
| 160 | 390 | 22x30 | 1.51 | 280 | 510 |
| 160 | 390 | 25x25 | 1.61 | 280 | 510 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 160 | 470 | 22x35 | 1.81 | 230 | 420 |
| 160 | 470 | 25x25 | 1.71 | 230 | 420 |
| 160 | 560 | 22x35 | 2.11 | 200 | 360 |
| 160 | 560 | 25x30 | 2.21 | 200 | 360 |
| 160 | 560 | 30x25 | 2.11 | 200 | 360 |
| 160 | 680 | 22x40 | 2.31 | 160 | 290 |
| 160 | 680 | 25x35 | 2.31 | 160 | 290 |
| 160 | 820 | 22x50 | 2.71 | 130 | 240 |
| 160 | 820 | 25x40 | 2.71 | 130 | 240 |
| 160 | 820 | 30x30 | 2.71 | 130 | 240 |
| 160 | 820 | 35x25 | 2.71 | 130 | 240 |
| 160 | 1000 | 25x45 | 3.31 | 110 | 200 |
| 160 | 1000 | 30x35 | 3.41 | 110 | 200 |
| 160 | 1000 | 35x30 | 3.41 | 110 | 200 |
| 160 | 1200 | 25x50 | 3.71 | 94 | 170 |
| 160 | 1200 | 30x40 | 3.81 | 94 | 170 |
| 160 | 1200 | 35x35 | 3.81 | 94 | 170 |
| 160 | 1500 | 30x45 | 4.41 | 72 | 130 |
| 160 | 1500 | 35x40 | 4.41 | 72 | 130 |
| 160 | 1800 | 35x40 | 4.41 | 61 | 110 |
| 160 | 2200 | 35x45 | 4.91 | 50 | 90 |
| 160 | 2700 | 35x50 | 5.31 | 41 | 74 |
| 160 | 3300 | 35x70 | 5.51 | 33 | 60 |
| 160 | 3300 | 40x60 | 5.51 | 33 | 60 |
| 160 | 3900 | 35x80 | 5.91 | 28 | 51 |
| 160 | 4700 | 40x80 | 7.31 | 24 | 42 |
| 180 | 270 | 22x25 | 1.21 | 410 | 740 |
| 180 | 330 | 22x30 | 1.51 | 330 | 600 |
| 180 | 390 | 25x25 | 1.68 | 280 | 510 |
| 180 | 470 | 22x35 | 1.71 | 230 | 420 |
| 180 | 470 | 25x30 | 1.71 | 230 | 420 |
| 180 | 470 | 30x25 | 1.81 | 230 | 420 |
| 180 | 560 | 22x40 | 2.12 | 200 | 360 |
| 180 | 560 | 25x35 | 2.12 | 200 | 360 |
| 180 | 680 | 22x50 | 2.41 | 160 | 290 |
| 180 | 680 | 25x40 | 2.41 | 160 | 290 |
| 180 | 680 | 30x30 | 2.41 | 160 | 290 |
| 180 | 680 | 35x25 | 2.41 | 160 | 290 |
| 180 | 820 | 25x45 | 2.71 | 130 | 240 |
| 180 | 820 | 30x35 | 2.71 | 130 | 240 |
| 180 | 820 | 35x30 | 2.71 | 130 | 240 |
| 180 | 1000 | 25x50 | 3.51 | 110 | 200 |
| 180 | 1000 | 30x40 | 3.51 | 110 | 200 |
| 180 | 1200 | 30x45 | 3.92 | 94 | 170 |
| 180 | 1200 | 35x35 | 3.92 | 94 | 170 |
| 180 | 1500 | 35x45 | 4.61 | 72 | 130 |
| 180 | 1800 | 35x50 | 4.11 | 61 | 110 |
| 200 | 220 | 22x25 | 1.21 | 500 | 900 |
| 200 | 270 | 22x25 | 1.32 | 410 | 740 |
| 200 | 330 | 22x25 | 1.54 | 330 | 600 |
| 200 | 330 | 22x30 | 1.61 | 330 | 600 |
| 200 | 330 | 25x25 | 1.64 | 330 | 600 |
| 200 | 390 | 22x30 | 1.75 | 280 | 510 |
| 200 | 390 | 25x25 | 1.68 | 280 | 510 |
| 200 | 390 | 25x30 | 1.87 | 280 | 510 |
| 200 | 390 | 30x25 | 2.06 | 280 | 510 |
| 200 | 470 | 22x30 | 1.95 | 230 | 420 |
| 200 | 470 | 22x35 | 2.00 | 230 | 420 |
| 200 | 470 | 25x25 | 1.95 | 230 | 420 |
| 200 | 470 | 25x30 | 2.05 | 230 | 420 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 200 | 470 | 30x25 | 2.28 | 230 | 420 |
| 200 | 560 | 22x35 | 2.25 | 200 | 360 |
| 200 | 560 | 22x40 | 2.32 | 200 | 360 |
| 200 | 560 | 25x30 | 2.24 | 200 | 360 |
| 200 | 560 | 25x35 | 2.34 | 200 | 360 |
| 200 | 560 | 30x25 | 2.34 | 200 | 360 |
| 200 | 560 | 30x30 | 2.59 | 200 | 360 |
| 200 | 560 | 35x25 | 2.58 | 200 | 360 |
| 200 | 680 | 22x40 | 2.60 | 160 | 290 |
| 200 | 680 | 22x45 | 2.57 | 160 | 290 |
| 200 | 680 | 25x35 | 2.49 | 160 | 290 |
| 200 | 680 | 25x40 | 2.68 | 160 | 290 |
| 200 | 680 | 30x25 | 2.42 | 160 | 290 |
| 200 | 680 | 30x30 | 2.87 | 160 | 290 |
| 200 | 680 | 35x25 | 2.90 | 160 | 290 |
| 200 | 820 | 22x45 | 2.99 | 130 | 240 |
| 200 | 820 | 25x35 | 2.76 | 130 | 240 |
| 200 | 820 | 25x40 | 2.99 | 130 | 240 |
| 200 | 820 | 25x45 | 3.06 | 130 | 240 |
| 200 | 820 | 30x30 | 2.99 | 130 | 240 |
| 200 | 820 | 30x35 | 3.28 | 130 | 240 |
| 200 | 820 | 35x25 | 3.06 | 130 | 240 |
| 200 | 820 | 35x30 | 3.30 | 130 | 240 |
| 200 | 1000 | 25x45 | 3.63 | 110 | 200 |
| 200 | 1000 | 25x50 | 3.80 | 110 | 200 |
| 200 | 1000 | 30x30 | 3.51 | 110 | 200 |
| 200 | 1000 | 30x35 | 3.63 | 110 | 200 |
| 200 | 1000 | 30x40 | 4.00 | 110 | 200 |
| 200 | 1000 | 35x25 | 3.51 | 110 | 200 |
| 200 | 1000 | 35x30 | 4.10 | 110 | 200 |
| 200 | 1200 | 25x50 | 4.03 | 94 | 170 |
| 200 | 1200 | 30x45 | 4.53 | 94 | 170 |
| 200 | 1200 | 35x35 | 4.53 | 94 | 170 |
| 200 | 1500 | 30x50 | 5.26 | 72 | 130 |
| 200 | 1500 | 35x35 | 4.80 | 72 | 130 |
| 200 | 1500 | 35x40 | 5.26 | 72 | 130 |
| 200 | 1800 | 30x50 | 5.31 | 61 | 110 |
| 200 | 1800 | 30x55 | 5.67 | 61 | 110 |
| 200 | 1800 | 35x40 | 5.31 | 61 | 110 |
| 200 | 1800 | 35x45 | 5.77 | 61 | 110 |
| 200 | 2200 | 35x45 | 5.81 | 50 | 90 |
| 200 | 2200 | 35x50 | 5.91 | 50 | 90 |
| 200 | 2700 | 35x55 | 6.03 | 41 | 74 |
| 200 | 2700 | 35x60 | 6.19 | 41 | 74 |
| 200 | 2700 | 40x50 | 6.19 | 41 | 74 |
| 200 | 3300 | 35x80 | 7.50 | 33 | 60 |
| 200 | 3300 | 40x60 | 7.50 | 33 | 60 |
| 200 | 3900 | 40x80 | 8.00 | 28 | 51 |
| 250 | 100 | 22x25 | 0.73 | 1110 | 1990 |
| 250 | 150 | 22x25 | 0.93 | 740 | 1330 |
| 250 | 180 | 22x25 | 1.12 | 620 | 1110 |
| 250 | 220 | 22x30 | 1.29 | 500 | 900 |
| 250 | 220 | 25x25 | 1.29 | 500 | 900 |
| 250 | 270 | 22x30 | 1.47 | 410 | 740 |
| 250 | 270 | 25x25 | 1.54 | 410 | 740 |
| 250 | 330 | 22x30 | 1.67 | 330 | 600 |
| 250 | 330 | 22x35 | 1.70 | 330 | 600 |
| 250 | 330 | 25x25 | 1.63 | 330 | 600 |
| 250 | 330 | 25x30 | 1.79 | 330 | 600 |
| 250 | 390 | 22x35 | 1.91 | 280 | 510 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 250 | 390 | 22x40 | 1.94 | 280 | 510 |
| 250 | 390 | 25x30 | 1.86 | 280 | 510 |
| 250 | 390 | 25x35 | 2.02 | 280 | 510 |
| 250 | 390 | 30x25 | 2.15 | 280 | 510 |
| 250 | 470 | 22x40 | 2.19 | 230 | 420 |
| 250 | 470 | 22x45 | 2.22 | 230 | 420 |
| 250 | 470 | 25x30 | 2.06 | 230 | 420 |
| 250 | 470 | 25x35 | 2.23 | 230 | 420 |
| 250 | 470 | 30x30 | 2.45 | 230 | 420 |
| 250 | 560 | 22x40 | 2.46 | 200 | 360 |
| 250 | 560 | 22x50 | 2.54 | 200 | 360 |
| 250 | 560 | 25x35 | 2.46 | 200 | 360 |
| 250 | 560 | 25x40 | 2.53 | 200 | 360 |
| 250 | 560 | 30x30 | 2.70 | 200 | 360 |
| 250 | 560 | 35x25 | 2.73 | 200 | 360 |
| 250 | 680 | 22x50 | 2.90 | 160 | 290 |
| 250 | 680 | 25x40 | 2.72 | 160 | 290 |
| 250 | 680 | 25x45 | 2.90 | 160 | 290 |
| 250 | 680 | 30x35 | 3.09 | 160 | 290 |
| 250 | 680 | 35x25 | 2.90 | 160 | 290 |
| 250 | 680 | 35x30 | 3.35 | 160 | 290 |
| 250 | 820 | 25x45 | 3.28 | 130 | 240 |
| 250 | 820 | 25x50 | 3.36 | 130 | 240 |
| 250 | 820 | 25x55 | 3.48 | 130 | 240 |
| 250 | 820 | 30x35 | 3.30 | 130 | 240 |
| 250 | 820 | 30x40 | 3.39 | 130 | 240 |
| 250 | 820 | 35x30 | 3.44 | 130 | 240 |
| 250 | 820 | 35x35 | 3.81 | 130 | 240 |
| 250 | 1000 | 25x50 | 3.80 | 110 | 200 |
| 250 | 1000 | 30x40 | 4.00 | 110 | 200 |
| 250 | 1000 | 30x45 | 4.29 | 110 | 200 |
| 250 | 1000 | 35x30 | 4.10 | 110 | 200 |
| 250 | 1000 | 35x35 | 4.29 | 110 | 200 |
| 250 | 1000 | 35x40 | 4.38 | 110 | 200 |
| 250 | 1200 | 30x45 | 4.62 | 94 | 170 |
| 250 | 1200 | 30x50 | 4.74 | 94 | 170 |
| 250 | 1200 | 35x35 | 4.62 | 94 | 170 |
| 250 | 1200 | 35x40 | 4.76 | 94 | 170 |
| 250 | 1500 | 35x40 | 5.38 | 72 | 130 |
| 250 | 1500 | 35x45 | 5.48 | 72 | 130 |
| 250 | 1800 | 35x45 | 5.78 | 61 | 110 |
| 250 | 1800 | 35x55 | 6.35 | 61 | 110 |
| 250 | 2200 | 35x55 | 6.45 | 50 | 90 |
| 250 | 2200 | 35x65 | 6.80 | 50 | 90 |
| 315 | 100 | 22x25 | 0.73 | 1110 | 1990 |
| 315 | 120 | 22x30 | 0.76 | 920 | 1660 |
| 315 | 150 | 22x30 | 0.94 | 740 | 1330 |
| 315 | 150 | 25x25 | 0.94 | 740 | 1330 |
| 315 | 180 | 22x35 | 1.12 | 620 | 1110 |
| 315 | 180 | 25x30 | 1.12 | 620 | 1110 |
| 315 | 220 | 22x40 | 1.32 | 500 | 900 |
| 315 | 220 | 25x35 | 1.32 | 500 | 900 |
| 315 | 220 | 30x25 | 1.32 | 500 | 900 |
| 315 | 270 | 22x45 | 1.61 | 410 | 740 |
| 315 | 270 | 25x40 | 1.61 | 410 | 740 |
| 315 | 270 | 30x30 | 1.61 | 410 | 740 |
| 315 | 270 | 35x25 | 1.61 | 410 | 740 |
| 315 | 330 | 25x45 | 1.76 | 330 | 600 |
| 315 | 330 | 30x35 | 1.76 | 330 | 600 |
| 315 | 390 | 25x50 | 2.21 | 280 | 510 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 315 | 390 | 30x40 | 2.21 | 280 | 510 |
| 315 | 390 | 35x30 | 2.21 | 280 | 510 |
| 315 | 470 | 30x45 | 2.45 | 230 | 420 |
| 315 | 470 | 35x35 | 2.45 | 230 | 420 |
| 315 | 560 | 30x50 | 2.85 | 200 | 360 |
| 315 | 560 | 35x40 | 2.85 | 200 | 360 |
| 315 | 680 | 35x45 | 2.31 | 160 | 290 |
| 350 | 82 | 22x25 | 0.65 | 1350 | 2430 |
| 350 | 100 | 22x25 | 0.73 | 1110 | 1990 |
| 350 | 120 | 22x30 | 0.83 | 920 | 1660 |
| 350 | 120 | 25x25 | 0.83 | 920 | 1660 |
| 350 | 150 | 22x35 | 0.95 | 740 | 1330 |
| 350 | 150 | 25x30 | 0.95 | 740 | 1330 |
| 350 | 180 | 22x40 | 1.12 | 620 | 1110 |
| 350 | 180 | 30x25 | 1.12 | 620 | 1110 |
| 350 | 220 | 22x45 | 1.42 | 500 | 900 |
| 350 | 220 | 25x35 | 1.42 | 500 | 900 |
| 350 | 220 | 30x30 | 1.42 | 500 | 900 |
| 350 | 220 | 35x25 | 1.51 | 500 | 900 |
| 350 | 270 | 25x40 | 1.72 | 410 | 740 |
| 350 | 270 | 30x35 | 1.72 | 410 | 740 |
| 350 | 330 | 25x45 | 1.83 | 330 | 600 |
| 350 | 330 | 30x40 | 1.83 | 330 | 600 |
| 350 | 330 | 35x30 | 1.83 | 330 | 600 |
| 350 | 390 | 30x40 | 2.34 | 280 | 510 |
| 350 | 390 | 35x35 | 2.34 | 280 | 510 |
| 350 | 470 | 30x45 | 2.49 | 230 | 420 |
| 350 | 470 | 35x40 | 2.49 | 230 | 420 |
| 350 | 560 | 35x45 | 3.22 | 200 | 360 |
| 350 | 680 | 35x45 | 3.70 | 160 | 290 |
| 350 | 820 | 35x50 | 4.50 | 130 | 240 |
| 350 | 1000 | 35x55 | 5.20 | 110 | 200 |
| 350 | 1200 | 35x60 | 5.50 | 94 | 170 |
| 350 | 1200 | 40x50 | 5.60 | 94 | 170 |
| 350 | 1500 | 40x60 | 8.50 | 72 | 130 |
| 350 | 1800 | 40x70 | 7.90 | 61 | 110 |
| 350 | 2200 | 40x80 | 8.70 | 50 | 90 |
| 400 | 68 | 22x25 | 0.63 | 1630 | 2930 |
| 400 | 82 | 22x25 | 0.79 | 1350 | 2430 |
| 400 | 100 | 22x25 | 0.87 | 1110 | 1990 |
| 400 | 100 | 22x30 | 0.91 | 1110 | 1990 |
| 400 | 100 | 25x25 | 1.05 | 1110 | 1990 |
| 400 | 120 | 22x30 | 0.99 | 920 | 1660 |
| 400 | 120 | 22x35 | 1.10 | 920 | 1660 |
| 400 | 120 | 25x25 | 1.10 | 920 | 1660 |
| 400 | 120 | 25x30 | 1.20 | 920 | 1660 |
| 400 | 150 | 22x30 | 1.15 | 740 | 1330 |
| 400 | 150 | 22x35 | 1.19 | 740 | 1330 |
| 400 | 150 | 25x25 | 1.15 | 740 | 1330 |
| 400 | 150 | 25x30 | 1.22 | 740 | 1330 |
| 400 | 150 | 30x25 | 1.24 | 740 | 1330 |
| 400 | 180 | 22x35 | 1.31 | 620 | 1110 |
| 400 | 180 | 22x40 | 1.37 | 620 | 1110 |
| 400 | 180 | 25x30 | 1.30 | 620 | 1110 |
| 400 | 180 | 25x35 | 1.46 | 620 | 1110 |
| 400 | 180 | 30x30 | 1.46 | 620 | 1110 |
| 400 | 220 | 22x40 | 1.53 | 500 | 900 |
| 400 | 220 | 22x50 | 1.76 | 500 | 900 |
| 400 | 220 | 25x35 | 1.50 | 500 | 900 |
| 400 | 220 | 25x40 | 1.76 | 500 | 900 |

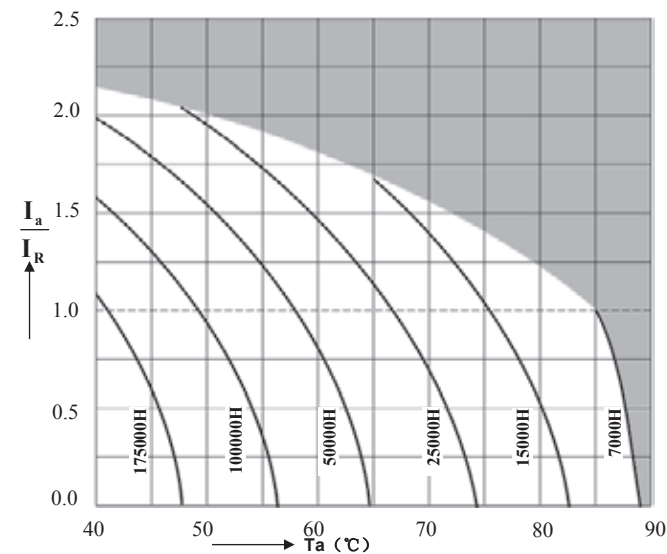
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 220 | 30x25 | 1.53 | 500 | 900 |
| 400 | 220 | 30x30 | 1.78 | 500 | 900 |
| 400 | 220 | 35x25 | 1.81 | 500 | 900 |
| 400 | 220 | 35x30 | 1.86 | 500 | 900 |
| 400 | 270 | 22x45 | 1.79 | 410 | 740 |
| 400 | 270 | 25x40 | 1.83 | 410 | 740 |
| 400 | 270 | 25x45 | 1.97 | 410 | 740 |
| 400 | 270 | 30x30 | 1.89 | 410 | 740 |
| 400 | 270 | 30x35 | 2.04 | 410 | 740 |
| 400 | 270 | 35x25 | 2.17 | 410 | 740 |
| 400 | 270 | 35x30 | 2.04 | 410 | 740 |
| 400 | 330 | 25x45 | 2.03 | 330 | 600 |
| 400 | 330 | 25x50 | 2.20 | 330 | 600 |
| 400 | 330 | 30x35 | 2.15 | 330 | 600 |
| 400 | 330 | 30x40 | 2.47 | 330 | 600 |
| 400 | 330 | 35x30 | 2.37 | 330 | 600 |
| 400 | 390 | 25x50 | 2.33 | 280 | 510 |
| 400 | 390 | 30x35 | 2.35 | 280 | 510 |
| 400 | 390 | 30x45 | 2.59 | 280 | 510 |
| 400 | 390 | 35x30 | 2.32 | 280 | 510 |
| 400 | 390 | 35x35 | 2.55 | 280 | 510 |
| 400 | 470 | 25x55 | 2.66 | 230 | 420 |
| 400 | 470 | 30x40 | 2.61 | 230 | 420 |
| 400 | 470 | 30x50 | 2.75 | 230 | 420 |
| 400 | 470 | 35x35 | 2.58 | 230 | 420 |
| 400 | 470 | 35x40 | 2.79 | 230 | 420 |
| 400 | 560 | 30x55 | 3.36 | 200 | 360 |
| 400 | 560 | 35x35 | 3.15 | 200 | 360 |
| 400 | 560 | 35x45 | 3.43 | 200 | 360 |
| 400 | 560 | 40x40 | 3.48 | 200 | 360 |
| 400 | 680 | 30x55 | 3.50 | 160 | 290 |
| 400 | 680 | 35x40 | 3.85 | 160 | 290 |
| 400 | 680 | 35x50 | 3.93 | 160 | 290 |
| 400 | 680 | 35x55 | 4.16 | 160 | 290 |
| 400 | 680 | 40x50 | 4.38 | 160 | 290 |
| 400 | 820 | 35x50 | 4.50 | 130 | 240 |
| 400 | 820 | 35x55 | 4.60 | 130 | 240 |
| 400 | 820 | 40x50 | 4.60 | 130 | 240 |
| 400 | 1000 | 35x65 | 5.20 | 110 | 200 |
| 400 | 1000 | 40x60 | 5.30 | 110 | 200 |
| 400 | 1000 | 45x50 | 5.30 | 110 | 200 |
| 400 | 1200 | 35x70 | 5.90 | 94 | 170 |
| 400 | 1200 | 40x60 | 5.90 | 94 | 170 |
| 400 | 1500 | 40x70 | 6.70 | 72 | 130 |
| 400 | 1800 | 45x80 | 7.40 | 61 | 110 |
| 420 | 100 | 22x30 | 1.08 | 1470 | 2650 |
| 420 | 100 | 25x25 | 1.08 | 1470 | 2650 |
| 420 | 120 | 25x30 | 1.23 | 1230 | 2210 |
| 420 | 150 | 22x40 | 1.19 | 980 | 1770 |
| 420 | 150 | 25x35 | 1.24 | 980 | 1770 |
| 420 | 180 | 25x35 | 1.46 | 820 | 1470 |
| 420 | 180 | 30x30 | 1.46 | 820 | 1470 |
| 420 | 220 | 25x40 | 1.82 | 670 | 1210 |
| 420 | 220 | 30x35 | 1.87 | 670 | 1210 |
| 420 | 270 | 25x55 | 2.07 | 540 | 980 |
| 420 | 270 | 30x35 | 2.07 | 540 | 980 |
| 420 | 270 | 35x30 | 2.07 | 540 | 980 |
| 420 | 330 | 30x45 | 2.40 | 440 | 800 |
| 420 | 330 | 35x35 | 2.40 | 440 | 800 |
| 420 | 390 | 30x50 | 2.66 | 380 | 680 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 420 | 470 | 30x55 | 2.84 | 310 | 560 |
| 420 | 470 | 35x45 | 2.89 | 310 | 560 |
| 420 | 560 | 35x50 | 3.45 | 260 | 470 |
| 420 | 680 | 35x60 | 4.01 | 220 | 390 |
| 420 | 820 | 35x65 | 4.61 | 180 | 320 |
| 420 | 1000 | 35x80 | 5.61 | 150 | 270 |
| 420 | 1500 | 40x80 | 7.21 | 100 | 180 |
| 420 | 1800 | 45x80 | 7.81 | 83 | 150 |
| 450 | 47 | 22x25 | 0.53 | 3130 | 5640 |
| 450 | 56 | 22x25 | 0.61 | 2630 | 4740 |
| 450 | 68 | 22x30 | 0.69 | 2170 | 3900 |
| 450 | 68 | 25x25 | 0.72 | 2170 | 3900 |
| 450 | 82 | 25x25 | 0.82 | 1790 | 3230 |
| 450 | 82 | 25x30 | 0.93 | 1790 | 3230 |
| 450 | 100 | 22x35 | 1.10 | 1470 | 2650 |
| 450 | 100 | 25x30 | 1.12 | 1470 | 2650 |
| 450 | 100 | 30x25 | 1.13 | 1470 | 2650 |
| 450 | 120 | 22x40 | 1.24 | 1230 | 2210 |
| 450 | 120 | 25x30 | 1.24 | 1230 | 2210 |
| 450 | 120 | 30x25 | 1.24 | 1230 | 2210 |
| 450 | 150 | 22x45 | 1.33 | 980 | 1770 |
| 450 | 150 | 25x30 | 1.20 | 980 | 1770 |
| 450 | 150 | 25x35 | 1.30 | 980 | 1770 |
| 450 | 150 | 30x30 | 1.36 | 980 | 1770 |
| 450 | 150 | 35x25 | 1.43 | 980 | 1770 |
| 450 | 180 | 25x35 | 1.46 | 820 | 1470 |
| 450 | 180 | 25x40 | 1.48 | 820 | 1470 |
| 450 | 180 | 30x35 | 1.70 | 820 | 1470 |
| 450 | 180 | 35x25 | 1.55 | 820 | 1470 |
| 450 | 180 | 35x30 | 1.72 | 820 | 1470 |
| 450 | 220 | 22x50 | 1.84 | 670 | 1210 |
| 450 | 220 | 25x40 | 1.82 | 670 | 1210 |
| 450 | 220 | 25x50 | 1.93 | 670 | 1210 |
| 450 | 220 | 30x35 | 1.87 | 670 | 1210 |
| 450 | 220 | 30x40 | 1.93 | 670 | 1210 |
| 450 | 220 | 35x25 | 1.88 | 670 | 1210 |
| 450 | 220 | 35x30 | 1.94 | 670 | 1210 |
| 450 | 270 | 25x45 | 2.11 | 540 | 980 |
| 450 | 270 | 25x55 | 2.22 | 540 | 980 |
| 450 | 270 | 30x35 | 2.10 | 540 | 980 |
| 450 | 270 | 30x40 | 2.22 | 540 | 980 |
| 450 | 270 | 35x30 | 2.05 | 540 | 980 |
| 450 | 270 | 35x35 | 2.22 | 540 | 980 |
| 450 | 330 | 25x50 | 2.24 | 440 | 800 |
| 450 | 330 | 30x40 | 2.24 | 440 | 800 |
| 450 | 330 | 30x45 | 2.40 | 440 | 800 |
| 450 | 330 | 35x30 | 2.35 | 440 | 800 |
| 450 | 330 | 35x40 | 2.53 | 440 | 800 |
| 450 | 390 | 30x45 | 2.64 | 380 | 680 |
| 450 | 390 | 30x55 | 2.74 | 380 | 680 |
| 450 | 390 | 35x35 | 2.63 | 380 | 680 |
| 450 | 390 | 35x45 | 2.83 | 380 | 680 |
| 450 | 470 | 30x50 | 2.75 | 310 | 560 |
| 450 | 470 | 35x40 | 2.79 | 310 | 560 |
| 450 | 470 | 35x50 | 3.22 | 310 | 560 |
| 450 | 470 | 40x40 | 3.22 | 310 | 560 |
| 450 | 560 | 30x55 | 3.63 | 260 | 470 |
| 450 | 560 | 35x45 | 3.43 | 260 | 470 |
| 450 | 560 | 35x55 | 3.63 | 260 | 470 |
| 450 | 560 | 40x50 | 3.63 | 260 | 470 |

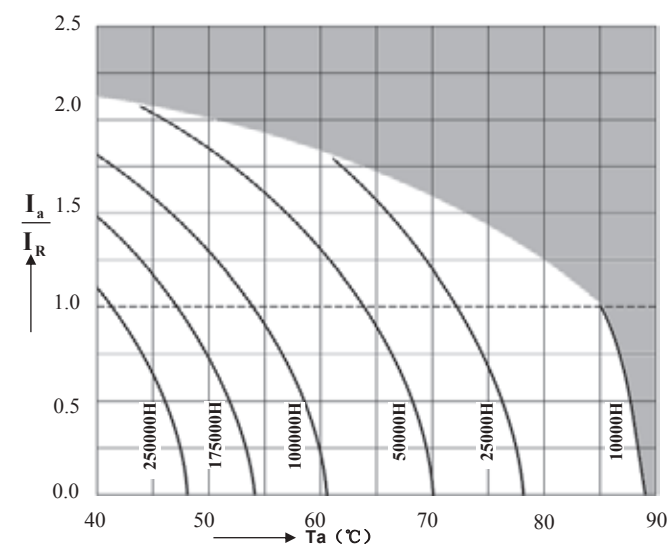
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 680 | 35x50 | 3.49 | 220 | 390 |
| 450 | 680 | 35x60 | 3.52 | 220 | 390 |
| 450 | 680 | 40x50 | 3.51 | 220 | 390 |
| 450 | 820 | 35x65 | 4.61 | 180 | 320 |
| 450 | 820 | 40x55 | 4.61 | 180 | 320 |
| 450 | 1000 | 35x70 | 5.71 | 150 | 270 |
| 450 | 1000 | 40x60 | 5.21 | 150 | 270 |
| 450 | 1200 | 35x80 | 5.91 | 120 | 220 |
| 450 | 1200 | 40x65 | 5.91 | 120 | 220 |
| 450 | 1500 | 40x80 | 7.31 | 100 | 180 |
| 450 | 1800 | 45x80 | 7.91 | 83 | 150 |
| 500 | 47 | 22x25 | 0.56 | 3130 | 5640 |
| 500 | 56 | 25x25 | 0.62 | 2630 | 4740 |
| 500 | 68 | 22x30 | 0.70 | 2170 | 3900 |
| 500 | 68 | 25x25 | 0.75 | 2170 | 3900 |
| 500 | 82 | 25x30 | 0.83 | 1790 | 3230 |
| 500 | 100 | 25x30 | 0.96 | 1470 | 2650 |
| 500 | 100 | 30x25 | 0.99 | 1470 | 2650 |
| 500 | 120 | 25x35 | 1.12 | 1230 | 2210 |
| 500 | 120 | 30x30 | 1.13 | 1230 | 2210 |
| 500 | 120 | 35x25 | 1.15 | 1230 | 2210 |
| 500 | 150 | 25x40 | 1.30 | 980 | 1770 |
| 500 | 150 | 30x30 | 1.32 | 980 | 1770 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 150 | 35x25 | 1.36 | 980 | 1770 |
| 500 | 180 | 25x45 | 1.58 | 820 | 1470 |
| 500 | 180 | 30x35 | 1.60 | 820 | 1470 |
| 500 | 180 | 35x30 | 1.63 | 820 | 1470 |
| 500 | 220 | 25x55 | 1.76 | 670 | 1210 |
| 500 | 220 | 30x40 | 1.73 | 670 | 1210 |
| 500 | 220 | 35x35 | 1.80 | 670 | 1210 |
| 500 | 270 | 30x45 | 2.15 | 540 | 980 |
| 500 | 270 | 35x35 | 2.15 | 540 | 980 |
| 500 | 330 | 30x50 | 2.41 | 440 | 800 |
| 500 | 330 | 35x40 | 2.32 | 440 | 800 |
| 500 | 390 | 35x45 | 2.71 | 380 | 680 |
| 500 | 470 | 35x55 | 2.99 | 310 | 560 |
| 500 | 560 | 35x60 | 3.11 | 260 | 470 |
| 500 | 560 | 40x50 | 3.13 | 260 | 470 |
| 500 | 680 | 35x70 | 3.21 | 220 | 390 |
| 500 | 680 | 40x60 | 3.22 | 220 | 390 |
| 500 | 820 | 35x80 | 4.61 | 180 | 320 |
| 500 | 820 | 40x70 | 4.43 | 180 | 320 |
| 500 | 1000 | 40x80 | 5.91 | 150 | 270 |
| 500 | 1200 | 40x80 | 5.98 | 120 | 220 |
| 500 | 1500 | 40x100 | 6.31 | 100 | 180 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \leq 100V$



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \geq 160V$

HP Series 105°C 2000H



Features

Standard capacitors

Applications

- ◆ Switch-mode power supplies in industrial and entertainment electronics
- ◆ Uninterruptible power supplies

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board

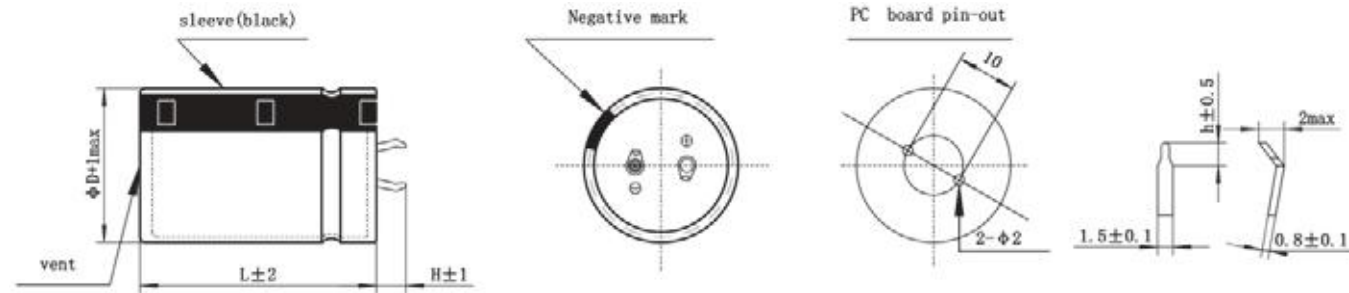
Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|---|---|--|----|----|--------|---------|--|-----|----|-----|---------|---------|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C | | | | | | | | | | |
| Rated voltage V_R | 6.3 to 450 V DC | 500 to 550 V DC | | | | | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | | | | | | |
| Rated capacitance C_R | 56 to 100000 μF | 47 to 1000 μF | | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current I_{leak} (+20°C.max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5minutes with rated working voltage applied | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | | | |
| | $\mu F/Vdc$ | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~420 | 450~600 |
| | ≤ 8200 | - | 35 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 15 | 20 |
| | 10000 to 22000 | 55 | 40 | 40 | 35 | 30 | 30 | 25 | 15 | - | - | - |
| ≥ 27000 | 60 | 50 | 40 | 35 | 35 | 30 | 25 | - | - | - | - | |
| Self-inductance ESL | approx. 20 nH | | | | | | | | | | | |
| Useful life 105°C; $V_R, I_{AC,R}$ 105°C; $V_R, I_{AC,R}$ | $V_R \leq 100V$: >3000 h | Requirements: $V_R \leq 100V$ DC/C $\leq \pm 30\%$ of initial value ESR ≤ 3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | $V_R > 100V$ DC/C $\leq \pm 20\%$ of initial value ESR ≤ 2 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| | $V_R > 100V$: >5000 h | | | | | | | | | | | |
| Voltage Endurance test 105°C; V_R | 2000 h | Post test requirements: $V_R \leq 100V$ DC/C $\leq \pm 15\%$ of initial value ESR ≤ 1.3 times initial specified limit | | | | | $V_R > 100V$ DC/C $\leq \pm 10\%$ of initial value ESR ≤ 1.3 times initial specified limit | | | | | |
| | | | | | | | | | | | | |
| Shelf Life 105°C | 1000 h | Post test requirements: $V_R \leq 100V$ DC/C $\leq \pm 15\%$ of initial value ESR ≤ 1.3 times initial specified limit | | | | | $V_R > 100V$ DC/C $\leq \pm 10\%$ of initial value ESR ≤ 1.3 times initial specified limit | | | | | |
| | | | | | | | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | | | | | | | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | |
| | $V_R(V)$ | 6.3~16 | 25 | 35 | 50~100 | 160~250 | 315~450 | 500 | | | | |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 3 | 3 | 3 | 3 | 8 | 8 | | | | |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 15 | 10 | 8 | 6 | 7 | 10 | - | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $10 \leq V_R \leq 100$ | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|--------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | 35 ≤ L ≤ 65 | ≥ 6(L=35、36) | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | 25 < L < 45 | / | 300 | 6 | 50 |
| 35 | 45 ≤ L ≤ 85 | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | 40 ≤ L ≤ 45 | / | 160 | 4 | 40 |
| 40 | 45 < L ≤ 75 | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | 40 ≤ L ≤ 65 | / | 140 | 4 | 35 |
| 45 | 65 < L ≤ 100 | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 6.3 | 12000 | 22x25 | 1.54 | 47 | 61 |
| 6.3 | 15000 | 22x25 | 1.72 | 37 | 49 |
| 6.3 | 18000 | 22x30 | 1.95 | 31 | 41 |
| 6.3 | 18000 | 25x25 | 1.96 | 31 | 41 |
| 6.3 | 22000 | 22x35 | 2.23 | 26 | 33 |
| 6.3 | 22000 | 25x30 | 2.25 | 26 | 33 |
| 6.3 | 22000 | 30x25 | 2.28 | 26 | 33 |
| 6.3 | 27000 | 22x40 | 2.54 | 23 | 29 |
| 6.3 | 27000 | 25x35 | 2.57 | 23 | 29 |
| 6.3 | 27000 | 30x25 | 2.59 | 23 | 29 |
| 6.3 | 33000 | 22x45 | 2.88 | 19 | 24 |
| 6.3 | 33000 | 25x40 | 2.93 | 19 | 24 |
| 6.3 | 33000 | 30x30 | 2.89 | 19 | 24 |
| 6.3 | 33000 | 35x25 | 2.93 | 19 | 24 |
| 6.3 | 39000 | 25x40 | 3.18 | 16 | 20 |
| 6.3 | 39000 | 30x35 | 3.26 | 16 | 20 |
| 6.3 | 39000 | 35x30 | 3.40 | 16 | 20 |
| 6.3 | 47000 | 25x50 | 3.69 | 13 | 17 |
| 6.3 | 47000 | 30x40 | 3.69 | 13 | 17 |
| 6.3 | 47000 | 35x30 | 3.73 | 13 | 17 |
| 6.3 | 56000 | 30x45 | 4.16 | 11 | 14 |
| 6.3 | 56000 | 35x35 | 4.17 | 11 | 14 |
| 6.3 | 68000 | 30x50 | 4.71 | 9 | 12 |
| 6.3 | 68000 | 35x40 | 4.71 | 9 | 12 |
| 6.3 | 82000 | 35x45 | 5.32 | 8 | 10 |
| 10 | 4700 | 22x25 | 1.24 | 76 | 99 |
| 10 | 6800 | 22x25 | 1.40 | 53 | 68 |
| 10 | 8200 | 22x25 | 1.65 | 44 | 57 |
| 10 | 10000 | 22x25 | 1.90 | 36 | 46 |
| 10 | 12000 | 22x30 | 2.48 | 34 | 44 |
| 10 | 12000 | 25x25 | 2.48 | 34 | 44 |
| 10 | 15000 | 22x35 | 2.71 | 27 | 35 |
| 10 | 15000 | 25x25 | 2.60 | 27 | 35 |
| 10 | 18000 | 22x35 | 2.89 | 23 | 29 |
| 10 | 18000 | 25x30 | 2.94 | 23 | 29 |
| 10 | 18000 | 30x25 | 2.94 | 23 | 29 |
| 10 | 22000 | 22x40 | 2.96 | 19 | 24 |
| 10 | 22000 | 25x30 | 2.96 | 19 | 24 |
| 10 | 22000 | 30x25 | 3.08 | 19 | 24 |
| 10 | 27000 | 22x50 | 3.12 | 19 | 25 |
| 10 | 27000 | 25x40 | 3.12 | 19 | 25 |
| 10 | 27000 | 30x30 | 3.13 | 19 | 25 |
| 10 | 27000 | 35x25 | 3.21 | 19 | 25 |
| 10 | 33000 | 25x45 | 3.32 | 15 | 20 |
| 10 | 33000 | 35x30 | 3.85 | 15 | 20 |
| 10 | 39000 | 30x40 | 3.85 | 13 | 17 |
| 10 | 47000 | 30x45 | 3.98 | 11 | 14 |
| 10 | 47000 | 35x35 | 4.05 | 11 | 14 |
| 10 | 56000 | 30x50 | 4.21 | 9 | 12 |
| 10 | 56000 | 35x40 | 4.32 | 9 | 12 |
| 10 | 68000 | 35x45 | 5.12 | 8 | 10 |
| 10 | 100000 | 35x50 | 6.14 | 5 | 7 |
| 16 | 4700 | 22x25 | 1.55 | 76 | 99 |
| 16 | 6800 | 22x25 | 1.78 | 53 | 68 |
| 16 | 8200 | 22x25 | 2.14 | 44 | 57 |
| 16 | 10000 | 22x30 | 2.48 | 36 | 46 |
| 16 | 10000 | 25x25 | 2.56 | 36 | 46 |
| 16 | 12000 | 22x35 | 2.80 | 34 | 44 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 16 | 12000 | 25x30 | 2.90 | 34 | 44 |
| 16 | 12000 | 30x25 | 2.97 | 34 | 44 |
| 16 | 15000 | 22x40 | 3.17 | 27 | 35 |
| 16 | 15000 | 25x35 | 3.29 | 27 | 35 |
| 16 | 15000 | 30x30 | 3.38 | 27 | 35 |
| 16 | 18000 | 22x45 | 3.50 | 23 | 29 |
| 16 | 18000 | 25x40 | 3.65 | 23 | 29 |
| 16 | 18000 | 30x30 | 3.65 | 23 | 29 |
| 16 | 22000 | 22x45 | 3.65 | 19 | 24 |
| 16 | 22000 | 25x40 | 3.71 | 19 | 24 |
| 16 | 22000 | 30x35 | 3.83 | 19 | 24 |
| 16 | 27000 | 25x40 | 3.95 | 15 | 20 |
| 16 | 27000 | 30x35 | 3.96 | 15 | 20 |
| 16 | 33000 | 25x45 | 4.32 | 12 | 16 |
| 16 | 33000 | 30x35 | 4.41 | 12 | 16 |
| 16 | 33000 | 35x30 | 4.43 | 12 | 16 |
| 16 | 39000 | 30x40 | 4.90 | 10 | 14 |
| 16 | 39000 | 35x35 | 5.10 | 10 | 14 |
| 16 | 47000 | 30x45 | 5.30 | 9 | 11 |
| 16 | 47000 | 35x40 | 5.52 | 9 | 11 |
| 16 | 56000 | 30x50 | 6.00 | 7 | 10 |
| 16 | 56000 | 35x40 | 6.05 | 7 | 10 |
| 16 | 68000 | 35x50 | 6.40 | 6 | 8 |
| 25 | 2200 | 22x25 | 1.03 | 140 | 180 |
| 25 | 3300 | 22x25 | 1.48 | 92 | 120 |
| 25 | 4700 | 22x25 | 1.73 | 65 | 85 |
| 25 | 5600 | 22x25 | 1.85 | 55 | 71 |
| 25 | 6800 | 22x30 | 2.05 | 45 | 59 |
| 25 | 6800 | 25x25 | 2.10 | 45 | 59 |
| 25 | 8200 | 22x30 | 2.31 | 37 | 49 |
| 25 | 8200 | 25x25 | 2.31 | 37 | 49 |
| 25 | 10000 | 22x35 | 2.65 | 31 | 40 |
| 25 | 10000 | 25x30 | 2.68 | 31 | 40 |
| 25 | 12000 | 22x40 | 2.92 | 30 | 39 |
| 25 | 12000 | 25x30 | 2.91 | 30 | 39 |
| 25 | 12000 | 30x25 | 2.93 | 30 | 39 |
| 25 | 15000 | 22x45 | 3.18 | 24 | 31 |
| 25 | 15000 | 25x35 | 3.10 | 24 | 31 |
| 25 | 15000 | 30x30 | 3.32 | 24 | 31 |
| 25 | 18000 | 22x45 | 3.51 | 20 | 26 |
| 25 | 18000 | 25x40 | 3.60 | 20 | 26 |
| 25 | 18000 | 30x30 | 3.80 | 20 | 26 |
| 25 | 22000 | 25x45 | 4.04 | 16 | 21 |
| 25 | 22000 | 30x35 | 4.04 | 16 | 21 |
| 25 | 22000 | 35x30 | 4.04 | 16 | 21 |
| 25 | 27000 | 30x40 | 4.74 | 13 | 17 |
| 25 | 27000 | 35x35 | 4.76 | 13 | 17 |
| 25 | 33000 | 30x45 | 5.50 | 11 | 14 |
| 25 | 33000 | 35x40 | 5.70 | 11 | 14 |
| 25 | 39000 | 35x45 | 5.80 | 9 | 12 |
| 25 | 47000 | 35x50 | 6.30 | 8 | 10 |
| 35 | 1500 | 22x25 | 1.26 | 170 | 220 |
| 35 | 2200 | 22x25 | 1.35 | 120 | 150 |
| 35 | 2700 | 22x25 | 1.36 | 92 | 120 |
| 35 | 3300 | 22x25 | 1.49 | 77 | 100 |
| 35 | 3900 | 22x30 | 1.82 | 65 | 85 |
| 35 | 4700 | 22x30 | 2.02 | 54 | 71 |
| 35 | 4700 | 25x25 | 2.12 | 54 | 71 |

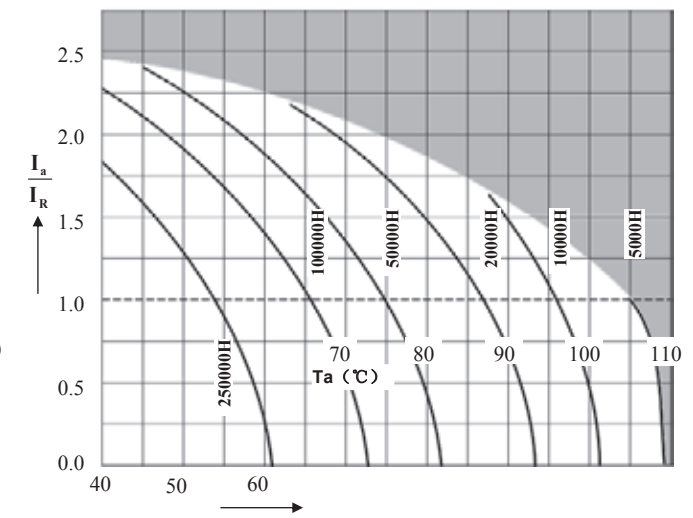
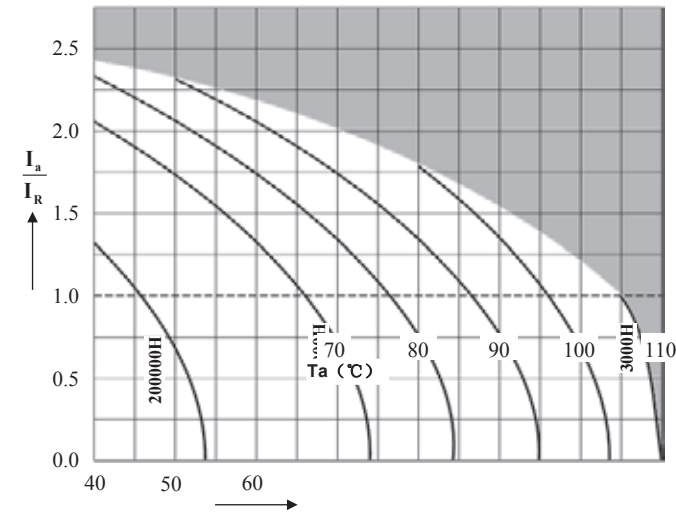
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 35 | 5600 | 22x30 | 2.25 | 46 | 59 |
| 35 | 5600 | 25x25 | 2.35 | 46 | 59 |
| 35 | 6800 | 22x35 | 2.36 | 38 | 49 |
| 35 | 6800 | 25x30 | 2.41 | 38 | 49 |
| 35 | 6800 | 30x25 | 2.50 | 38 | 49 |
| 35 | 8200 | 22x40 | 2.55 | 31 | 40 |
| 35 | 8200 | 25x35 | 2.61 | 31 | 40 |
| 35 | 8200 | 30x25 | 2.65 | 31 | 40 |
| 35 | 10000 | 22x40 | 3.00 | 26 | 33 |
| 35 | 10000 | 25x35 | 3.15 | 26 | 33 |
| 35 | 10000 | 30x30 | 3.35 | 26 | 33 |
| 35 | 12000 | 22x45 | 3.47 | 26 | 33 |
| 35 | 12000 | 25x40 | 3.50 | 26 | 33 |
| 35 | 12000 | 30x35 | 3.52 | 26 | 33 |
| 35 | 12000 | 35x30 | 3.58 | 26 | 33 |
| 35 | 15000 | 25x45 | 3.65 | 20 | 27 |
| 35 | 15000 | 30x40 | 3.69 | 20 | 27 |
| 35 | 15000 | 35x35 | 3.75 | 20 | 27 |
| 35 | 18000 | 25x50 | 3.82 | 17 | 22 |
| 35 | 18000 | 30x40 | 3.95 | 17 | 22 |
| 35 | 18000 | 35x35 | 4.12 | 17 | 22 |
| 35 | 22000 | 30x45 | 4.38 | 14 | 18 |
| 35 | 22000 | 35x40 | 4.78 | 14 | 18 |
| 35 | 27000 | 30x50 | 4.86 | 13 | 17 |
| 35 | 27000 | 35x45 | 5.12 | 13 | 17 |
| 35 | 33000 | 35x50 | 5.90 | 11 | 14 |
| 50 | 1000 | 22x25 | 0.84 | 210 | 270 |
| 50 | 1500 | 22x25 | 1.27 | 140 | 180 |
| 50 | 1800 | 22x25 | 1.35 | 120 | 150 |
| 50 | 2200 | 22x25 | 1.48 | 92 | 120 |
| 50 | 2700 | 22x25 | 1.68 | 76 | 98 |
| 50 | 3300 | 22x30 | 1.75 | 62 | 80 |
| 50 | 3300 | 25x25 | 1.87 | 62 | 80 |
| 50 | 3900 | 22x30 | 2.12 | 52 | 68 |
| 50 | 3900 | 25x25 | 2.21 | 52 | 68 |
| 50 | 4700 | 22x35 | 2.25 | 43 | 56 |
| 50 | 4700 | 25x30 | 2.31 | 43 | 56 |
| 50 | 4700 | 30x25 | 2.33 | 43 | 56 |
| 50 | 5600 | 22x40 | 2.49 | 36 | 47 |
| 50 | 5600 | 25x35 | 2.76 | 36 | 47 |
| 50 | 5600 | 30x30 | 2.85 | 36 | 47 |
| 50 | 6800 | 22x50 | 3.10 | 30 | 39 |
| 50 | 6800 | 25x40 | 3.05 | 30 | 39 |
| 50 | 6800 | 30x35 | 3.34 | 30 | 39 |
| 50 | 6800 | 35x30 | 3.42 | 30 | 39 |
| 50 | 8200 | 25x45 | 3.48 | 25 | 32 |
| 50 | 8200 | 30x35 | 3.51 | 25 | 32 |
| 50 | 8200 | 35x30 | 3.60 | 25 | 32 |
| 50 | 10000 | 25x50 | 3.91 | 20 | 27 |
| 50 | 10000 | 30x40 | 3.98 | 20 | 27 |
| 50 | 10000 | 35x30 | 4.05 | 20 | 27 |
| 50 | 12000 | 30x45 | 4.31 | 26 | 33 |
| 50 | 12000 | 35x35 | 4.38 | 26 | 33 |
| 50 | 15000 | 35x50 | 4.80 | 20 | 27 |
| 50 | 18000 | 35x50 | 5.30 | 17 | 22 |
| 50 | 22000 | 35x60 | 5.50 | 14 | 18 |
| 63 | 680 | 22x25 | 0.70 | 300 | 390 |
| 63 | 1000 | 22x25 | 1.00 | 210 | 270 |
| 63 | 1200 | 22x25 | 1.21 | 170 | 220 |
| 63 | 1500 | 22x25 | 1.36 | 140 | 180 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 63 | 1800 | 22x30 | 1.41 | 120 | 150 |
| 63 | 1800 | 25x25 | 1.46 | 120 | 150 |
| 63 | 2200 | 22x30 | 1.54 | 92 | 120 |
| 63 | 2200 | 25x25 | 1.61 | 92 | 120 |
| 63 | 2700 | 22x35 | 2.02 | 76 | 98 |
| 63 | 2700 | 25x30 | 2.05 | 76 | 98 |
| 63 | 2700 | 30x25 | 2.10 | 76 | 98 |
| 63 | 3300 | 22x40 | 2.12 | 62 | 80 |
| 63 | 3300 | 25x35 | 2.20 | 62 | 80 |
| 63 | 3300 | 30x25 | 2.25 | 62 | 80 |
| 63 | 3300 | 35x25 | 2.32 | 62 | 80 |
| 63 | 3900 | 22x40 | 2.34 | 52 | 68 |
| 63 | 3900 | 25x35 | 2.42 | 52 | 68 |
| 63 | 3900 | 30x25 | 2.43 | 52 | 68 |
| 63 | 4700 | 22x45 | 2.59 | 43 | 56 |
| 63 | 4700 | 25x40 | 2.65 | 43 | 56 |
| 63 | 4700 | 30x30 | 2.71 | 43 | 56 |
| 63 | 5600 | 25x45 | 2.93 | 36 | 47 |
| 63 | 5600 | 30x35 | 3.05 | 36 | 47 |
| 63 | 5600 | 35x30 | 3.09 | 36 | 47 |
| 63 | 6800 | 30x40 | 3.72 | 30 | 39 |
| 63 | 6800 | 35x35 | 3.78 | 30 | 39 |
| 63 | 8200 | 30x40 | 3.82 | 25 | 32 |
| 63 | 8200 | 35x35 | 3.92 | 25 | 32 |
| 63 | 10000 | 30x45 | 4.05 | 20 | 27 |
| 63 | 10000 | 35x40 | 4.10 | 20 | 27 |
| 63 | 12000 | 35x45 | 4.76 | 21 | 28 |
| 63 | 15000 | 35x50 | 5.40 | 17 | 22 |
| 80 | 680 | 22x25 | 0.75 | 220 | 290 |
| 80 | 820 | 22x25 | 1.11 | 180 | 240 |
| 80 | 1000 | 22x25 | 1.22 | 150 | 200 |
| 80 | 1200 | 22x30 | 1.32 | 130 | 170 |
| 80 | 1200 | 25x25 | 1.39 | 130 | 170 |
| 80 | 1500 | 22x30 | 1.59 | 100 | 130 |
| 80 | 1500 | 25x25 | 1.60 | 100 | 130 |
| 80 | 1800 | 22x35 | 1.71 | 85 | 110 |
| 80 | 1800 | 25x30 | 1.75 | 85 | 110 |
| 80 | 1800 | 30x25 | 1.95 | 85 | 110 |
| 80 | 2200 | 22x40 | 2.12 | 70 | 90 |
| 80 | 2200 | 25x30 | 2.05 | 70 | 90 |
| 80 | 2700 | 22x45 | 2.41 | 57 | 74 |
| 80 | 2700 | 25x40 | 2.45 | 57 | 74 |
| 80 | 2700 | 30x30 | 2.49 | 57 | 74 |
| 80 | 3300 | 25x45 | 2.60 | 46 | 60 |
| 80 | 3300 | 30x35 | 2.64 | 46 | 60 |
| 80 | 3300 | 35x25 | 2.62 | 46 | 60 |
| 80 | 3900 | 30x35 | 2.95 | 39 | 51 |
| 80 | 3900 | 35x30 | 3.05 | 39 | 51 |
| 80 | 4700 | 30x45 | 3.21 | 33 | 42 |
| 80 | 4700 | 35x30 | 3.45 | 33 | 42 |
| 80 | 4700 | 35x35 | 3.51 | 33 | 42 |
| 80 | 5600 | 30x45 | 3.55 | 27 | 36 |
| 80 | 5600 | 35x35 | 3.65 | 27 | 36 |
| 80 | 6800 | 30x50 | 3.72 | 23 | 29 |
| 80 | 6800 | 35x45 | 3.90 | 23 | 29 |
| 80 | 8200 | 35x50 | 4.30 | 19 | 24 |
| 80 | 10000 | 35x50 | 4.40 | 15 | 20 |
| 100 | 330 | 22x25 | 0.55 | 460 | 600 |
| 100 | 470 | 22x25 | 0.79 | 320 | 420 |
| 100 | 560 | 22x25 | 1.06 | 280 | 360 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 450 | 180 | 35x30 | 1.28 | 820 | 1470 |
| 450 | 220 | 22x40 | 1.12 | 670 | 1210 |
| 450 | 220 | 22x45 | 1.20 | 670 | 1210 |
| 450 | 220 | 25x35 | 1.20 | 670 | 1210 |
| 450 | 220 | 25x40 | 1.25 | 670 | 1210 |
| 450 | 220 | 30x25 | 1.17 | 670 | 1210 |
| 450 | 220 | 30x30 | 1.25 | 670 | 1210 |
| 450 | 220 | 35x25 | 1.24 | 670 | 1210 |
| 450 | 220 | 35x30 | 1.33 | 670 | 1210 |
| 450 | 270 | 22x50 | 1.30 | 540 | 980 |
| 450 | 270 | 25x40 | 1.30 | 540 | 980 |
| 450 | 270 | 30x30 | 1.29 | 540 | 980 |
| 450 | 270 | 30x35 | 1.42 | 540 | 980 |
| 450 | 270 | 35x25 | 1.35 | 540 | 980 |
| 450 | 270 | 35x30 | 1.42 | 540 | 980 |
| 450 | 330 | 25x50 | 1.68 | 440 | 800 |
| 450 | 330 | 30x35 | 1.54 | 440 | 800 |
| 450 | 330 | 30x40 | 1.69 | 440 | 800 |
| 450 | 330 | 35x30 | 1.70 | 440 | 800 |
| 450 | 330 | 35x35 | 1.87 | 440 | 800 |
| 450 | 390 | 25x50 | 1.71 | 380 | 680 |
| 450 | 390 | 30x40 | 1.69 | 380 | 680 |
| 450 | 390 | 30x45 | 1.90 | 380 | 680 |
| 450 | 390 | 35x35 | 1.91 | 380 | 680 |
| 450 | 390 | 35x40 | 2.07 | 380 | 680 |
| 450 | 470 | 30x45 | 1.94 | 310 | 560 |
| 450 | 470 | 30x50 | 2.23 | 310 | 560 |
| 450 | 470 | 35x35 | 1.97 | 310 | 560 |
| 450 | 470 | 35x40 | 2.10 | 310 | 560 |
| 450 | 470 | 35x45 | 2.50 | 310 | 560 |
| 450 | 560 | 30x50 | 2.44 | 260 | 470 |
| 450 | 560 | 35x40 | 2.40 | 260 | 470 |
| 450 | 560 | 35x45 | 2.50 | 260 | 470 |
| 450 | 560 | 35x50 | 2.79 | 260 | 470 |
| 450 | 680 | 35x45 | 2.77 | 220 | 390 |
| 450 | 680 | 35x50 | 2.90 | 220 | 390 |
| 450 | 820 | 35x55 | 3.08 | 180 | 320 |
| 450 | 820 | 35x60 | 3.22 | 180 | 320 |
| 450 | 1000 | 35x65 | 3.31 | 150 | 270 |
| 450 | 1000 | 40x60 | 3.40 | 150 | 270 |
| 450 | 1200 | 35x80 | 3.62 | 120 | 220 |
| 450 | 1200 | 40x70 | 3.67 | 120 | 220 |
| 500 | 47 | 22x25 | 0.42 | 3130 | 5640 |
| 500 | 56 | 22x30 | 0.50 | 2630 | 4740 |
| 500 | 56 | 25x25 | 0.51 | 2630 | 4740 |
| 500 | 68 | 22x30 | 0.55 | 2170 | 3900 |
| 500 | 68 | 25x25 | 0.55 | 2170 | 3900 |
| 500 | 82 | 22x35 | 0.73 | 1790 | 3230 |
| 500 | 82 | 25x30 | 0.75 | 1790 | 3230 |
| 500 | 82 | 30x25 | 0.76 | 1790 | 3230 |
| 500 | 100 | 22x40 | 0.90 | 1470 | 2650 |
| 500 | 100 | 22x45 | 0.94 | 1470 | 2650 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 500 | 100 | 25x35 | 0.92 | 1470 | 2650 |
| 500 | 100 | 30x25 | 0.93 | 1470 | 2650 |
| 500 | 100 | 30x30 | 0.96 | 1470 | 2650 |
| 500 | 120 | 22x50 | 0.94 | 1230 | 2210 |
| 500 | 120 | 25x35 | 0.93 | 1230 | 2210 |
| 500 | 120 | 25x40 | 0.94 | 1230 | 2210 |
| 500 | 120 | 30x30 | 0.94 | 1230 | 2210 |
| 500 | 120 | 35x25 | 0.94 | 1230 | 2210 |
| 500 | 150 | 22x50 | 1.10 | 980 | 1770 |
| 500 | 150 | 25x40 | 1.10 | 980 | 1770 |
| 500 | 150 | 30x35 | 1.13 | 980 | 1770 |
| 500 | 150 | 35x25 | 1.00 | 980 | 1770 |
| 500 | 150 | 35x30 | 1.14 | 980 | 1770 |
| 500 | 180 | 25x50 | 1.39 | 820 | 1470 |
| 500 | 180 | 30x35 | 1.31 | 820 | 1470 |
| 500 | 180 | 30x40 | 1.40 | 820 | 1470 |
| 500 | 180 | 35x30 | 1.41 | 820 | 1470 |
| 500 | 220 | 25x55 | 1.62 | 670 | 1210 |
| 500 | 220 | 30x40 | 1.59 | 670 | 1210 |
| 500 | 220 | 30x45 | 1.63 | 670 | 1210 |
| 500 | 220 | 35x35 | 1.65 | 670 | 1210 |
| 500 | 270 | 30x50 | 1.75 | 540 | 980 |
| 500 | 270 | 35x40 | 1.76 | 540 | 980 |
| 500 | 330 | 30x55 | 2.03 | 440 | 800 |
| 500 | 330 | 35x45 | 2.05 | 440 | 800 |
| 500 | 390 | 35x50 | 2.47 | 380 | 680 |
| 500 | 470 | 35x55 | 2.63 | 310 | 560 |
| 500 | 680 | 35x65 | 3.19 | 220 | 390 |
| 500 | 820 | 35x75 | 3.85 | 180 | 320 |
| 500 | 820 | 40x65 | 3.85 | 180 | 320 |
| 500 | 1000 | 40x80 | 4.70 | 150 | 270 |
| 550 | 47 | 25x25 | 0.48 | 3130 | 5640 |
| 550 | 56 | 25x30 | 0.55 | 2630 | 4740 |
| 550 | 68 | 25x35 | 0.63 | 2170 | 3900 |
| 550 | 68 | 30x25 | 0.65 | 2170 | 3900 |
| 550 | 82 | 25x35 | 0.76 | 1790 | 3230 |
| 550 | 82 | 30x30 | 0.77 | 1790 | 3230 |
| 550 | 100 | 25x40 | 0.93 | 1470 | 2650 |
| 550 | 100 | 30x35 | 0.94 | 1470 | 2650 |
| 550 | 100 | 35x25 | 0.93 | 1470 | 2650 |
| 550 | 120 | 25x50 | 0.96 | 1230 | 2210 |
| 550 | 120 | 30x35 | 0.98 | 1230 | 2210 |
| 550 | 120 | 35x30 | 1.06 | 1230 | 2210 |
| 550 | 150 | 25x55 | 1.13 | 980 | 1770 |
| 550 | 150 | 30x45 | 1.18 | 980 | 1770 |
| 550 | 150 | 35x35 | 1.22 | 980 | 1770 |
| 550 | 180 | 30x50 | 1.35 | 820 | 1470 |
| 550 | 180 | 35x40 | 1.38 | 820 | 1470 |
| 550 | 220 | 30x55 | 1.56 | 670 | 1210 |
| 550 | 220 | 35x45 | 1.58 | 670 | 1210 |
| 550 | 270 | 35x50 | 1.80 | 540 | 980 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \leq 100V$

depending on ambient temperature T_a versus under ripple current operating conditions $V_R \geq 160V$

HW Series Snap-in Type 105°C 15mm Height



Features

- ◆ Endurance 2000 hours 105°C with height 15mm
- ◆ ROHS compliant

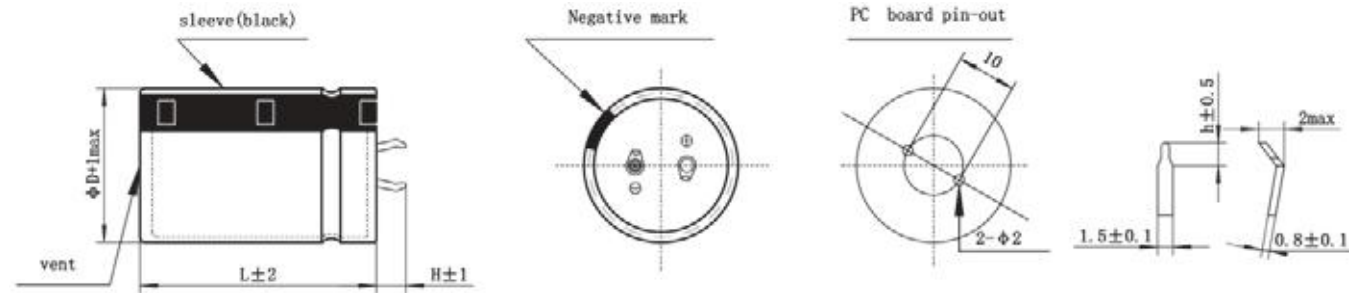
Specifications

| Item | Performance Characteristics | | |
|--|---|-------------------------|--|
| Operating Temperature Range | -40 to +85°C | | -25 to +85°C |
| Rated voltage V_R | 6.3 to 450 V DC | | 500 to 600 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | |
| Rated capacitance C_R | 22 to 100000 μF | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | |
| | V_R (dc) | 160-250 | 315-450 |
| | D.F. | 20% | 20% |
| Self-inductance ESL | approx. 20 nH | | |
| Useful life 105°C; $V_R, I_{AC,R}$ | $V_R \leq 100V$: >5000 h | Requirements: | |
| | | $\Delta C/C$ | $\leq \pm 30\%$ of initial value |
| | | $\tan \delta$ | ≤ 3 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Voltage Endurance test 105°C; V_R | 2000 h | Post test requirements: | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value |
| | | $\tan \delta$ | ≤ 2 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Shelf Life 105°C | 1000 h | Post test requirements: | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value |
| | | $\tan \delta$ | ≤ 2 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | |
| | V_R (V) | 160-250 | 315-450 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 8 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | 14 |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | |

Multiplier for Ripple Current vs. Frequency

| V_R (V)/Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 450$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in

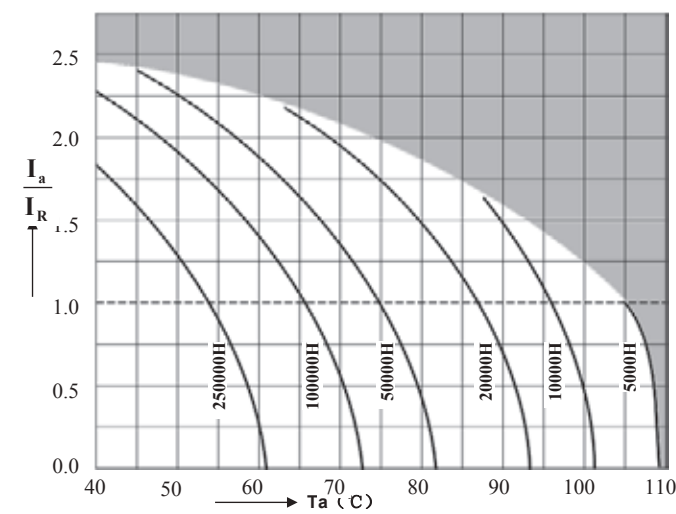


Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 160 | 150 | 20x15 | 0.55 | 980 | 1770 |
| 160 | 180 | 22x15 | 0.65 | 820 | 1470 |
| 160 | 220 | 25x15 | 0.80 | 670 | 1210 |
| 160 | 270 | 30x15 | 0.95 | 540 | 980 |
| 160 | 330 | 30x15 | 1.00 | 440 | 800 |
| 160 | 390 | 35x15 | 1.20 | 380 | 680 |
| 180 | 120 | 20x15 | 0.50 | 1230 | 2210 |
| 180 | 150 | 22x15 | 0.60 | 980 | 1770 |
| 180 | 180 | 25x15 | 0.75 | 820 | 1470 |
| 180 | 220 | 30x15 | 0.85 | 670 | 1210 |
| 180 | 270 | 30x15 | 1.00 | 540 | 980 |
| 180 | 330 | 35x15 | 1.10 | 440 | 800 |
| 180 | 390 | 35x15 | 1.20 | 380 | 680 |
| 200 | 100 | 20x15 | 0.45 | 1470 | 2650 |
| 200 | 120 | 22x15 | 0.55 | 1230 | 2210 |
| 200 | 150 | 25x15 | 0.65 | 980 | 1770 |
| 200 | 180 | 25x15 | 0.75 | 820 | 1470 |
| 200 | 180 | 30x15 | 0.80 | 820 | 1470 |
| 200 | 220 | 30x15 | 0.90 | 670 | 1210 |
| 200 | 270 | 30x15 | 1.00 | 540 | 980 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 200 | 330 | 35x15 | 1.10 | 440 | 800 |
| 250 | 100 | 22x15 | 0.50 | 1470 | 2650 |
| 250 | 120 | 25x15 | 0.60 | 1230 | 2210 |
| 250 | 150 | 30x15 | 0.70 | 980 | 1770 |
| 250 | 180 | 30x15 | 0.75 | 820 | 1470 |
| 250 | 220 | 35x15 | 0.90 | 670 | 1210 |
| 250 | 270 | 35x15 | 1.00 | 540 | 980 |
| 315 | 56 | 22x15 | 0.35 | 2630 | 4740 |
| 315 | 68 | 25x15 | 0.40 | 2170 | 3900 |
| 315 | 82 | 30x15 | 0.45 | 1790 | 3230 |
| 315 | 100 | 30x15 | 0.50 | 1470 | 2650 |
| 315 | 120 | 35x15 | 0.55 | 1230 | 2210 |
| 315 | 150 | 35x15 | 0.60 | 980 | 1770 |
| 400 | 39 | 22x15 | 0.30 | 3780 | 6800 |
| 400 | 47 | 25x15 | 0.35 | 3130 | 5640 |
| 400 | 56 | 30x15 | 0.40 | 2630 | 4740 |
| 400 | 68 | 30x15 | 0.45 | 2170 | 3900 |
| 400 | 82 | 35x15 | 0.50 | 1790 | 3230 |
| 400 | 100 | 35x15 | 0.55 | 1470 | 2650 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

HU Series 105°C 3000H



Features

Standard capacitors

Applications

- ◆ Switch-mode power supplies in industrial and entertainment electronics
- ◆ Uninterruptible power supplies

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board

Specifications

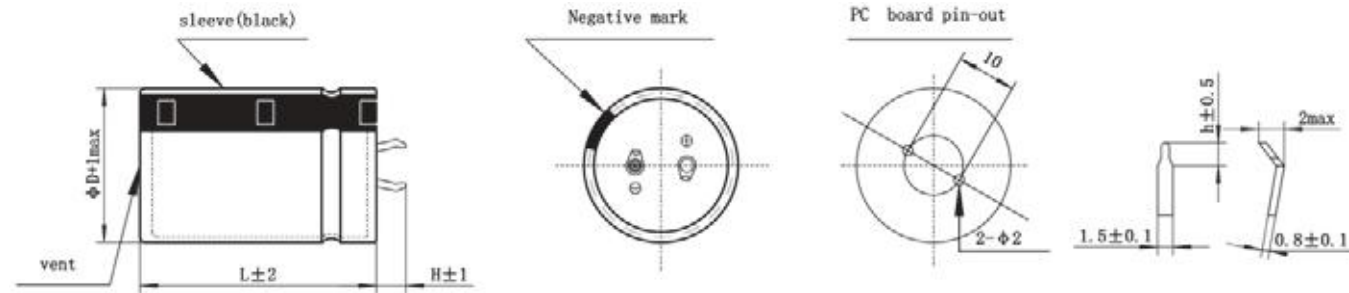
| Item | Performance Characteristics | | | | | | | | | | | | |
|---|---|--|----|----|--------|---------|---------|--|----|-----|---------|---------|--|
| Operating Temperature Range | -40 to +105°C | -25 to +105°C | | | | | | | | | | | |
| Rated voltage V_R | 10 to 450 V DC | 500 V DC | | | | | | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | | | | | | | |
| Rated capacitance C_R | 33 to 82000 μF | 39 to 470 μF | | | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz,+20°C) | | | | | | | | | | | | |
| Leakage Current I_{leak} (+20°C.max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5minutes with rated working voltage applied | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | | | | |
| | $\mu F/Vdc$ | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~420 | 450~500 | |
| | ≤ 8200 | - | 35 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 15 | 20 | |
| | 10000 to 22000 | 55 | 40 | 40 | 35 | 30 | 30 | 25 | 15 | - | - | - | |
| | ≥ 27000 | 60 | 50 | 40 | 35 | 35 | 30 | 25 | - | - | - | - | |
| Self-inductance ESL | approx. 20 nH | | | | | | | | | | | | |
| Useful life 105°C; $V_R, I_{AC,R}$ 105°C; $V_R, I_{AC,R}$ | $V_R \leq 100V$: >5000 h | Requirements: $V_R \leq 100V$ DC/C $\leq \pm 30\%$ of initial value ESR ≤ 3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | $V_R > 100V$ DC/C $\leq \pm 20\%$ of initial value ESR ≤ 2 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| | $V_R > 100V$: >8000 h | | | | | | | | | | | | |
| Voltage Endurance test 105°C; V_R | 3000 h | Post test requirements: | | | | | | | | | | | |
| | | $V_R \leq 100V$ DC/C $\leq \pm 15\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | $V_R > 100V$ DC/C $\leq \pm 10\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| Shelf Life 105°C | 1000 h | Post test requirements: | | | | | | | | | | | |
| | | $V_R \leq 100V$ DC/C $\leq \pm 15\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | $V_R > 100V$ DC/C $\leq \pm 10\%$ of initial value ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | | |
| | $V_R(V)$ | 6.3~16 | 25 | 35 | 50~100 | 160~250 | 315~450 | 500 | | | | | |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 3 | 3 | 3 | 3 | 8 | 8 | | | | | |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 15 | 10 | 8 | 6 | 7 | 10 | - | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | | |

Snap-in

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $10 \leq V_R \leq 100$ | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

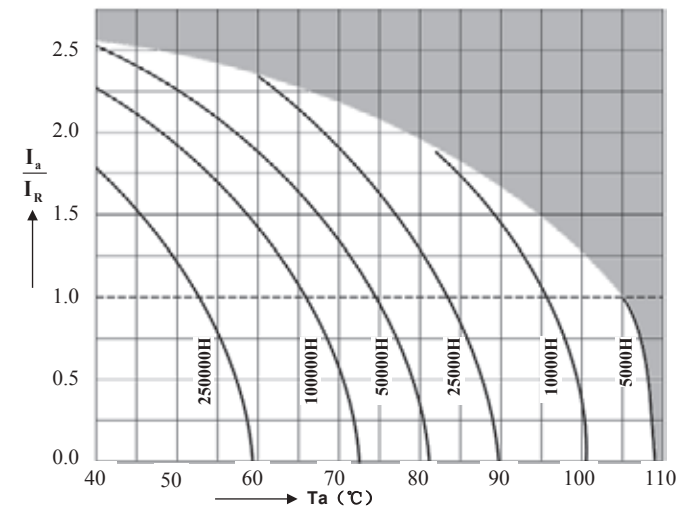
Packing of snap-in



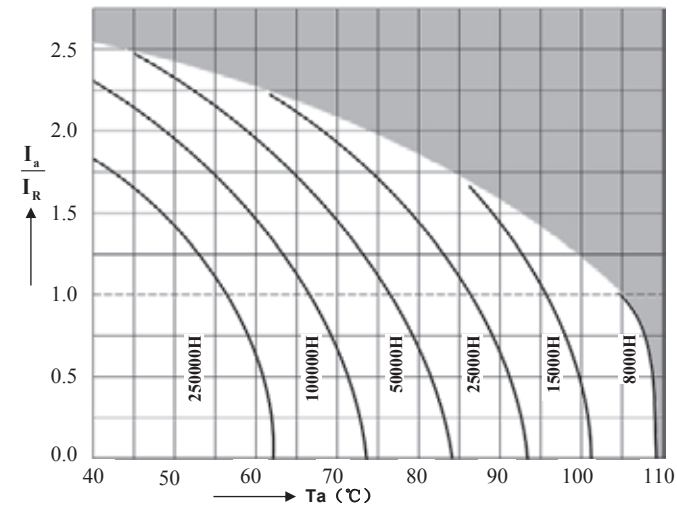
Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) | WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|----------|----------|-----------|--|--------------------------|-------------------------|
| 10 | 4700 | 22x25 | 0.86 | 76 | 99 | 25 | 15000 | 35x30 | 3.30 | 24 | 31 |
| 10 | 6800 | 22x25 | 1.31 | 53 | 68 | 25 | 18000 | 25x50 | 3.55 | 20 | 26 |
| 10 | 8200 | 25x20 | 1.60 | 44 | 57 | 25 | 18000 | 30x40 | 3.56 | 20 | 26 |
| 10 | 10000 | 25x20 | 1.81 | 36 | 46 | 25 | 22000 | 30x45 | 4.25 | 16 | 21 |
| 10 | 12000 | 22x30 | 2.11 | 34 | 44 | 25 | 22000 | 35x35 | 4.26 | 16 | 21 |
| 10 | 15000 | 22x35 | 2.31 | 27 | 35 | 25 | 27000 | 35x45 | 4.76 | 13 | 17 |
| 10 | 18000 | 22x40 | 2.40 | 23 | 29 | 25 | 33000 | 35x50 | 5.50 | 11 | 14 |
| 10 | 22000 | 25x35 | 2.60 | 19 | 24 | 35 | 2200 | 25x25 | 1.52 | 120 | 150 |
| 10 | 27000 | 35x25 | 3.11 | 19 | 25 | 35 | 3300 | 22x25 | 1.53 | 77 | 100 |
| 10 | 33000 | 35x30 | 3.42 | 15 | 20 | 35 | 3900 | 22x30 | 1.70 | 65 | 85 |
| 10 | 39000 | 35x30 | 3.70 | 13 | 17 | 35 | 4700 | 22x35 | 2.03 | 54 | 71 |
| 10 | 47000 | 35x35 | 4.21 | 11 | 14 | 35 | 4700 | 25x25 | 2.04 | 54 | 71 |
| 10 | 56000 | 35x40 | 5.10 | 9 | 12 | 35 | 5600 | 22x35 | 2.13 | 46 | 59 |
| 10 | 68000 | 35x50 | 5.51 | 8 | 10 | 35 | 5600 | 25x30 | 2.14 | 46 | 59 |
| 16 | 3300 | 22x25 | 1.30 | 110 | 140 | 35 | 5600 | 30x25 | 2.15 | 46 | 59 |
| 16 | 4700 | 22x25 | 1.52 | 76 | 99 | 35 | 6800 | 22x40 | 2.60 | 38 | 49 |
| 16 | 6800 | 22x25 | 1.81 | 53 | 68 | 35 | 6800 | 25x35 | 2.60 | 38 | 49 |
| 16 | 8200 | 22x30 | 2.05 | 44 | 57 | 35 | 6800 | 30x25 | 2.55 | 38 | 49 |
| 16 | 10000 | 22x30 | 2.15 | 36 | 46 | 35 | 8200 | 22x50 | 2.85 | 31 | 40 |
| 16 | 10000 | 25x25 | 2.20 | 36 | 46 | 35 | 8200 | 25x40 | 2.86 | 31 | 40 |
| 16 | 12000 | 22x35 | 2.31 | 34 | 44 | 35 | 8200 | 30x30 | 2.87 | 31 | 40 |
| 16 | 12000 | 25x30 | 2.32 | 34 | 44 | 35 | 10000 | 25x45 | 3.07 | 26 | 33 |
| 16 | 12000 | 30x25 | 2.40 | 34 | 44 | 35 | 10000 | 30x35 | 3.08 | 26 | 33 |
| 16 | 15000 | 22x40 | 2.70 | 27 | 35 | 35 | 10000 | 30x50 | 3.37 | 26 | 33 |
| 16 | 15000 | 25x35 | 2.71 | 27 | 35 | 35 | 12000 | 30x40 | 3.38 | 26 | 33 |
| 16 | 15000 | 30x30 | 2.73 | 27 | 35 | 35 | 12000 | 35x30 | 3.40 | 26 | 33 |
| 16 | 18000 | 22x45 | 2.98 | 23 | 29 | 35 | 15000 | 30x45 | 3.75 | 20 | 27 |
| 16 | 18000 | 25x40 | 3.17 | 23 | 29 | 35 | 15000 | 35x35 | 3.76 | 20 | 27 |
| 16 | 18000 | 30x30 | 3.20 | 23 | 29 | 35 | 18000 | 35x40 | 4.37 | 17 | 22 |
| 16 | 22000 | 25x45 | 3.41 | 19 | 24 | 35 | 22000 | 35x50 | 4.95 | 14 | 18 |
| 16 | 22000 | 30x35 | 3.42 | 19 | 24 | 50 | 1500 | 25x20 | 1.15 | 140 | 180 |
| 16 | 22000 | 35x30 | 3.43 | 19 | 24 | 50 | 1800 | 22x25 | 1.35 | 120 | 150 |
| 16 | 27000 | 25x50 | 3.85 | 15 | 20 | 50 | 2200 | 22x25 | 1.55 | 92 | 120 |
| 16 | 27000 | 30x40 | 3.86 | 15 | 20 | 50 | 2700 | 22x30 | 1.75 | 76 | 98 |
| 16 | 27000 | 35x30 | 3.87 | 15 | 20 | 50 | 2700 | 25x25 | 1.76 | 76 | 98 |
| 16 | 33000 | 30x45 | 4.40 | 12 | 16 | 50 | 3300 | 22x35 | 1.99 | 62 | 80 |
| 16 | 33000 | 35x35 | 4.42 | 12 | 16 | 50 | 3300 | 25x30 | 2.00 | 62 | 80 |
| 16 | 39000 | 30x50 | 4.82 | 10 | 14 | 50 | 3900 | 22x40 | 2.25 | 52 | 68 |
| 16 | 39000 | 35x40 | 4.83 | 10 | 14 | 50 | 3900 | 30x25 | 2.26 | 52 | 68 |
| 16 | 47000 | 35x45 | 5.54 | 9 | 11 | 50 | 4700 | 22x45 | 2.56 | 43 | 56 |
| 16 | 56000 | 35x50 | 5.90 | 7 | 10 | 50 | 4700 | 25x35 | 2.62 | 43 | 56 |
| 16 | 68000 | 35x60 | 6.60 | 6 | 8 | 50 | 4700 | 30x30 | 2.63 | 43 | 56 |
| 16 | 82000 | 40x60 | 7.66 | 5 | 7 | 50 | 5600 | 22x50 | 2.89 | 36 | 47 |
| 25 | 2200 | 22x25 | 1.30 | 140 | 180 | 50 | 5600 | 25x40 | 2.90 | 36 | 47 |
| 25 | 3300 | 22x25 | 1.31 | 92 | 120 | 50 | 5600 | 30x30 | 2.95 | 36 | 47 |
| 25 | 4700 | 22x25 | 1.62 | 65 | 85 | 50 | 6800 | 25x45 | 3.37 | 30 | 39 |
| 25 | 5600 | 22x30 | 1.80 | 55 | 71 | 50 | 6800 | 30x35 | 3.39 | 30 | 39 |
| 25 | 6800 | 25x25 | 1.92 | 45 | 59 | 50 | 6800 | 35x30 | 3.40 | 30 | 39 |
| 25 | 8200 | 22x35 | 2.15 | 37 | 49 | 50 | 8200 | 30x40 | 3.71 | 25 | 32 |
| 25 | 8200 | 30x25 | 2.30 | 37 | 49 | 50 | 8200 | 35x35 | 3.72 | 25 | 32 |
| 25 | 10000 | 22x40 | 2.50 | 31 | 40 | 50 | 10000 | 30x50 | 4.09 | 20 | 27 |
| 25 | 10000 | 25x30 | 2.50 | 31 | 40 | 50 | 10000 | 35x40 | 4.10 | 20 | 27 |
| 25 | 10000 | 30x30 | 2.68 | 31 | 40 | 50 | 12000 | 35x45 | 4.56 | 26 | 33 |
| 25 | 12000 | 22x45 | 2.76 | 30 | 39 | 50 | 15000 | 35x50 | 4.77 | 20 | 27 |
| 25 | 12000 | 25x40 | 2.81 | 30 | 39 | 63 | 1000 | 22x25 | 1.17 | 210 | 270 |
| 25 | 12000 | 30x30 | 2.82 | 30 | 39 | 63 | 1200 | 22x25 | 1.25 | 170 | 220 |
| 25 | 15000 | 25x45 | 3.28 | 24 | 31 | 63 | 1500 | 22x30 | 1.48 | 140 | 180 |
| 25 | 15000 | 30x35 | 3.29 | 24 | 31 | 63 | 1500 | 25x25 | 1.50 | 140 | 180 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \leq 100V$



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \geq 160V$

HL Series 105°C 5000H

Features

Standard capacitors

Applications

- ◆ Switch-mode power supplies in industrial and entertainment electronics
- ◆ Uninterruptible power supplies

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



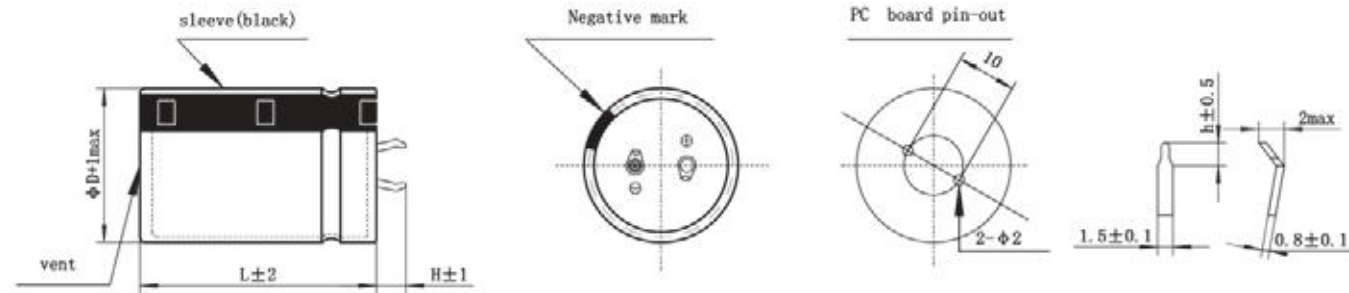
Specifications

| Item | Performance Characteristics | | | | | | | | | | | |
|---|---|---|----|----|--------|---------|---|-----|----|-----|---------|---------|
| Operating Temperature Range | -40 to +10°C | -25 to +105°C | | | | | | | | | | |
| Rated voltage V _R | 10 to 450 V DC | 500 to 550 V DC | | | | | | | | | | |
| Surge voltage V _S | V _R ≤ 315V 1.15 V _R V _R > 315V 1.10 V _R | | | | | | | | | | | |
| Rated capacitance C _R | 39 to 56000 μF | 47 to 470 μF | | | | | | | | | | |
| Capacitance tolerance | ±20%(120Hz,+20°C) | | | | | | | | | | | |
| Leakage Current I _{leak} (+20°C.max.) | I ≤ 3 √CV (μA) After 5minutes with rated working voltage applied | | | | | | | | | | | |
| Dissipation Factor (tan δ ,at 20°C,120Hz) | Less than the value under table(%) | | | | | | | | | | | |
| | μF/Vdc | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160~420 | 450~600 |
| | ≤8200 | - | 35 | 35 | 30 | 25 | 20 | 20 | 15 | 15 | 15 | 20 |
| | 10000 to 22000 | 55 | 40 | 40 | 35 | 30 | 30 | 25 | 15 | - | - | - |
| ≥27000 | 60 | 50 | 40 | 35 | 35 | 30 | 25 | - | - | - | - | |
| Self-inductance ESL | approx. 20 nH | | | | | | | | | | | |
| Useful life 105°C; V _R ,I _{AC,R} 105°C; V _R ,I _{AC,R} | VR≤100V: | Requirements: | | | | | | | | | | |
| | >7000 h | VR≤100V DC/C ≤ ±30% of initial value ESR ≤ 3 times initial specified limit I _{leak} ≤ initial specified limit | | | | | VR>100V DC/C ≤ ±20% of initial value ESR ≤ 2 times initial specified limit I _{leak} ≤ initial specified limit | | | | | |
| Voltage Endurance test 105°C; V _R | 5000 h | Post test requirements: | | | | | | | | | | |
| | | VR≤100V DC/C ≤ ±15% of initial value ESR ≤ 1.3 times initial specified limit | | | | | VR>100V DC/C ≤ ±10% of initial value ESR ≤ 1.3 times initial specified limit | | | | | |
| Shelf Life 105°C | 1000 h | Post test requirements: | | | | | | | | | | |
| | | VR≤100V DC/C ≤ ±15% of initial value ESR ≤ 1.3 times initial specified limit | | | | | VR>100V DC/C ≤ ±10% of initial value ESR ≤ 1.3 times initial specified limit | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | |
| | V _R (V) | 6.3~16 | 25 | 35 | 50~100 | 160~250 | 315~450 | 500 | | | | |
| | Z _{-25°C} / Z _{20°C} | 4 | 3 | 3 | 3 | 3 | 8 | 8 | | | | |
| Z _{-40°C} / Z _{20°C} | 15 | 10 | 8 | 6 | 7 | 10 | - | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| V _R (V)/Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|----------------------------------|--------|-----|------|------|------|----------|
| 10≤V _R ≤100 | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| 160≤V _R ≤250 | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| 315≤V _R ≤600 | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

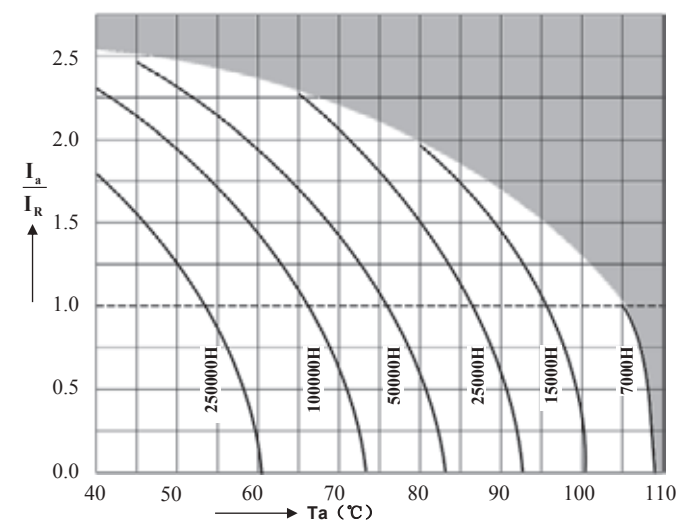
Packing of snap-in



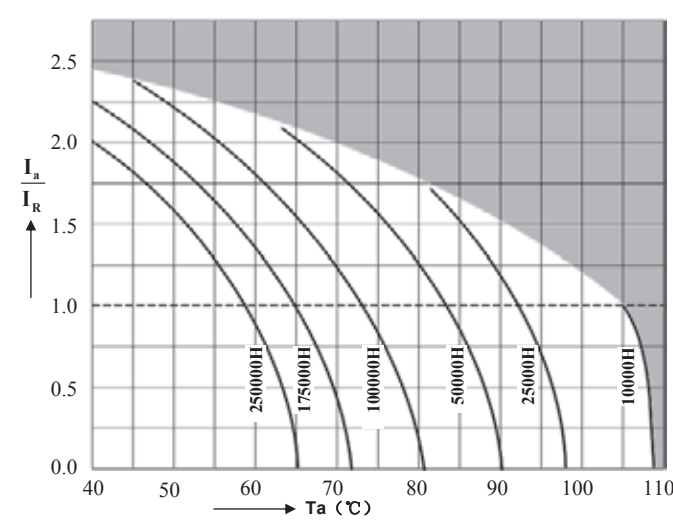
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 420 | 470 | 30x45 | 1.82 | 290 | 560 |
| 420 | 470 | 35x40 | 1.89 | 290 | 560 |
| 420 | 560 | 30x55 | 2.17 | 240 | 470 |
| 420 | 560 | 35x45 | 2.17 | 240 | 470 |
| 420 | 680 | 30x60 | 2.48 | 200 | 390 |
| 420 | 680 | 35x50 | 2.50 | 200 | 390 |
| 420 | 820 | 35x55 | 2.91 | 160 | 320 |
| 420 | 820 | 35x60 | 2.97 | 160 | 320 |
| 420 | 1000 | 35x60 | 3.28 | 140 | 270 |
| 450 | 39 | 22x25 | 0.37 | 3490 | 6800 |
| 450 | 47 | 22x25 | 0.38 | 2890 | 5640 |
| 450 | 56 | 22x25 | 0.45 | 2430 | 4740 |
| 450 | 68 | 22x30 | 0.55 | 2000 | 3900 |
| 450 | 68 | 25x25 | 0.55 | 2000 | 3900 |
| 450 | 82 | 22x25 | 0.56 | 1660 | 3230 |
| 450 | 82 | 22x30 | 0.61 | 1660 | 3230 |
| 450 | 82 | 25x30 | 0.65 | 1660 | 3230 |
| 450 | 100 | 22x30 | 0.67 | 1360 | 2650 |
| 450 | 100 | 25x25 | 0.67 | 1360 | 2650 |
| 450 | 100 | 30x25 | 0.75 | 1360 | 2650 |
| 450 | 120 | 22x35 | 0.75 | 1130 | 2210 |
| 450 | 120 | 25x30 | 0.75 | 1130 | 2210 |
| 450 | 120 | 30x30 | 0.88 | 1130 | 2210 |
| 450 | 150 | 22x40 | 0.93 | 910 | 1770 |
| 450 | 150 | 25x25 | 0.88 | 910 | 1770 |
| 450 | 150 | 30x30 | 0.99 | 910 | 1770 |
| 450 | 150 | 35x30 | 1.08 | 910 | 1770 |
| 450 | 180 | 22x45 | 1.10 | 750 | 1470 |
| 450 | 180 | 25x35 | 1.10 | 750 | 1470 |
| 450 | 180 | 30x30 | 1.10 | 750 | 1470 |
| 450 | 180 | 35x25 | 1.11 | 750 | 1470 |
| 450 | 220 | 25x35 | 1.13 | 620 | 1210 |
| 450 | 220 | 30x30 | 1.13 | 620 | 1210 |
| 450 | 220 | 30x35 | 1.15 | 620 | 1210 |
| 450 | 220 | 35x30 | 1.16 | 620 | 1210 |
| 450 | 270 | 25x45 | 1.24 | 500 | 980 |
| 450 | 270 | 25x50 | 1.30 | 500 | 980 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 450 | 270 | 30x40 | 0.30 | 500 | 980 |
| 450 | 270 | 35x30 | 1.30 | 500 | 980 |
| 450 | 330 | 25x50 | 1.44 | 410 | 800 |
| 450 | 330 | 30x40 | 1.45 | 410 | 800 |
| 450 | 330 | 35x35 | 1.50 | 410 | 800 |
| 450 | 390 | 30x45 | 1.66 | 350 | 680 |
| 450 | 390 | 35x35 | 1.63 | 350 | 680 |
| 450 | 470 | 35x40 | 1.89 | 290 | 560 |
| 450 | 560 | 35x50 | 2.27 | 240 | 470 |
| 450 | 680 | 35x55 | 2.61 | 200 | 390 |
| 500 | 47 | 22x25 | 0.38 | 2890 | 5640 |
| 500 | 56 | 25x25 | 0.44 | 2430 | 4740 |
| 500 | 68 | 22x30 | 0.49 | 2000 | 3900 |
| 500 | 68 | 25x25 | 0.49 | 2000 | 3900 |
| 500 | 82 | 22x35 | 0.57 | 1660 | 3230 |
| 500 | 82 | 25x30 | 0.58 | 1660 | 3230 |
| 500 | 82 | 30x25 | 0.60 | 1660 | 3230 |
| 500 | 100 | 22x40 | 0.67 | 1360 | 2650 |
| 500 | 100 | 25x35 | 0.68 | 1360 | 2650 |
| 500 | 100 | 30x25 | 0.67 | 1360 | 2650 |
| 500 | 120 | 25x40 | 0.79 | 1130 | 2210 |
| 500 | 120 | 30x25 | 0.72 | 1130 | 2210 |
| 500 | 150 | 22x50 | 0.91 | 910 | 1770 |
| 500 | 150 | 25x45 | 0.93 | 910 | 1770 |
| 500 | 150 | 30x30 | 0.91 | 910 | 1770 |
| 500 | 180 | 25x50 | 1.06 | 750 | 1470 |
| 500 | 180 | 30x35 | 1.01 | 750 | 1470 |
| 500 | 180 | 35x30 | 1.05 | 750 | 1470 |
| 500 | 220 | 25x50 | 1.18 | 620 | 1210 |
| 500 | 220 | 30x45 | 1.25 | 620 | 1210 |
| 500 | 220 | 35x30 | 1.16 | 620 | 1210 |
| 500 | 270 | 30x50 | 1.44 | 500 | 980 |
| 500 | 270 | 35x35 | 1.36 | 500 | 980 |
| 500 | 330 | 35x40 | 1.62 | 410 | 800 |
| 500 | 390 | 35x50 | 1.83 | 350 | 680 |
| 500 | 470 | 35x55 | 2.15 | 290 | 560 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \leq 100V$



depending on ambient temperature T_a versus under ripple current operating conditions $V_R \geq 160V$

LT Series 4 Terminals Snap-in Type 85°C



Features

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board

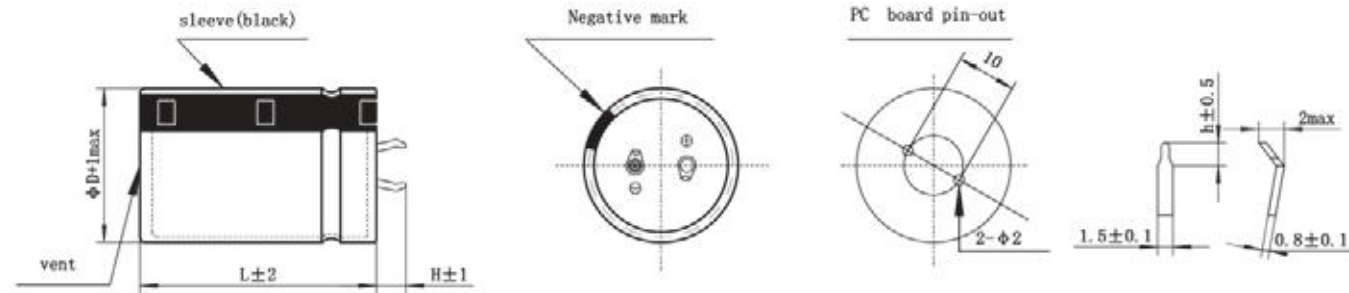
Specifications

| Item | Performance Characteristics | |
|---|---|--|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C |
| Rated voltage V_R | 16 to 450 V DC | 500 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | |
| Rated capacitance C_R | 330 to 82000 μF | 220 to 1500 μF |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | |
| | $\mu F/Vdc$ | 16 25 35 50 63 80 100 160~420 450~500 |
| | ≤ 8200 | 35 30 25 20 20 15 15 15 20 |
| | 10000 to 22000 ≥ 27000 | 40 35 30 30 25 15 - - - |
| Self-inductance ESL | approx. 20 nH | |
| Useful life 85°C; $V_R, I_{AC,R}$ 85°C; $V_R, I_{AC,R}$ | $V_R \leq 100V$: >3000 h | Requirements: $V_R \leq 100V$ $\Delta C/C$ $\leq \pm 30\%$ of initial value $\tan \delta$ ≤ 3 times initial specified limit I_{leak} \leq initial specified limit |
| | $V_R > 100V$: >5000 h | $V_R > 100V$ $\Delta C/C$ $\leq \pm 20\%$ of initial value $\tan \delta$ ≤ 2 times initial specified limit I_{leak} \leq initial specified limit |
| Voltage Endurance test 85°C; V_R | 2000 h | Post test requirements: $V_R \leq 100V$ $\Delta C/C$ $\leq \pm 15\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit |
| | | $V_R > 100V$ $\Delta C/C$ $\leq \pm 10\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit |
| Shelf Life 85°C | 1000 h | Post test requirements: $V_R \leq 100V$ $\Delta C/C$ $\leq \pm 15\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit |
| | | $V_R > 100V$ $\Delta C/C$ $\leq \pm 10\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | |
| | $V_R(V)$ | 16 25 35~100 160~250 315~450 500~600 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ $Z_{-40^\circ C} / Z_{20^\circ C}$ | 5 4 4 4 8 8 15 15 12 7 10 - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $10 \leq V_R \leq 100$ | 0.88 | 1 | 1.07 | 1.15 | 1.15 | 1.15 |
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < $6(L=35, 36)$ | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35, 36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

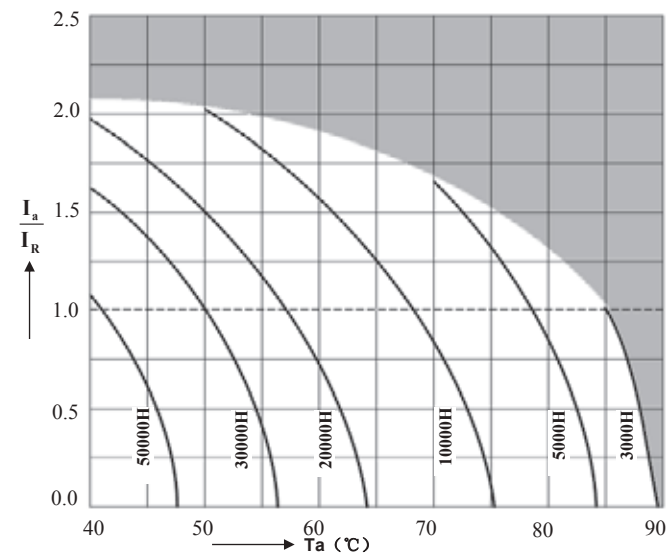
Packing of snap-in



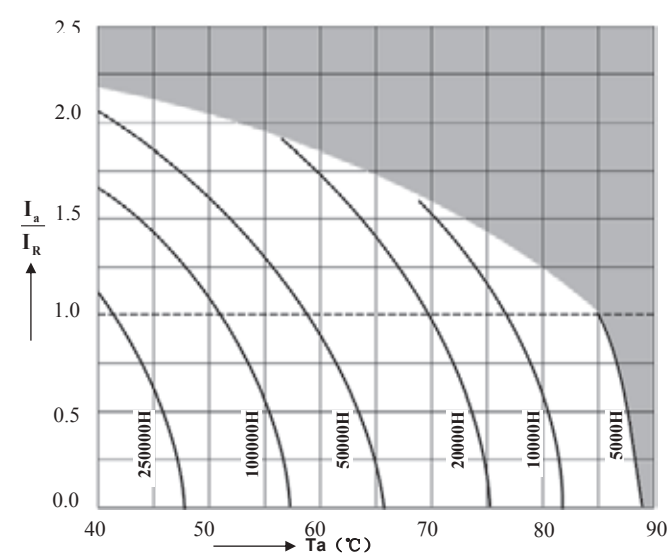
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 420 | 1000 | 45x45 | 4.48 | 110 | 200 |
| 420 | 1200 | 35x85 | 5.49 | 94 | 170 |
| 420 | 1200 | 40x70 | 5.30 | 94 | 170 |
| 420 | 1200 | 45x55 | 5.14 | 94 | 170 |
| 420 | 1500 | 40x80 | 6.21 | 72 | 130 |
| 420 | 1500 | 45x65 | 5.99 | 72 | 130 |
| 420 | 1800 | 40x95 | 7.15 | 61 | 110 |
| 420 | 1800 | 45x70 | 6.72 | 61 | 110 |
| 420 | 2200 | 45x85 | 7.83 | 50 | 90 |
| 450 | 330 | 35x40 | 2.29 | 440 | 800 |
| 450 | 390 | 35x40 | 2.56 | 380 | 680 |
| 450 | 470 | 35x45 | 2.90 | 310 | 560 |
| 450 | 470 | 40x40 | 2.94 | 310 | 560 |
| 450 | 560 | 35x55 | 3.30 | 260 | 470 |
| 450 | 560 | 40x45 | 3.30 | 260 | 470 |
| 450 | 680 | 35x60 | 3.77 | 220 | 390 |
| 450 | 680 | 40x50 | 3.74 | 220 | 390 |
| 450 | 680 | 45x40 | 3.70 | 220 | 390 |
| 450 | 820 | 35x70 | 4.34 | 180 | 320 |
| 450 | 820 | 40x55 | 4.23 | 180 | 320 |
| 450 | 820 | 45x45 | 4.17 | 180 | 320 |
| 450 | 1000 | 35x80 | 5.04 | 150 | 270 |
| 450 | 1000 | 40x60 | 4.71 | 150 | 270 |
| 450 | 1000 | 40x65 | 4.87 | 150 | 270 |
| 450 | 1000 | 45x50 | 4.71 | 150 | 270 |
| 450 | 1200 | 35x95 | 5.82 | 120 | 220 |
| 450 | 1200 | 40x75 | 5.56 | 120 | 220 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 1200 | 45x60 | 5.39 | 120 | 220 |
| 450 | 1500 | 40x90 | 6.59 | 100 | 180 |
| 450 | 1500 | 45x70 | 6.28 | 100 | 180 |
| 450 | 1800 | 45x80 | 7.15 | 83 | 150 |
| 450 | 2200 | 45x95 | 8.31 | 67 | 120 |
| 500 | 220 | 35x40 | 1.30 | 670 | 1210 |
| 500 | 270 | 35x45 | 1.48 | 540 | 980 |
| 500 | 330 | 35x50 | 1.69 | 440 | 800 |
| 500 | 330 | 40x40 | 1.72 | 440 | 800 |
| 500 | 390 | 35x55 | 1.90 | 380 | 680 |
| 500 | 390 | 40x45 | 1.92 | 380 | 680 |
| 500 | 470 | 35x60 | 2.16 | 310 | 560 |
| 500 | 470 | 40x50 | 2.16 | 310 | 560 |
| 500 | 470 | 45x40 | 2.17 | 310 | 560 |
| 500 | 560 | 35x70 | 2.46 | 260 | 470 |
| 500 | 560 | 40x55 | 2.43 | 260 | 470 |
| 500 | 560 | 45x45 | 2.43 | 260 | 470 |
| 500 | 680 | 35x80 | 2.84 | 220 | 390 |
| 500 | 680 | 40x65 | 2.79 | 220 | 390 |
| 500 | 680 | 45x50 | 2.75 | 220 | 390 |
| 500 | 820 | 35x95 | 3.29 | 180 | 320 |
| 500 | 820 | 40x75 | 3.19 | 180 | 320 |
| 500 | 820 | 45x60 | 3.14 | 180 | 320 |
| 500 | 1000 | 40x85 | 3.69 | 150 | 270 |
| 500 | 1000 | 45x70 | 3.61 | 150 | 270 |
| 500 | 1200 | 45x80 | 4.11 | 120 | 220 |
| 500 | 1500 | 45x100 | 4.86 | 100 | 180 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions $VR \leq 100V$



depending on ambient temperature T_a versus under ripple current operating conditions $VR \geq 160V$

HT Series 4 Terminals Snap-in Type 105°C



Features

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board

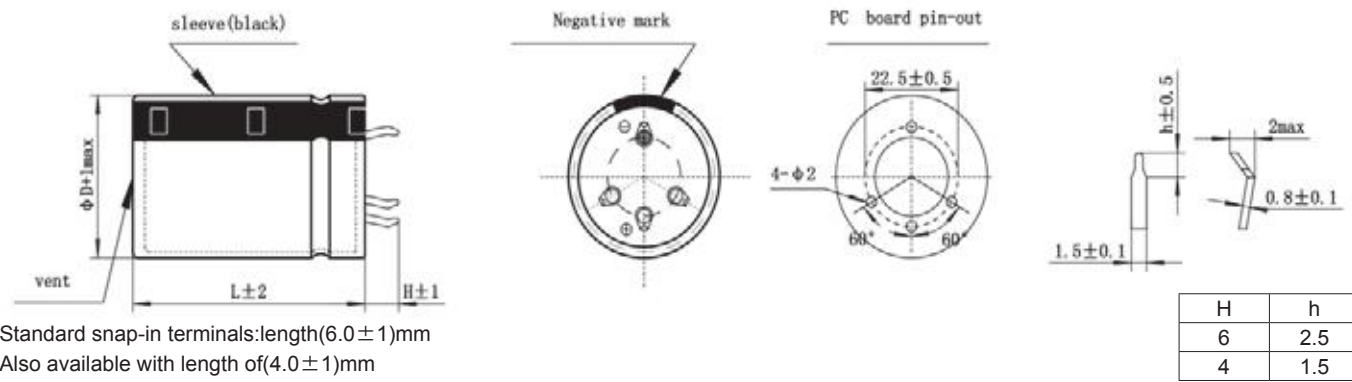
Specifications

| Item | Performance Characteristics | | | |
|--|---|--|----------------------------------|--------------|
| Operating Temperature Range | -40 to +105°C | | | |
| Rated voltage V_R | 160 to 450 V DC | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | |
| Rated capacitance C_R | 82 to 2700 μF | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | |
| | W.V.(V) | 160~420 | 450 | |
| | D.F.(%) max | 15 | 20 | |
| Self-inductance ESL | approx. 20 nH | | | |
| Useful life 105°C; $V_R, I_{AC,R}$ | >5000 h | Requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value | |
| | $\tan \delta$ | ≤ 2 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Voltage Endurance test 105°C; V_R | 2000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Shelf Life 105°C | 1000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | |
| | $V_R(V)$ | 160-250 | 315-450 | $\geq 500 V$ |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 8 | 8 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | 14 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 450$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings



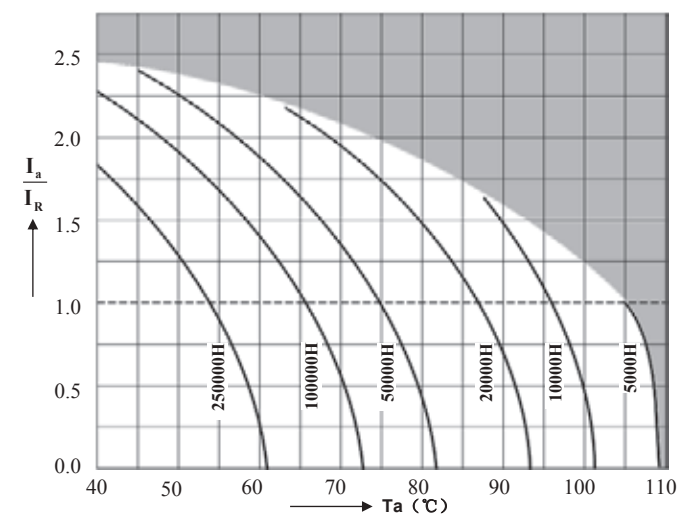
Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35、36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

UB Series 85°C

Features

Standard capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

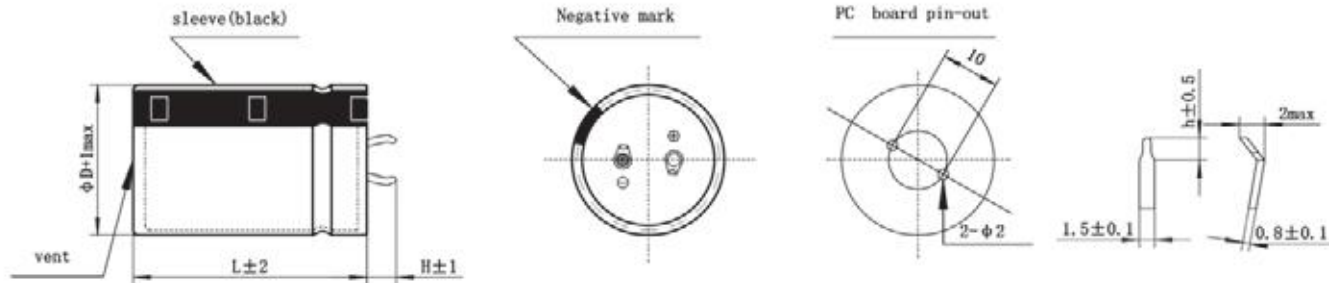
| Item | Performance Characteristics | | | |
|---|---|-------------------------|-------------------------------------|---------|
| Operating Temperature Range | -40 to +85°C | | -25 to +85°C | |
| Rated voltage V _R | 200 to 450 V DC | | 500V DC | |
| Surge voltage V _S | V _R ≤ 315V 1.15 V _R V _R > 315V 1.10 V _R | | | |
| Rated capacitance C _R | 68 ~ 3300 μF | | 100 ~ 1500 μF | |
| Capacitance tolerance | ±20%(120Hz, +20°C) | | | |
| Leakage Current I _{leak} (+20°C, max.) | I ≤ 3 √CV (μA) After 5minutes with rated working voltage applied | | | |
| Dissipation Factor (tan δ, at 20°C, 120Hz) | Less than the value under table(%) | | | |
| | W.V.(V) | 160~420 | 450~550 | |
| | D.F.(%) max | 15 | 20 | |
| Self-inductance ESL | approx. 20 nH | | | |
| Useful life 85°C; V _R , I _{AC,R} | >5000 h | Requirements: | | |
| | | ΔC/C | ≤ ±20% of initial value | |
| | | tan δ | ≤ 2 times initial specified limit | |
| | | I _{leak} | ≤ initial specified limit | |
| Voltage Endurance test 85°C; V _R | 2000 h | Post test requirements: | | |
| | | ΔC/C | ≤ ±10% of initial value | |
| | | tan δ | ≤ 1.3 times initial specified limit | |
| | | I _{leak} | ≤ initial specified limit | |
| Shelf Life 85°C | 1000 h | Post test requirements: | | |
| | | ΔC/C | ≤ ±10% of initial value | |
| | | tan δ | ≤ 1.3 times initial specified limit | |
| | | I _{leak} | ≤ initial specified limit | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | |
| | V _R (V) | 200-250 V | 315-450 V | ≥ 500 V |
| | Z _{-25°C} / Z _{20°C} | 4 | 8 | 8 |
| | Z _{-40°C} / Z _{20°C} | 7 | 10 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | |

Multiplier for Ripple Current vs. Frequency

| V _R (V)/Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|----------------------------------|--------|-----|------|------|------|----------|
| 160 ≤ V _R ≤ 250 | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| 315 ≤ V _R ≤ 600 | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings

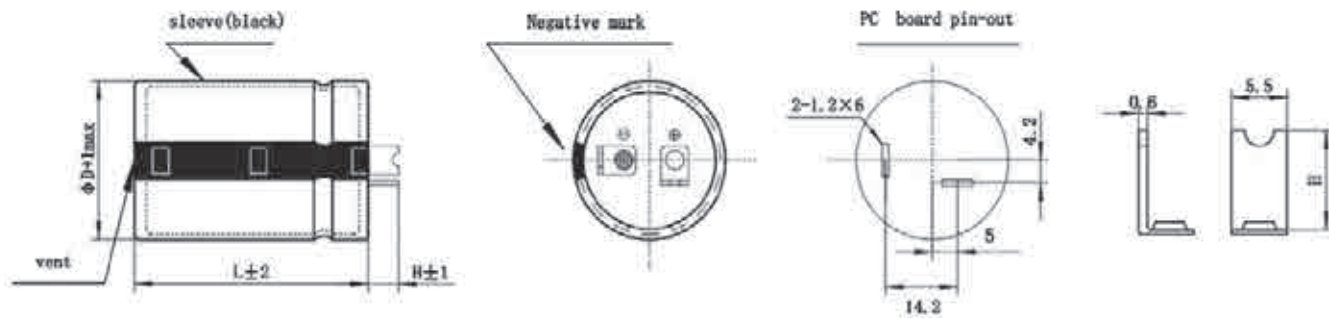
1. Standard 2 terminals



Standard snap-in terminals:length(6.0±1)mm
Also available with length of(4.0±1)mm

| | |
|---|-----|
| H | h |
| 6 | 2.5 |
| 4 | 1.5 |

2. Vibration proof terminal T type



Standard terminals:Length 4.5±1mm.Also available with length of 5.5±1mm

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|--------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | 35 ≤ L ≤ 65 | ≥ 6(L=35、36) | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | 25 < L < 45 | / | 300 | 6 | 50 |
| 35 | 45 ≤ L ≤ 85 | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | 40 ≤ L ≤ 45 | / | 160 | 4 | 40 |
| 40 | 45 < L ≤ 75 | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | 40 ≤ L ≤ 65 | / | 140 | 4 | 35 |
| 45 | 65 < L ≤ 100 | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

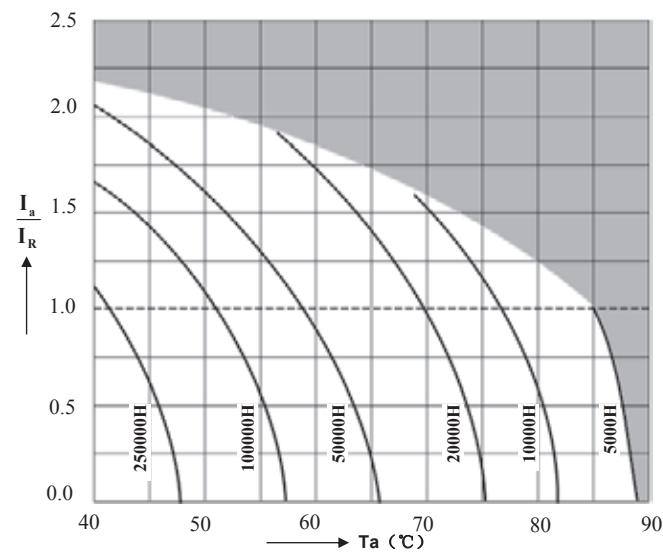
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 200 | 120 | 22x25 | 1.10 | 980 | 1660 |
| 200 | 220 | 22x25 | 1.15 | 530 | 900 |
| 200 | 270 | 22x30 | 1.30 | 440 | 740 |
| 200 | 330 | 22x30 | 1.50 | 350 | 600 |
| 200 | 330 | 25x25 | 1.50 | 350 | 600 |
| 200 | 390 | 22x35 | 1.65 | 300 | 510 |
| 200 | 390 | 25x30 | 1.70 | 300 | 510 |
| 200 | 470 | 22x40 | 1.95 | 250 | 420 |
| 200 | 470 | 25x30 | 1.80 | 250 | 420 |
| 200 | 470 | 30x25 | 1.90 | 250 | 420 |
| 200 | 560 | 22x45 | 2.15 | 210 | 360 |
| 200 | 560 | 25x35 | 2.12 | 210 | 360 |
| 200 | 560 | 30x30 | 2.20 | 210 | 360 |
| 200 | 560 | 35x20 | 2.10 | 210 | 360 |
| 200 | 680 | 22x45 | 2.35 | 170 | 290 |
| 200 | 680 | 25x40 | 2.40 | 170 | 290 |
| 200 | 680 | 30x35 | 2.50 | 170 | 290 |
| 200 | 680 | 35x20 | 2.32 | 170 | 290 |
| 200 | 820 | 25x40 | 2.65 | 140 | 240 |
| 200 | 820 | 30x35 | 2.73 | 140 | 240 |
| 200 | 820 | 35x25 | 2.82 | 140 | 240 |
| 200 | 1000 | 25x40 | 2.72 | 120 | 200 |
| 200 | 1000 | 30x40 | 3.15 | 120 | 200 |
| 200 | 1000 | 35x30 | 3.00 | 120 | 200 |
| 200 | 1200 | 30x45 | 3.50 | 100 | 170 |
| 200 | 1200 | 35x35 | 3.50 | 100 | 170 |
| 200 | 1500 | 25x50 | 3.74 | 76 | 130 |
| 200 | 1500 | 30x45 | 3.93 | 76 | 130 |
| 200 | 1500 | 35x40 | 3.93 | 76 | 130 |
| 200 | 1800 | 35x40 | 4.10 | 65 | 110 |
| 200 | 2200 | 35x50 | 4.25 | 53 | 90 |
| 200 | 3300 | 35x60 | 4.40 | 35 | 60 |
| 250 | 100 | 22x25 | 0.72 | 1170 | 1990 |
| 250 | 180 | 22x25 | 1.00 | 650 | 1110 |
| 250 | 220 | 22x30 | 1.15 | 530 | 900 |
| 250 | 220 | 25x25 | 1.15 | 530 | 900 |
| 250 | 270 | 22x30 | 1.28 | 440 | 740 |
| 250 | 330 | 22x30 | 1.36 | 350 | 600 |
| 250 | 330 | 25x30 | 1.42 | 350 | 600 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 250 | 330 | 30x25 | 1.53 | 350 | 600 |
| 250 | 390 | 22x45 | 1.72 | 300 | 510 |
| 250 | 390 | 25x35 | 1.70 | 300 | 510 |
| 250 | 390 | 30x25 | 1.69 | 300 | 510 |
| 250 | 470 | 22x50 | 2.01 | 250 | 420 |
| 250 | 470 | 25x40 | 1.89 | 250 | 420 |
| 250 | 470 | 30x30 | 1.87 | 250 | 420 |
| 250 | 470 | 35x20 | 1.86 | 250 | 420 |
| 250 | 560 | 25x45 | 2.25 | 210 | 360 |
| 250 | 560 | 30x35 | 2.25 | 210 | 360 |
| 250 | 560 | 35x25 | 2.22 | 210 | 360 |
| 250 | 680 | 25x50 | 2.65 | 170 | 290 |
| 250 | 680 | 30x40 | 2.65 | 170 | 290 |
| 250 | 680 | 35x30 | 2.61 | 170 | 290 |
| 250 | 820 | 30x40 | 2.95 | 140 | 240 |
| 250 | 820 | 35x35 | 2.92 | 140 | 240 |
| 250 | 1000 | 30x40 | 3.18 | 120 | 200 |
| 250 | 1000 | 35x35 | 3.25 | 120 | 200 |
| 250 | 1200 | 30x45 | 3.58 | 100 | 170 |
| 250 | 1200 | 35x40 | 3.58 | 100 | 170 |
| 250 | 1500 | 30x50 | 3.94 | 76 | 130 |
| 250 | 1500 | 35x45 | 4.30 | 76 | 130 |
| 250 | 1800 | 35x45 | 4.46 | 65 | 110 |
| 250 | 2200 | 35x50 | 4.67 | 53 | 90 |
| 315 | 100 | 22x25 | 0.72 | 1170 | 1990 |
| 315 | 150 | 22x30 | 0.90 | 780 | 1330 |
| 315 | 150 | 25x25 | 0.90 | 780 | 1330 |
| 315 | 180 | 22x35 | 1.00 | 650 | 1110 |
| 315 | 180 | 25x30 | 1.02 | 650 | 1110 |
| 315 | 220 | 22x40 | 1.15 | 530 | 900 |
| 315 | 220 | 25x35 | 1.18 | 530 | 900 |
| 315 | 220 | 30x25 | 1.12 | 530 | 900 |
| 315 | 270 | 22x45 | 1.23 | 440 | 740 |
| 315 | 270 | 25x40 | 1.35 | 440 | 740 |
| 315 | 270 | 30x30 | 1.33 | 440 | 740 |
| 315 | 270 | 35x25 | 1.38 | 440 | 740 |
| 315 | 330 | 25x45 | 1.60 | 350 | 600 |
| 315 | 330 | 30x35 | 1.60 | 350 | 600 |
| 315 | 390 | 35x30 | 1.70 | 300 | 510 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 680 | 45x40 | 3.96 | 230 | 390 |
| 450 | 820 | 35x60 | 4.44 | 190 | 320 |
| 450 | 820 | 40x55 | 4.53 | 190 | 320 |
| 450 | 820 | 40x60 | 4.58 | 190 | 320 |
| 450 | 820 | 45x45 | 4.49 | 190 | 320 |
| 450 | 1000 | 35x80 | 5.23 | 160 | 270 |
| 450 | 1000 | 40x65 | 5.19 | 160 | 270 |
| 450 | 1000 | 40x70 | 5.26 | 160 | 270 |
| 450 | 1000 | 45x50 | 5.15 | 160 | 270 |
| 450 | 1500 | 40x90 | 6.83 | 110 | 180 |
| 450 | 1500 | 45x70 | 6.78 | 110 | 180 |
| 450 | 1800 | 45x80 | 7.39 | 88 | 150 |
| 450 | 2200 | 45x95 | 8.61 | 71 | 120 |
| 500 | 100 | 30x25 | 0.93 | 1560 | 2650 |
| 500 | 120 | 30x30 | 1.05 | 1300 | 2210 |
| 500 | 120 | 35x25 | 1.07 | 1300 | 2210 |
| 500 | 150 | 30x35 | 1.23 | 1040 | 1770 |
| 500 | 180 | 30x40 | 1.46 | 860 | 1470 |
| 500 | 180 | 35x30 | 1.38 | 860 | 1470 |
| 500 | 220 | 30x45 | 1.66 | 710 | 1210 |
| 500 | 220 | 35x35 | 1.57 | 710 | 1210 |
| 500 | 270 | 30x50 | 1.85 | 580 | 980 |
| 500 | 270 | 35x40 | 1.77 | 580 | 980 |
| 500 | 330 | 35x40 | 1.79 | 470 | 800 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 330 | 35x45 | 1.88 | 470 | 800 |
| 500 | 330 | 40x40 | 1.88 | 470 | 800 |
| 500 | 390 | 35x45 | 2.12 | 400 | 680 |
| 500 | 390 | 35x50 | 2.36 | 400 | 680 |
| 500 | 390 | 40x45 | 2.41 | 400 | 680 |
| 500 | 470 | 35x50 | 2.42 | 330 | 560 |
| 500 | 470 | 35x55 | 2.56 | 330 | 560 |
| 500 | 470 | 40x50 | 2.60 | 330 | 560 |
| 500 | 470 | 45x40 | 2.58 | 330 | 560 |
| 500 | 560 | 35x55 | 2.56 | 280 | 470 |
| 500 | 560 | 35x70 | 2.82 | 280 | 470 |
| 500 | 560 | 40x55 | 2.73 | 280 | 470 |
| 500 | 560 | 45x45 | 2.70 | 280 | 470 |
| 500 | 680 | 35x65 | 2.70 | 230 | 390 |
| 500 | 680 | 35x70 | 2.82 | 230 | 390 |
| 500 | 680 | 40x65 | 2.89 | 230 | 390 |
| 500 | 680 | 45x50 | 2.82 | 230 | 390 |
| 500 | 820 | 35x95 | 3.30 | 190 | 320 |
| 500 | 820 | 40x65 | 3.00 | 190 | 320 |
| 500 | 820 | 45x60 | 3.20 | 190 | 320 |
| 500 | 1000 | 40x85 | 3.70 | 160 | 270 |
| 500 | 1000 | 45x70 | 3.65 | 160 | 270 |
| 500 | 1200 | 45x80 | 4.15 | 130 | 220 |
| 500 | 1500 | 45x100 | 4.95 | 110 | 180 |

Useful life



depending on ambient temperature Ta versus under ripple current operating conditions VR ≥ 160V

UC Series 85°C

Features

Standard capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

| Item | Performance Characteristics | | | | |
|--|---|--|-----------|-------|-----------|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C | | | |
| Rated voltage V_R | 200 to 450 V DC | 500 to 630 V DC | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | |
| Rated capacitance C_R | 68 ~ 6800 μF | 56 ~ 1500 μF | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | |
| | W.V.(V) | 160~420 450~630 | | | |
| | D.F.(%) max | 15 20 | | | |
| Self-inductance ESL | approx. 20 nH | | | | |
| Useful life 85°C; $V_R, I_{AC,R}$ | >7000 h | Requirements: | | | |
| | | $\Delta C/C$ $\leq \pm 20\%$ of initial value $\tan \delta$ ≤ 2 times initial specified limit I_{leak} \leq initial specified limit | | | |
| Voltage Endurance test 85°C; V_R | 3000 h | Post test requirements: | | | |
| | | $\Delta C/C$ $\leq \pm 10\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit | | | |
| Shelf Life 85°C | 1000 h | Post test requirements: | | | |
| | | $\Delta C/C$ $\leq \pm 10\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | |
| | $V_R(V)$ | 200-250 V | 315-450 V | 500 V | 550-630 V |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 8 | 8 | 8 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 7 | 10 | - | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | |

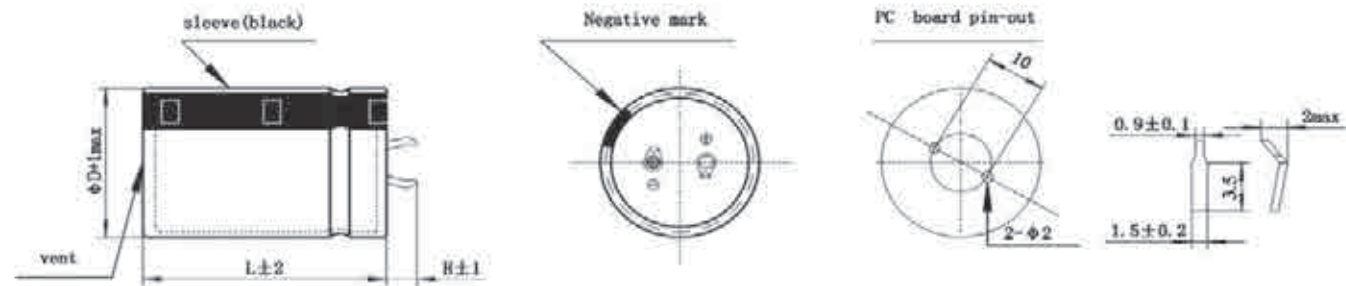
For inverter

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq VR \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq VR \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings

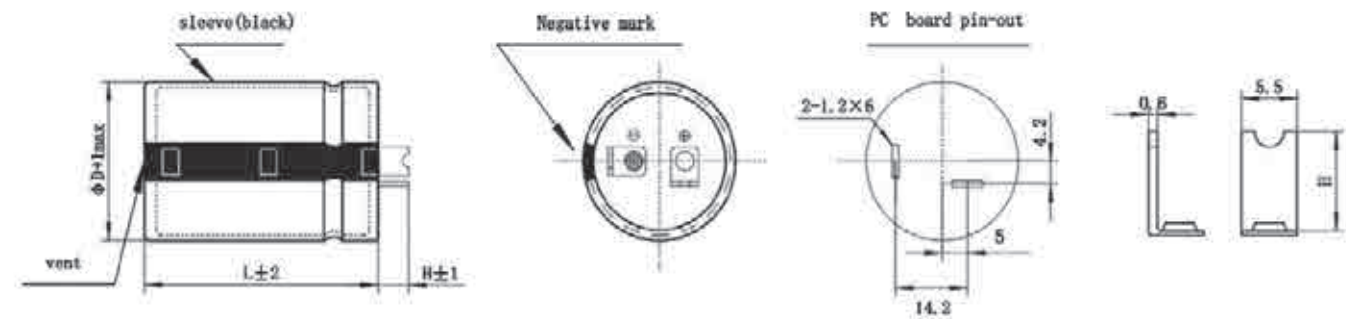
1. Standard 2 terminals



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

2. Vibration proof terminal T type



Standard terminals: Length 4.5 ± 1 mm. Also available with length of 5.5 ± 1 mm

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35、36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

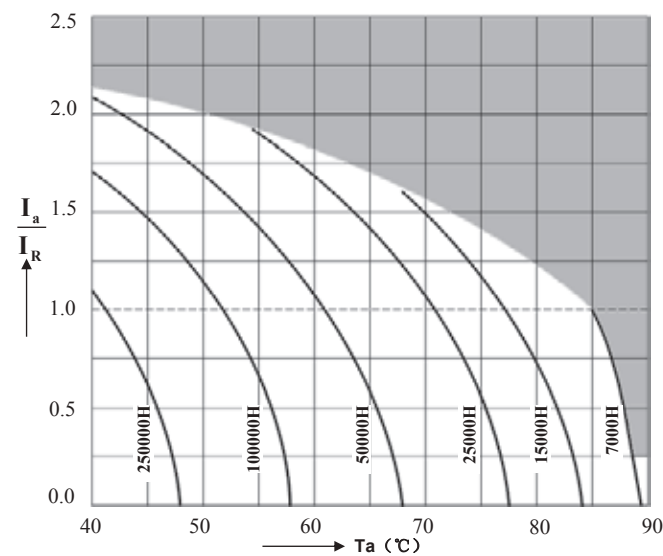
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 200 | 220 | 22x25 | 1.16 | 510 | 900 |
| 200 | 270 | 22x25 | 1.31 | 420 | 740 |
| 200 | 330 | 22x25 | 1.41 | 340 | 600 |
| 200 | 390 | 22x25 | 1.43 | 290 | 510 |
| 200 | 470 | 22x30 | 1.69 | 240 | 420 |
| 200 | 470 | 25x25 | 1.69 | 240 | 420 |
| 200 | 560 | 22x35 | 2.06 | 210 | 360 |
| 200 | 560 | 25x30 | 2.06 | 210 | 360 |
| 200 | 560 | 30x25 | 2.06 | 210 | 360 |
| 200 | 680 | 22x40 | 2.26 | 170 | 290 |
| 200 | 680 | 25x30 | 2.15 | 170 | 290 |
| 200 | 680 | 30x25 | 2.23 | 170 | 290 |
| 200 | 820 | 22x45 | 2.62 | 140 | 240 |
| 200 | 820 | 25x35 | 2.62 | 140 | 240 |
| 200 | 820 | 30x30 | 2.63 | 140 | 240 |
| 200 | 820 | 35x25 | 2.69 | 140 | 240 |
| 200 | 1000 | 22x50 | 2.70 | 110 | 200 |
| 200 | 1000 | 25x40 | 2.64 | 110 | 200 |
| 200 | 1000 | 30x30 | 2.63 | 110 | 200 |
| 200 | 1000 | 35x25 | 2.69 | 110 | 200 |
| 200 | 1200 | 25x45 | 2.90 | 97 | 170 |
| 200 | 1200 | 30x35 | 2.90 | 97 | 170 |
| 200 | 1200 | 35x30 | 3.00 | 97 | 170 |
| 200 | 1500 | 25x55 | 3.45 | 74 | 130 |
| 200 | 1500 | 30x45 | 3.47 | 74 | 130 |
| 200 | 1500 | 35x35 | 3.45 | 74 | 130 |
| 200 | 1800 | 30x50 | 4.00 | 63 | 110 |
| 200 | 1800 | 35x40 | 4.00 | 63 | 110 |
| 200 | 2200 | 30x60 | 4.60 | 52 | 90 |
| 200 | 2200 | 35x45 | 4.43 | 52 | 90 |
| 200 | 2200 | 40x40 | 4.52 | 52 | 90 |
| 200 | 2700 | 35x55 | 5.00 | 42 | 74 |
| 200 | 2700 | 40x50 | 5.24 | 42 | 74 |
| 200 | 3300 | 35x65 | 5.85 | 34 | 60 |
| 200 | 3300 | 40x60 | 5.91 | 34 | 60 |
| 200 | 3900 | 35x80 | 6.32 | 29 | 51 |
| 200 | 3900 | 40x60 | 6.00 | 29 | 51 |
| 200 | 4700 | 40x70 | 6.81 | 24 | 42 |
| 200 | 5600 | 40x80 | 7.45 | 20 | 36 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 200 | 6800 | 40x100 | 8.68 | 17 | 29 |
| 250 | 180 | 22x25 | 1.01 | 630 | 1110 |
| 250 | 220 | 22x25 | 1.26 | 510 | 900 |
| 250 | 270 | 22x25 | 1.41 | 420 | 740 |
| 250 | 330 | 22x30 | 1.59 | 340 | 600 |
| 250 | 330 | 25x25 | 1.54 | 340 | 600 |
| 250 | 390 | 22x30 | 1.60 | 290 | 510 |
| 250 | 390 | 25x25 | 1.58 | 290 | 510 |
| 250 | 470 | 22x35 | 1.74 | 240 | 420 |
| 250 | 470 | 25x30 | 1.74 | 240 | 420 |
| 250 | 470 | 30x25 | 1.81 | 240 | 420 |
| 250 | 560 | 22x45 | 2.13 | 210 | 360 |
| 250 | 560 | 25x35 | 2.05 | 210 | 360 |
| 250 | 560 | 30x25 | 2.02 | 210 | 360 |
| 250 | 680 | 22x50 | 2.50 | 170 | 290 |
| 250 | 680 | 25x45 | 2.55 | 170 | 290 |
| 250 | 680 | 30x30 | 2.40 | 170 | 290 |
| 250 | 820 | 25x50 | 2.93 | 140 | 240 |
| 250 | 820 | 30x35 | 2.80 | 140 | 240 |
| 250 | 820 | 35x30 | 2.90 | 140 | 240 |
| 250 | 1000 | 25x55 | 3.07 | 110 | 200 |
| 250 | 1000 | 30x45 | 3.12 | 110 | 200 |
| 250 | 1000 | 35x35 | 3.07 | 110 | 200 |
| 250 | 1200 | 25x60 | 3.35 | 97 | 170 |
| 250 | 1200 | 30x50 | 3.41 | 97 | 170 |
| 250 | 1200 | 35x35 | 3.21 | 97 | 170 |
| 250 | 1500 | 30x60 | 4.10 | 74 | 130 |
| 250 | 1500 | 35x45 | 3.95 | 74 | 130 |
| 250 | 1500 | 40x40 | 4.05 | 74 | 130 |
| 250 | 1800 | 30x65 | 4.30 | 63 | 110 |
| 250 | 1800 | 35x50 | 4.20 | 63 | 110 |
| 250 | 1800 | 40x45 | 4.30 | 63 | 110 |
| 250 | 2200 | 35x60 | 4.95 | 52 | 90 |
| 250 | 2200 | 40x50 | 4.95 | 52 | 90 |
| 250 | 2700 | 35x80 | 6.10 | 42 | 74 |
| 250 | 2700 | 40x70 | 6.10 | 42 | 74 |
| 250 | 3300 | 35x80 | 6.52 | 34 | 60 |
| 250 | 3300 | 40x70 | 6.61 | 34 | 60 |
| 250 | 3900 | 40x80 | 7.50 | 29 | 51 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 575 | 680 | 45x65 | 2.85 | 220 | 390 |
| 575 | 820 | 40x100 | 3.20 | 180 | 320 |
| 575 | 820 | 45x75 | 3.20 | 180 | 320 |
| 575 | 1000 | 45x90 | 3.36 | 150 | 270 |
| 575 | 1200 | 45x105 | 3.56 | 130 | 220 |
| 600 | 150 | 30x45 | 1.10 | 1010 | 1770 |
| 600 | 180 | 30x50 | 1.11 | 840 | 1470 |
| 600 | 220 | 30x60 | 1.24 | 690 | 1210 |
| 600 | 270 | 30x70 | 1.35 | 560 | 980 |
| 600 | 330 | 30x80 | 1.36 | 460 | 800 |
| 600 | 330 | 40x50 | 1.36 | 460 | 800 |
| 600 | 390 | 40x60 | 1.60 | 390 | 680 |
| 600 | 470 | 40x70 | 1.75 | 320 | 560 |
| 600 | 470 | 45x55 | 1.75 | 320 | 560 |
| 600 | 560 | 40x80 | 1.90 | 270 | 470 |
| 600 | 560 | 45x60 | 1.90 | 270 | 470 |
| 600 | 680 | 40x90 | 2.00 | 220 | 390 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 600 | 680 | 45x70 | 2.00 | 220 | 390 |
| 600 | 820 | 45x85 | 2.50 | 180 | 320 |
| 600 | 1000 | 45x100 | 2.90 | 150 | 270 |
| 630 | 150 | 30x45 | 1.00 | 1010 | 1770 |
| 630 | 180 | 30x50 | 1.02 | 840 | 1470 |
| 630 | 220 | 30x60 | 1.11 | 690 | 1210 |
| 630 | 270 | 30x70 | 1.30 | 560 | 980 |
| 630 | 330 | 30x85 | 1.33 | 460 | 800 |
| 630 | 330 | 40x50 | 1.33 | 460 | 800 |
| 630 | 470 | 40x70 | 1.70 | 320 | 560 |
| 630 | 470 | 45x55 | 1.70 | 320 | 560 |
| 630 | 560 | 40x80 | 1.80 | 270 | 470 |
| 630 | 560 | 45x65 | 1.80 | 270 | 470 |
| 630 | 680 | 40x95 | 1.95 | 220 | 390 |
| 630 | 680 | 45x75 | 1.95 | 220 | 390 |
| 630 | 820 | 45x90 | 2.30 | 180 | 320 |
| 630 | 1000 | 45x105 | 2.30 | 150 | 270 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

UD Series 85°C

Features

Standard capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

| Item | Performance Characteristics | | | | |
|--|---|-------------------------|--|-------|-----------|
| Operating Temperature Range | -40 to +85°C | | -25 to +85°C | | |
| Rated voltage V_R | 200 to 450 V DC | | 500 to 600 V DC | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | |
| Rated capacitance C_R | 68 ~ 2700 μF | | 47 ~ 680 μF | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | |
| | W.V.(V) | 160~420 | 450~600 | | |
| | D.F.(%) max | 15 | 20 | | |
| Self-inductance ESL | approx. 20 nH | | | | |
| Useful life 85°C; $V_R, I_{AC,R}$ | >10000 h | Requirements: | | | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value | | |
| | | $\tan \delta$ | ≤ 2 times initial specified limit | | |
| | | I_{leak} | \leq initial specified limit | | |
| Voltage Endurance test 85°C; V_R | 5000 h | Post test requirements: | | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | | |
| | | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | | I_{leak} | \leq initial specified limit | | |
| Shelf Life 85°C | 1000 h | Post test requirements: | | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | | |
| | | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | | I_{leak} | \leq initial specified limit | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | |
| | $V_R(V)$ | 200-250 V | 315-450 V | 500 V | 550~600 V |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 8 | 8 | 12 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 7 | 10 | - | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | |

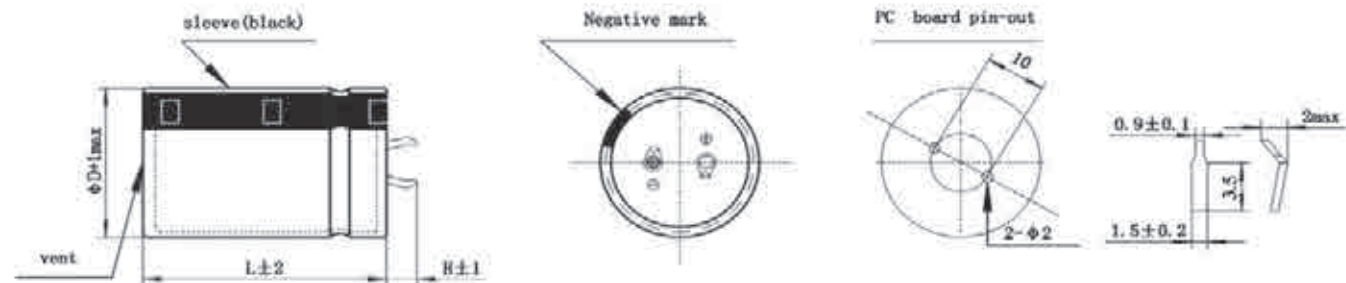
For inverter

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq VR \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq VR \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings

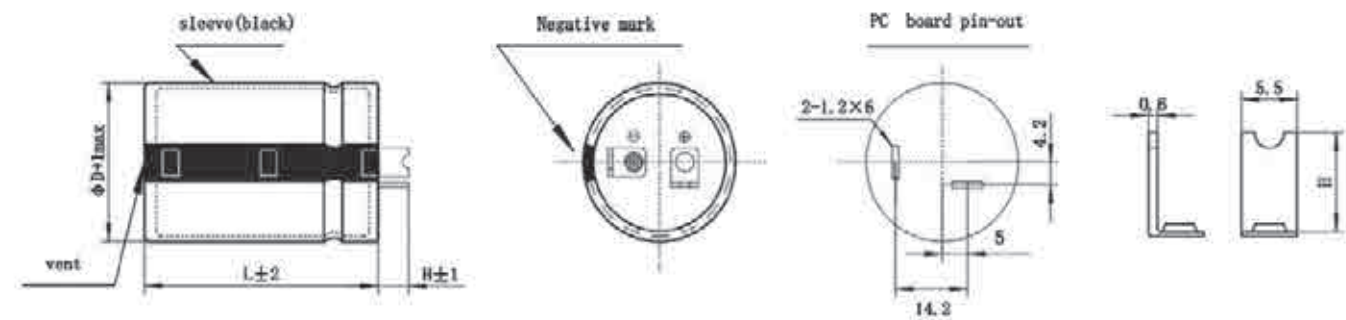
1. Standard 2 terminals



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

2. Vibration proof terminal T type



Standard terminals: Length 4.5 ± 1 mm. Also available with length of 5.5 ± 1 mm

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35、36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 200 | 330 | 22x25 | 1.55 | 330 | 600 |
| 200 | 330 | 25x25 | 1.65 | 330 | 600 |
| 200 | 390 | 22x30 | 1.76 | 280 | 510 |
| 200 | 390 | 25x25 | 1.66 | 280 | 510 |
| 200 | 470 | 22x30 | 1.98 | 230 | 420 |
| 200 | 470 | 25x25 | 1.93 | 230 | 420 |
| 200 | 560 | 22x35 | 2.25 | 200 | 360 |
| 200 | 560 | 25x30 | 2.15 | 200 | 360 |
| 200 | 680 | 22x40 | 2.62 | 160 | 290 |
| 200 | 680 | 25x35 | 2.56 | 160 | 290 |
| 200 | 680 | 30x25 | 2.48 | 160 | 290 |
| 200 | 820 | 22x45 | 2.99 | 130 | 240 |
| 200 | 820 | 25x35 | 2.84 | 130 | 240 |
| 200 | 820 | 30x30 | 2.60 | 130 | 240 |
| 200 | 820 | 35x25 | 2.42 | 130 | 240 |
| 200 | 1000 | 25x45 | 3.29 | 110 | 200 |
| 200 | 1000 | 30x30 | 2.76 | 110 | 200 |
| 200 | 1000 | 35x25 | 2.70 | 110 | 200 |
| 200 | 1200 | 25x50 | 3.75 | 94 | 170 |
| 200 | 1200 | 30x35 | 3.54 | 94 | 170 |
| 200 | 1200 | 35x30 | 3.54 | 94 | 170 |
| 200 | 1500 | 30x40 | 3.92 | 72 | 130 |
| 200 | 1500 | 35x35 | 3.92 | 72 | 130 |
| 200 | 1800 | 30x50 | 4.75 | 61 | 110 |
| 200 | 1800 | 35x40 | 4.70 | 61 | 110 |
| 200 | 2200 | 30x55 | 5.31 | 50 | 90 |
| 200 | 2200 | 35x45 | 5.30 | 50 | 90 |
| 200 | 2700 | 35x50 | 5.48 | 41 | 74 |
| 250 | 150 | 22x25 | 0.95 | 740 | 1330 |
| 250 | 180 | 22x25 | 1.15 | 620 | 1110 |
| 250 | 220 | 22x30 | 1.29 | 500 | 900 |
| 250 | 220 | 25x25 | 1.31 | 500 | 900 |
| 250 | 270 | 22x30 | 1.47 | 410 | 740 |
| 250 | 270 | 25x25 | 1.47 | 410 | 740 |
| 250 | 330 | 22x30 | 1.68 | 330 | 600 |
| 250 | 330 | 25x25 | 1.68 | 330 | 600 |
| 250 | 390 | 22x35 | 2.00 | 280 | 510 |
| 250 | 390 | 25x30 | 1.95 | 280 | 510 |
| 250 | 390 | 30x25 | 2.10 | 280 | 510 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 250 | 470 | 22x40 | 2.21 | 230 | 420 |
| 250 | 470 | 25x30 | 2.15 | 230 | 420 |
| 250 | 470 | 35x25 | 2.20 | 230 | 420 |
| 250 | 560 | 22x40 | 2.50 | 200 | 360 |
| 250 | 560 | 25x35 | 2.50 | 200 | 360 |
| 250 | 560 | 30x30 | 2.51 | 200 | 360 |
| 250 | 560 | 35x25 | 2.53 | 200 | 360 |
| 250 | 680 | 22x50 | 2.91 | 160 | 290 |
| 250 | 680 | 25x40 | 2.80 | 160 | 290 |
| 250 | 680 | 30x30 | 2.75 | 160 | 290 |
| 250 | 680 | 35x25 | 2.64 | 160 | 290 |
| 250 | 820 | 25x45 | 3.12 | 130 | 240 |
| 250 | 820 | 30x35 | 3.01 | 130 | 240 |
| 250 | 820 | 35x30 | 3.00 | 130 | 240 |
| 250 | 1000 | 25x50 | 3.60 | 110 | 200 |
| 250 | 1000 | 30x40 | 3.46 | 110 | 200 |
| 250 | 1000 | 35x30 | 3.39 | 110 | 200 |
| 250 | 1200 | 30x45 | 3.93 | 94 | 170 |
| 250 | 1200 | 35x35 | 3.81 | 94 | 170 |
| 250 | 1500 | 30x50 | 4.52 | 72 | 130 |
| 250 | 1500 | 35x40 | 4.52 | 72 | 130 |
| 250 | 1800 | 35x45 | 5.21 | 61 | 110 |
| 250 | 2200 | 35x55 | 5.70 | 50 | 90 |
| 350 | 560 | 35x50 | 3.21 | 200 | 360 |
| 350 | 680 | 35x40 | 3.19 | 160 | 290 |
| 350 | 820 | 35x50 | 3.67 | 130 | 240 |
| 350 | 1000 | 35x55 | 4.23 | 110 | 200 |
| 350 | 1500 | 40x80 | 6.52 | 72 | 130 |
| 350 | 1500 | 45x70 | 6.52 | 72 | 130 |
| 350 | 2200 | 45x100 | 8.70 | 50 | 90 |
| 400 | 82 | 22x25 | 0.79 | 1350 | 2430 |
| 400 | 100 | 22x25 | 0.90 | 1110 | 1990 |
| 400 | 100 | 25x25 | 1.05 | 1110 | 1990 |
| 400 | 120 | 22x30 | 1.05 | 920 | 1660 |
| 400 | 120 | 25x25 | 1.05 | 920 | 1660 |
| 400 | 150 | 22x30 | 1.15 | 740 | 1330 |
| 400 | 150 | 25x25 | 1.15 | 740 | 1330 |
| 400 | 180 | 22x35 | 1.31 | 620 | 1110 |
| 400 | 180 | 25x30 | 1.32 | 620 | 1110 |

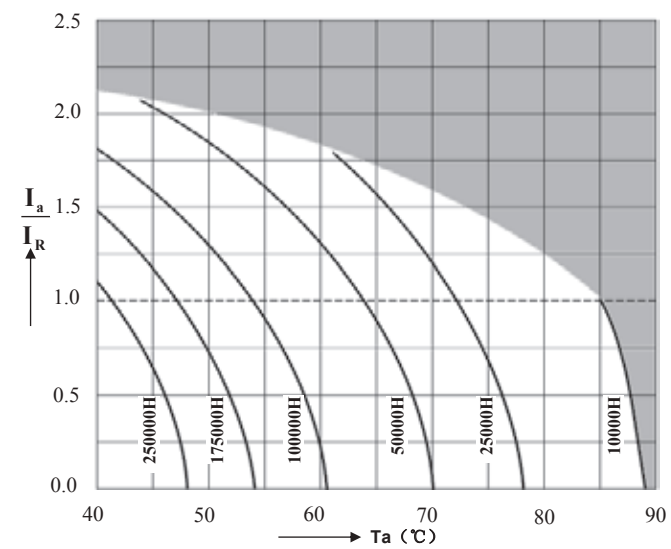
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 180 | 30x25 | 1.32 | 620 | 1110 |
| 400 | 220 | 22x40 | 1.55 | 500 | 900 |
| 400 | 220 | 25x35 | 1.52 | 500 | 900 |
| 400 | 220 | 30x25 | 1.51 | 500 | 900 |
| 400 | 220 | 35x25 | 1.55 | 500 | 900 |
| 400 | 270 | 22x45 | 1.80 | 410 | 740 |
| 400 | 270 | 25x40 | 1.76 | 410 | 740 |
| 400 | 270 | 30x30 | 1.76 | 410 | 740 |
| 400 | 270 | 35x25 | 1.72 | 410 | 740 |
| 400 | 330 | 25x45 | 2.05 | 330 | 600 |
| 400 | 330 | 30x35 | 2.02 | 330 | 600 |
| 400 | 330 | 35x25 | 2.01 | 330 | 600 |
| 400 | 390 | 25x50 | 2.33 | 280 | 510 |
| 400 | 390 | 30x35 | 2.18 | 280 | 510 |
| 400 | 390 | 35x30 | 2.24 | 280 | 510 |
| 400 | 470 | 25x55 | 2.68 | 230 | 420 |
| 400 | 470 | 30x40 | 2.65 | 230 | 420 |
| 400 | 470 | 35x35 | 2.59 | 230 | 420 |
| 400 | 560 | 30x45 | 3.00 | 200 | 360 |
| 400 | 560 | 35x35 | 2.98 | 200 | 360 |
| 400 | 680 | 30x55 | 3.51 | 160 | 290 |
| 400 | 680 | 35x40 | 3.20 | 160 | 290 |
| 400 | 680 | 35x45 | 3.42 | 160 | 290 |
| 400 | 820 | 35x50 | 3.72 | 130 | 240 |
| 400 | 1000 | 35x55 | 4.30 | 110 | 200 |
| 400 | 1200 | 35x65 | 4.82 | 94 | 170 |
| 400 | 1200 | 40x55 | 4.80 | 94 | 170 |
| 400 | 1500 | 40x80 | 6.62 | 72 | 130 |
| 400 | 1500 | 45x60 | 6.31 | 72 | 130 |
| 400 | 1800 | 45x80 | 7.60 | 61 | 110 |
| 450 | 68 | 22x25 | 0.68 | 2170 | 3900 |
| 450 | 82 | 22x25 | 0.81 | 1790 | 3230 |
| 450 | 82 | 25x25 | 0.81 | 1790 | 3230 |
| 450 | 100 | 22x30 | 0.94 | 1470 | 2650 |
| 450 | 100 | 30x25 | 0.98 | 1470 | 2650 |
| 450 | 120 | 22x30 | 1.05 | 1230 | 2210 |
| 450 | 120 | 25x25 | 1.09 | 1230 | 2210 |
| 450 | 150 | 22x35 | 1.21 | 980 | 1770 |
| 450 | 150 | 25x30 | 1.21 | 980 | 1770 |
| 450 | 150 | 30x25 | 1.21 | 980 | 1770 |
| 450 | 180 | 22x40 | 1.39 | 820 | 1470 |
| 450 | 180 | 25x35 | 1.39 | 820 | 1470 |
| 450 | 180 | 30x25 | 1.35 | 820 | 1470 |
| 450 | 220 | 22x50 | 1.68 | 670 | 1210 |
| 450 | 220 | 25x40 | 1.68 | 670 | 1210 |
| 450 | 220 | 30x30 | 1.62 | 670 | 1210 |
| 450 | 220 | 35x25 | 1.60 | 670 | 1210 |
| 450 | 270 | 25x45 | 1.85 | 540 | 980 |
| 450 | 270 | 30x35 | 1.82 | 540 | 980 |
| 450 | 270 | 35x30 | 1.91 | 540 | 980 |
| 450 | 330 | 25x50 | 2.18 | 440 | 800 |
| 450 | 330 | 30x40 | 2.21 | 440 | 800 |
| 450 | 330 | 35x30 | 2.20 | 440 | 800 |
| 450 | 390 | 30x45 | 2.51 | 380 | 680 |
| 450 | 390 | 35x35 | 2.50 | 380 | 680 |
| 450 | 470 | 30x50 | 2.88 | 310 | 560 |
| 450 | 470 | 35x40 | 2.80 | 310 | 560 |
| 450 | 560 | 30x55 | 3.25 | 260 | 470 |
| 450 | 560 | 35x45 | 3.26 | 260 | 470 |
| 450 | 680 | 35x50 | 3.48 | 220 | 390 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 1500 | 45x100 | 7.24 | 100 | 180 |
| 500 | 47 | 22x25 | 0.52 | 3130 | 5640 |
| 500 | 68 | 22x30 | 0.70 | 2170 | 3900 |
| 500 | 68 | 25x25 | 0.70 | 2170 | 3900 |
| 500 | 82 | 25x30 | 0.82 | 1790 | 3230 |
| 500 | 100 | 25x35 | 0.97 | 1470 | 2650 |
| 500 | 100 | 30x25 | 0.97 | 1470 | 2650 |
| 500 | 120 | 25x35 | 1.09 | 1230 | 2210 |
| 500 | 120 | 30x30 | 1.10 | 1230 | 2210 |
| 500 | 150 | 25x40 | 1.26 | 980 | 1770 |
| 500 | 150 | 30x30 | 1.30 | 980 | 1770 |
| 500 | 150 | 35x25 | 1.32 | 980 | 1770 |
| 500 | 180 | 25x45 | 1.50 | 820 | 1470 |
| 500 | 180 | 30x35 | 1.53 | 820 | 1470 |
| 500 | 180 | 35x30 | 1.55 | 820 | 1470 |
| 500 | 220 | 25x55 | 1.61 | 670 | 1210 |
| 500 | 220 | 30x40 | 1.75 | 670 | 1210 |
| 500 | 220 | 35x35 | 1.80 | 670 | 1210 |
| 500 | 270 | 30x45 | 2.01 | 540 | 980 |
| 500 | 270 | 35x35 | 2.03 | 540 | 980 |
| 500 | 330 | 30x55 | 2.32 | 440 | 800 |
| 500 | 330 | 35x40 | 2.32 | 440 | 800 |
| 500 | 390 | 35x45 | 2.63 | 380 | 680 |
| 500 | 470 | 35x55 | 2.99 | 310 | 560 |
| 500 | 560 | 35x65 | 3.24 | 260 | 470 |
| 500 | 680 | 40x60 | 3.90 | 220 | 390 |
| 550 | 56 | 25x25 | 0.66 | 2630 | 4740 |
| 550 | 68 | 25x30 | 0.75 | 2170 | 3900 |
| 550 | 82 | 25x35 | 0.84 | 1790 | 3230 |
| 550 | 82 | 30x25 | 0.87 | 1790 | 3230 |
| 550 | 100 | 25x35 | 1.01 | 1470 | 2650 |
| 550 | 100 | 30x30 | 1.01 | 1470 | 2650 |
| 550 | 120 | 25x40 | 1.12 | 1230 | 2210 |
| 550 | 120 | 30x35 | 1.15 | 1230 | 2210 |
| 550 | 120 | 35x25 | 1.15 | 1230 | 2210 |
| 550 | 150 | 25x50 | 1.36 | 980 | 1770 |
| 550 | 150 | 30x35 | 1.30 | 980 | 1770 |
| 550 | 150 | 35x30 | 1.45 | 980 | 1770 |
| 550 | 180 | 25x55 | 1.57 | 820 | 1470 |
| 550 | 180 | 30x40 | 1.58 | 820 | 1470 |
| 550 | 180 | 35x35 | 1.63 | 820 | 1470 |
| 550 | 220 | 30x50 | 1.87 | 670 | 1210 |
| 550 | 220 | 35x40 | 1.87 | 670 | 1210 |
| 550 | 270 | 30x55 | 2.12 | 540 | 980 |
| 550 | 270 | 35x45 | 2.15 | 540 | 980 |
| 550 | 330 | 35x50 | 2.45 | 440 | 800 |
| 550 | 390 | 35x55 | 2.78 | 380 | 680 |
| 600 | 47 | 25x25 | 0.61 | 3130 | 5640 |
| 600 | 56 | 25x30 | 0.68 | 2630 | 4740 |
| 600 | 68 | 25x35 | 0.82 | 2170 | 3900 |
| 600 | 68 | 30x25 | 0.82 | 2170 | 3900 |
| 600 | 82 | 25x35 | 0.88 | 1790 | 3230 |
| 600 | 82 | 30x30 | 0.92 | 1790 | 3230 |
| 600 | 100 | 25x40 | 1.05 | 1470 | 2650 |
| 600 | 100 | 30x35 | 1.07 | 1470 | 2650 |
| 600 | 100 | 35x25 | 1.11 | 1470 | 2650 |
| 600 | 120 | 25x50 | 1.19 | 1230 | 2210 |
| 600 | 120 | 30x35 | 1.23 | 1230 | 2210 |
| 600 | 120 | 35x30 | 1.31 | 1230 | 2210 |
| 600 | 150 | 25x55 | 1.53 | 980 | 1770 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 600 | 150 | 30x45 | 1.53 | 980 | 1770 |
| 600 | 150 | 35x35 | 1.53 | 980 | 1770 |
| 600 | 180 | 30x50 | 1.68 | 820 | 1470 |
| 600 | 180 | 35x40 | 1.72 | 820 | 1470 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 600 | 220 | 30x55 | 1.95 | 670 | 1210 |
| 600 | 220 | 35x45 | 1.95 | 670 | 1210 |
| 600 | 270 | 35x50 | 2.26 | 540 | 980 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

UJ Series 105°C

Features

Standard capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

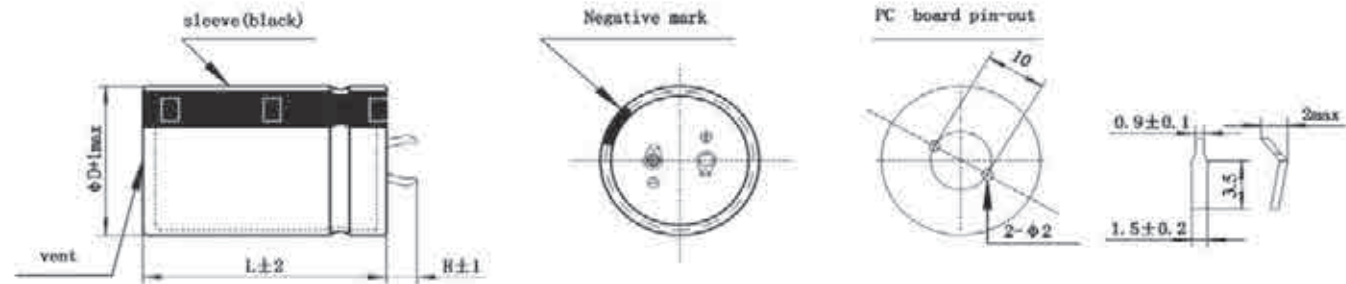
| Item | Performance Characteristics | | | |
|--|---|-------------------------|--|--------------|
| Operating Temperature Range | -40 to +105°C | | -25 to +105°C | |
| Rated voltage V_R | 200 to 450 V DC | | 500 to 550 V DC | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | |
| Rated capacitance C_R | 82 ~ 3300 μF | | 47 ~ 1000 μF | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | |
| | W.V.(V) | 160~420 | 450~550 | |
| | D.F.(%) max | 15 | 20 | |
| Self-inductance ESL | approx. 20 nH | | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | >5000 h | Requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value | |
| | | $\tan \delta$ | ≤ 2 times initial specified limit | |
| | | I_{leak} | \leq initial specified limit | |
| Voltage Endurance test 105°C; V_R | 2000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | | $\tan \delta$ | ≤ 1.3 times initial specified limit | |
| | | I_{leak} | \leq initial specified limit | |
| Shelf Life 105°C | 1000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | | $\tan \delta$ | ≤ 1.3 times initial specified limit | |
| | | I_{leak} | \leq initial specified limit | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | |
| | $V_R(V)$ | 200-250 V | 315-450 V | $\geq 500 V$ |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 8 | 8 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 7 | 10 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq VR \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq VR \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings

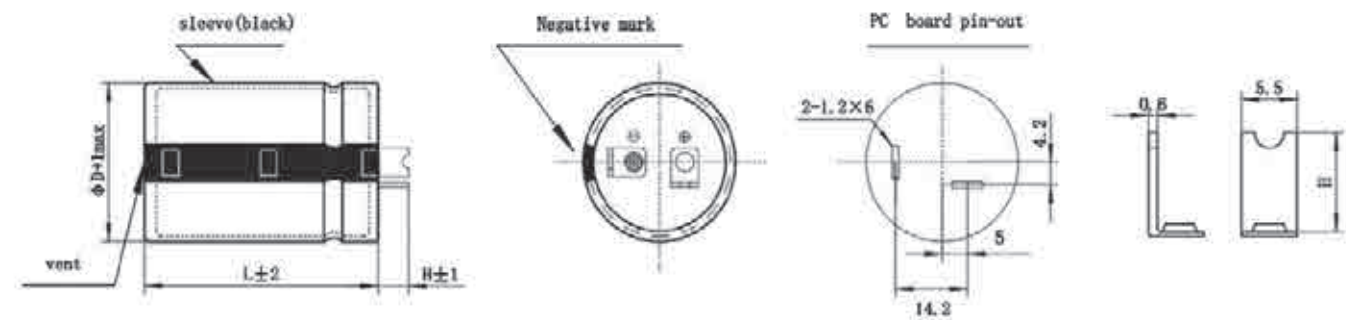
1. Standard 2 terminals



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

2. Vibration proof terminal T type



Standard terminals: Length 4.5 ± 1 mm. Also available with length of 5.5 ± 1 mm

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35、36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 200 | 330 | 22x25 | 1.13 | 330 | 600 |
| 200 | 390 | 22x25 | 1.21 | 280 | 510 |
| 200 | 390 | 22x30 | 1.25 | 280 | 510 |
| 200 | 390 | 25x25 | 1.31 | 280 | 510 |
| 200 | 470 | 22x30 | 1.40 | 230 | 420 |
| 200 | 470 | 25x25 | 1.40 | 230 | 420 |
| 200 | 470 | 25x30 | 1.52 | 230 | 420 |
| 200 | 560 | 22x35 | 1.61 | 200 | 360 |
| 200 | 560 | 25x30 | 1.61 | 200 | 360 |
| 200 | 560 | 30x25 | 1.62 | 200 | 360 |
| 200 | 680 | 22x40 | 1.86 | 160 | 290 |
| 200 | 680 | 25x30 | 1.69 | 160 | 290 |
| 200 | 680 | 30x25 | 1.98 | 160 | 290 |
| 200 | 820 | 22x45 | 2.14 | 130 | 240 |
| 200 | 820 | 25x35 | 2.14 | 130 | 240 |
| 200 | 820 | 30x30 | 2.29 | 130 | 240 |
| 200 | 1000 | 22x50 | 2.48 | 110 | 200 |
| 200 | 1000 | 25x40 | 2.48 | 110 | 200 |
| 200 | 1000 | 30x30 | 2.52 | 110 | 200 |
| 200 | 1000 | 35x25 | 2.44 | 110 | 200 |
| 200 | 1200 | 25x45 | 2.89 | 94 | 170 |
| 200 | 1200 | 30x35 | 2.89 | 94 | 170 |
| 200 | 1200 | 35x30 | 3.03 | 94 | 170 |
| 200 | 1500 | 25x55 | 3.52 | 72 | 130 |
| 200 | 1500 | 30x40 | 3.59 | 72 | 130 |
| 200 | 1500 | 35x35 | 3.52 | 72 | 130 |
| 200 | 1800 | 30x45 | 4.09 | 61 | 110 |
| 200 | 1800 | 35x35 | 3.77 | 61 | 110 |
| 200 | 2200 | 30x55 | 4.82 | 50 | 90 |
| 200 | 2200 | 35x45 | 4.82 | 50 | 90 |
| 200 | 2700 | 35x50 | 5.16 | 41 | 74 |
| 200 | 3300 | 35x55 | 5.85 | 33 | 60 |
| 250 | 220 | 22x25 | 0.91 | 500 | 900 |
| 250 | 270 | 22x25 | 1.03 | 410 | 740 |
| 250 | 330 | 22x30 | 1.20 | 330 | 600 |
| 250 | 390 | 22x35 | 1.37 | 280 | 510 |
| 250 | 390 | 25x25 | 1.26 | 280 | 510 |
| 250 | 470 | 22x35 | 1.53 | 230 | 420 |
| 250 | 470 | 25x30 | 1.53 | 230 | 420 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 250 | 470 | 30x25 | 1.69 | 230 | 420 |
| 250 | 560 | 22x40 | 1.76 | 200 | 360 |
| 250 | 560 | 25x35 | 1.68 | 200 | 360 |
| 250 | 680 | 22x45 | 2.04 | 160 | 290 |
| 250 | 680 | 25x40 | 2.13 | 160 | 290 |
| 250 | 680 | 30x30 | 2.13 | 160 | 290 |
| 250 | 680 | 35x25 | 2.12 | 160 | 290 |
| 250 | 820 | 25x45 | 2.23 | 130 | 240 |
| 250 | 820 | 30x35 | 2.45 | 130 | 240 |
| 250 | 820 | 35x30 | 2.62 | 130 | 240 |
| 250 | 1000 | 25x50 | 2.57 | 110 | 200 |
| 250 | 1000 | 30x40 | 2.85 | 110 | 200 |
| 250 | 1000 | 35x30 | 2.77 | 110 | 200 |
| 250 | 1200 | 30x45 | 3.42 | 94 | 170 |
| 250 | 1200 | 35x35 | 3.26 | 94 | 170 |
| 250 | 1500 | 30x50 | 3.72 | 72 | 130 |
| 250 | 1500 | 35x40 | 3.78 | 72 | 130 |
| 250 | 1800 | 35x45 | 4.09 | 61 | 110 |
| 250 | 2200 | 35x55 | 5.04 | 50 | 90 |
| 350 | 100 | 22x25 | 0.59 | 1110 | 1990 |
| 350 | 120 | 22x30 | 0.69 | 920 | 1660 |
| 350 | 120 | 25x25 | 0.69 | 920 | 1660 |
| 350 | 150 | 22x35 | 0.80 | 740 | 1330 |
| 350 | 180 | 25x30 | 0.85 | 620 | 1110 |
| 350 | 180 | 30x25 | 0.89 | 620 | 1110 |
| 350 | 220 | 22x40 | 0.99 | 500 | 900 |
| 350 | 220 | 25x40 | 1.10 | 500 | 900 |
| 350 | 220 | 30x30 | 1.08 | 500 | 900 |
| 350 | 220 | 35x25 | 1.08 | 500 | 900 |
| 350 | 270 | 25x45 | 1.28 | 410 | 740 |
| 350 | 270 | 30x35 | 1.25 | 410 | 740 |
| 350 | 270 | 35x25 | 1.25 | 410 | 740 |
| 350 | 330 | 25x50 | 1.55 | 330 | 600 |
| 350 | 330 | 30x35 | 1.46 | 330 | 600 |
| 350 | 330 | 35x30 | 1.46 | 330 | 600 |
| 350 | 390 | 35x40 | 1.92 | 280 | 510 |
| 350 | 470 | 35x45 | 2.17 | 230 | 420 |
| 350 | 560 | 35x45 | 2.41 | 200 | 360 |
| 350 | 560 | 40x40 | 2.46 | 200 | 360 |

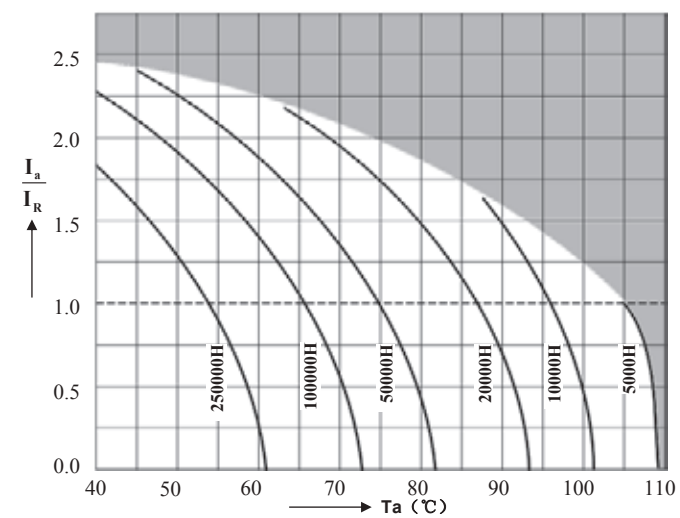
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 350 | 680 | 35x55 | 2.79 | 160 | 290 |
| 350 | 680 | 40x45 | 2.79 | 160 | 290 |
| 350 | 820 | 35x60 | 3.21 | 130 | 240 |
| 350 | 820 | 40x50 | 3.15 | 130 | 240 |
| 350 | 820 | 45x40 | 3.11 | 130 | 240 |
| 350 | 1000 | 35x60 | 3.23 | 110 | 200 |
| 350 | 1000 | 40x50 | 3.26 | 110 | 200 |
| 350 | 1200 | 40x55 | 3.68 | 94 | 170 |
| 350 | 1500 | 40x65 | 4.56 | 72 | 130 |
| 350 | 1800 | 40x75 | 5.67 | 61 | 110 |
| 400 | 100 | 22x25 | 0.65 | 1110 | 1990 |
| 400 | 120 | 22x25 | 0.92 | 920 | 1660 |
| 400 | 150 | 22x30 | 1.08 | 740 | 1330 |
| 400 | 180 | 22x30 | 1.15 | 620 | 1110 |
| 400 | 180 | 25x25 | 1.12 | 620 | 1110 |
| 400 | 220 | 22x35 | 1.32 | 500 | 900 |
| 400 | 220 | 25x30 | 1.30 | 500 | 900 |
| 400 | 270 | 22x40 | 1.50 | 410 | 740 |
| 400 | 270 | 25x35 | 1.49 | 410 | 740 |
| 400 | 270 | 30x25 | 1.33 | 410 | 740 |
| 400 | 330 | 22x50 | 1.76 | 330 | 600 |
| 400 | 330 | 25x40 | 1.68 | 330 | 600 |
| 400 | 330 | 30x30 | 1.55 | 330 | 600 |
| 400 | 330 | 35x25 | 1.44 | 330 | 600 |
| 400 | 390 | 22x55 | 1.94 | 280 | 510 |
| 400 | 390 | 25x45 | 1.86 | 280 | 510 |
| 400 | 390 | 30x35 | 1.75 | 280 | 510 |
| 400 | 390 | 35x30 | 1.75 | 280 | 510 |
| 400 | 470 | 25x50 | 2.07 | 230 | 420 |
| 400 | 470 | 30x40 | 1.97 | 230 | 420 |
| 400 | 470 | 35x30 | 1.91 | 230 | 420 |
| 400 | 560 | 25x60 | 2.37 | 200 | 360 |
| 400 | 560 | 30x45 | 2.18 | 200 | 360 |
| 400 | 560 | 35x35 | 1.92 | 200 | 360 |
| 400 | 680 | 30x50 | 2.41 | 160 | 290 |
| 400 | 680 | 35x40 | 2.35 | 160 | 290 |
| 400 | 820 | 30x60 | 2.76 | 130 | 240 |
| 400 | 820 | 35x45 | 2.67 | 130 | 240 |
| 400 | 1000 | 35x55 | 3.16 | 110 | 200 |
| 400 | 1000 | 40x50 | 3.24 | 110 | 200 |
| 400 | 1200 | 35x60 | 3.56 | 94 | 170 |
| 400 | 1200 | 40x55 | 3.64 | 94 | 170 |
| 400 | 1500 | 45x70 | 4.68 | 72 | 130 |
| 400 | 1800 | 45x80 | 5.29 | 61 | 110 |
| 450 | 82 | 22x25 | 0.59 | 1790 | 3230 |
| 450 | 100 | 22x30 | 0.69 | 1470 | 2650 |
| 450 | 100 | 25x25 | 0.69 | 1470 | 2650 |
| 450 | 120 | 22x35 | 0.72 | 1230 | 2210 |
| 450 | 150 | 22x35 | 0.92 | 980 | 1770 |
| 450 | 150 | 25x30 | 0.91 | 980 | 1770 |
| 450 | 150 | 30x25 | 0.97 | 980 | 1770 |
| 450 | 180 | 22x40 | 1.28 | 820 | 1470 |
| 450 | 180 | 25x30 | 1.20 | 820 | 1470 |
| 450 | 180 | 30x25 | 1.18 | 820 | 1470 |
| 450 | 220 | 22x45 | 1.44 | 670 | 1210 |
| 450 | 220 | 25x35 | 1.37 | 670 | 1210 |
| 450 | 220 | 30x30 | 1.36 | 670 | 1210 |
| 450 | 330 | 22x60 | 1.86 | 440 | 800 |
| 450 | 330 | 25x50 | 1.82 | 440 | 800 |
| 450 | 330 | 30x35 | 1.64 | 440 | 800 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 450 | 330 | 35x30 | 1.64 | 440 | 800 |
| 450 | 390 | 25x55 | 2.01 | 380 | 680 |
| 450 | 390 | 30x40 | 1.83 | 380 | 680 |
| 450 | 390 | 35x35 | 1.83 | 380 | 680 |
| 450 | 470 | 25x60 | 2.21 | 310 | 560 |
| 450 | 470 | 30x45 | 2.05 | 310 | 560 |
| 450 | 470 | 35x40 | 2.05 | 310 | 560 |
| 450 | 560 | 30x50 | 2.26 | 260 | 470 |
| 450 | 560 | 35x45 | 2.18 | 260 | 470 |
| 450 | 680 | 30x60 | 2.59 | 220 | 390 |
| 450 | 680 | 35x50 | 2.58 | 220 | 390 |
| 450 | 820 | 35x60 | 2.80 | 180 | 320 |
| 450 | 820 | 40x50 | 2.80 | 180 | 320 |
| 450 | 1000 | 35x65 | 3.21 | 150 | 270 |
| 450 | 1000 | 40x55 | 3.21 | 150 | 270 |
| 450 | 1200 | 40x70 | 3.54 | 120 | 220 |
| 500 | 56 | 22x25 | 0.63 | 2630 | 4740 |
| 500 | 82 | 22x35 | 0.82 | 1790 | 3230 |
| 500 | 82 | 25x25 | 0.78 | 1790 | 3230 |
| 500 | 120 | 22x45 | 1.05 | 1230 | 2210 |
| 500 | 120 | 25x35 | 1.02 | 1230 | 2210 |
| 500 | 120 | 30x25 | 0.97 | 1230 | 2210 |
| 500 | 150 | 22x50 | 1.20 | 980 | 1770 |
| 500 | 150 | 25x40 | 1.17 | 980 | 1770 |
| 500 | 150 | 30x30 | 1.13 | 980 | 1770 |
| 500 | 150 | 35x25 | 1.09 | 980 | 1770 |
| 500 | 180 | 22x60 | 1.37 | 820 | 1470 |
| 500 | 180 | 25x45 | 1.31 | 820 | 1470 |
| 500 | 180 | 30x35 | 1.28 | 820 | 1470 |
| 500 | 180 | 35x30 | 1.26 | 820 | 1470 |
| 500 | 220 | 25x50 | 1.46 | 670 | 1210 |
| 500 | 220 | 30x40 | 1.45 | 670 | 1210 |
| 500 | 220 | 35x35 | 1.44 | 670 | 1210 |
| 500 | 270 | 25x60 | 1.70 | 540 | 980 |
| 500 | 270 | 30x45 | 1.63 | 540 | 980 |
| 500 | 270 | 35x35 | 1.63 | 540 | 980 |
| 500 | 330 | 30x50 | 1.81 | 440 | 800 |
| 500 | 330 | 35x40 | 1.71 | 440 | 800 |
| 500 | 390 | 30x60 | 2.06 | 380 | 680 |
| 500 | 390 | 35x50 | 2.06 | 380 | 680 |
| 500 | 470 | 35x55 | 2.19 | 310 | 560 |
| 500 | 560 | 35x60 | 2.65 | 260 | 470 |
| 500 | 680 | 40x60 | 3.00 | 220 | 390 |
| 500 | 820 | 40x70 | 4.00 | 180 | 320 |
| 500 | 1000 | 40x80 | 4.68 | 150 | 270 |
| 550 | 47 | 25x25 | 0.47 | 3130 | 5640 |
| 550 | 56 | 25x30 | 0.54 | 2630 | 4740 |
| 550 | 68 | 25x35 | 0.62 | 2170 | 3900 |
| 550 | 68 | 30x25 | 0.65 | 2170 | 3900 |
| 550 | 82 | 25x35 | 0.69 | 1790 | 3230 |
| 550 | 82 | 30x30 | 0.73 | 1790 | 3230 |
| 550 | 100 | 25x40 | 0.80 | 1470 | 2650 |
| 550 | 100 | 30x35 | 0.84 | 1470 | 2650 |
| 550 | 100 | 35x25 | 0.87 | 1470 | 2650 |
| 550 | 120 | 25x50 | 0.92 | 1230 | 2210 |
| 550 | 120 | 30x35 | 0.94 | 1230 | 2210 |
| 550 | 120 | 35x30 | 1.04 | 1230 | 2210 |
| 550 | 150 | 25x55 | 1.09 | 980 | 1770 |
| 550 | 150 | 30x45 | 1.17 | 980 | 1770 |
| 550 | 150 | 35x35 | 1.21 | 980 | 1770 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 550 | 180 | 30x50 | 1.33 | 820 | 1470 |
| 550 | 180 | 35x35 | 1.29 | 820 | 1470 |
| 550 | 180 | 35x40 | 1.36 | 820 | 1470 |
| 550 | 220 | 30x55 | 1.54 | 670 | 1210 |
| 550 | 220 | 35x35 | 1.40 | 670 | 1210 |
| 550 | 220 | 35x45 | 1.56 | 670 | 1210 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 550 | 270 | 35x40 | 1.63 | 540 | 980 |
| 550 | 270 | 35x50 | 1.79 | 540 | 980 |
| 550 | 330 | 35x50 | 1.66 | 440 | 800 |
| 550 | 390 | 35x55 | 1.85 | 380 | 680 |
| 550 | 470 | 35x60 | 2.10 | 310 | 560 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

UK Series 105°C

Features

Standard capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

| Item | Performance Characteristics | | | |
|--|---|--|----------------------------------|--------------|
| Operating Temperature Range | -40 to +105°C | | -25 to +105°C | |
| Rated voltage V_R | 200 to 450 V DC | | 500 to 550 V DC | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | |
| Rated capacitance C_R | 68 ~ 2200 μF | | 47 ~ 680 μF | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | |
| | W.V.(V) | 160~420 | 450~550 | |
| | D.F.(%) max | 15 | 20 | |
| Self-inductance ESL | approx. 20 nH | | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | >8000 h | Requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value | |
| | $\tan \delta$ | ≤ 2 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Voltage Endurance test 105°C; V_R | 3000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Shelf Life 105°C | 1000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | |
| | $V_R(V)$ | 200-250 V | 315-450 V | $\geq 500 V$ |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 8 | 8 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 7 | 10 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | |

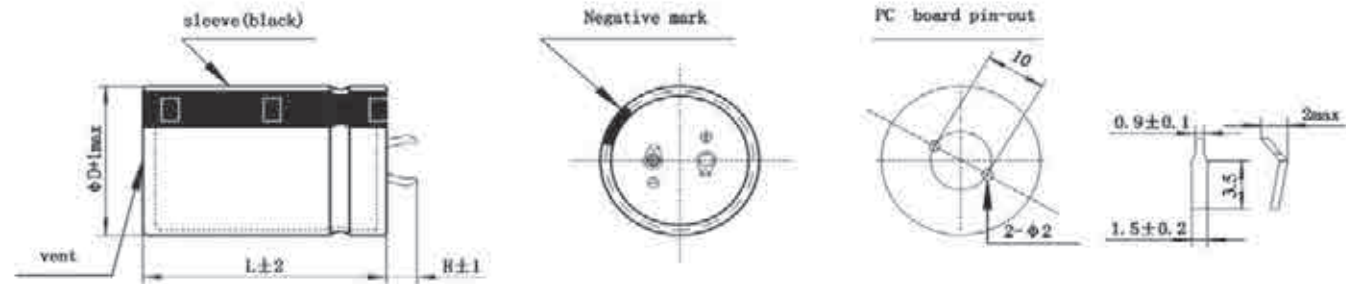
For inverter

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings

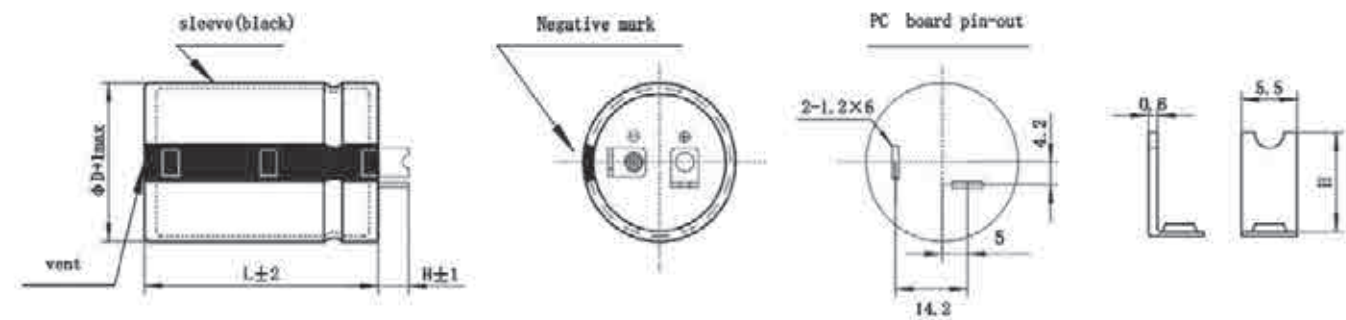
1. Standard 2 terminals



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

2. Vibration proof terminal T type



Standard terminals: Length 4.5 ± 1 mm. Also available with length of 5.5 ± 1 mm

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35、36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 200 | 330 | 22x25 | 1.38 | 320 | 600 |
| 200 | 390 | 22x25 | 1.45 | 280 | 510 |
| 200 | 470 | 22x30 | 1.68 | 230 | 420 |
| 200 | 470 | 25x25 | 1.68 | 230 | 420 |
| 200 | 560 | 22x35 | 1.81 | 190 | 360 |
| 200 | 560 | 25x30 | 1.78 | 190 | 360 |
| 200 | 560 | 30x25 | 1.96 | 190 | 360 |
| 200 | 680 | 22x40 | 2.15 | 160 | 290 |
| 200 | 680 | 25x35 | 2.06 | 160 | 290 |
| 200 | 680 | 30x25 | 2.17 | 160 | 290 |
| 200 | 820 | 22x45 | 2.42 | 130 | 240 |
| 200 | 820 | 25x35 | 2.22 | 130 | 240 |
| 200 | 820 | 30x25 | 2.34 | 130 | 240 |
| 200 | 1000 | 25x45 | 2.72 | 110 | 200 |
| 200 | 1000 | 30x30 | 2.91 | 110 | 200 |
| 200 | 1000 | 35x25 | 3.14 | 110 | 200 |
| 200 | 1200 | 25x50 | 2.87 | 92 | 170 |
| 200 | 1200 | 30x35 | 3.42 | 92 | 170 |
| 200 | 1200 | 35x30 | 3.38 | 92 | 170 |
| 200 | 1500 | 25x60 | 3.29 | 70 | 130 |
| 200 | 1500 | 30x45 | 4.12 | 70 | 130 |
| 200 | 1500 | 35x35 | 3.91 | 70 | 130 |
| 200 | 1800 | 30x50 | 4.33 | 59 | 110 |
| 200 | 1800 | 35x40 | 4.46 | 59 | 110 |
| 200 | 2200 | 30x60 | 4.75 | 49 | 90 |
| 200 | 2200 | 35x45 | 5.11 | 49 | 90 |
| 250 | 220 | 22x25 | 1.15 | 490 | 900 |
| 250 | 270 | 22x25 | 1.21 | 400 | 740 |
| 250 | 330 | 22x30 | 1.52 | 320 | 600 |
| 250 | 330 | 25x25 | 1.45 | 320 | 600 |
| 250 | 390 | 22x35 | 1.72 | 280 | 510 |
| 250 | 390 | 22x40 | 1.82 | 280 | 510 |
| 250 | 390 | 25x30 | 1.58 | 280 | 510 |
| 250 | 390 | 30x25 | 1.62 | 280 | 510 |
| 250 | 470 | 22x40 | 1.96 | 230 | 420 |
| 250 | 470 | 25x30 | 1.72 | 230 | 420 |
| 250 | 470 | 30x25 | 1.88 | 230 | 420 |
| 250 | 560 | 22x45 | 2.16 | 190 | 360 |
| 250 | 560 | 25x35 | 1.96 | 190 | 360 |
| 250 | 560 | 30x30 | 2.22 | 190 | 360 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 250 | 560 | 35x25 | 2.08 | 190 | 360 |
| 250 | 680 | 22x50 | 2.41 | 160 | 290 |
| 250 | 680 | 25x40 | 2.21 | 160 | 290 |
| 250 | 680 | 30x30 | 2.35 | 160 | 290 |
| 250 | 680 | 35x25 | 2.50 | 160 | 290 |
| 250 | 820 | 30x35 | 2.78 | 130 | 240 |
| 250 | 820 | 35x30 | 2.90 | 130 | 240 |
| 250 | 1000 | 30x40 | 3.30 | 110 | 200 |
| 250 | 1000 | 35x35 | 3.36 | 110 | 200 |
| 250 | 1200 | 30x50 | 3.85 | 92 | 170 |
| 250 | 1200 | 35x40 | 3.82 | 92 | 170 |
| 250 | 1500 | 30x55 | 4.33 | 70 | 130 |
| 250 | 1500 | 35x45 | 4.34 | 70 | 130 |
| 250 | 1800 | 35x50 | 4.70 | 59 | 110 |
| 250 | 2200 | 35x60 | 5.58 | 49 | 90 |
| 315 | 150 | 22x25 | 1.00 | 720 | 1330 |
| 315 | 180 | 22x30 | 1.15 | 600 | 1110 |
| 315 | 220 | 22x30 | 1.30 | 490 | 900 |
| 315 | 220 | 25x25 | 1.30 | 490 | 900 |
| 315 | 270 | 22x35 | 1.41 | 400 | 740 |
| 315 | 270 | 25x30 | 1.42 | 400 | 740 |
| 315 | 330 | 22x40 | 1.74 | 320 | 600 |
| 315 | 330 | 25x35 | 1.58 | 320 | 600 |
| 315 | 330 | 30x25 | 1.62 | 320 | 600 |
| 315 | 390 | 22x50 | 1.94 | 280 | 510 |
| 315 | 390 | 25x35 | 1.70 | 280 | 510 |
| 315 | 390 | 30x30 | 1.78 | 280 | 510 |
| 315 | 390 | 35x25 | 1.80 | 280 | 510 |
| 315 | 470 | 22x55 | 2.05 | 230 | 420 |
| 315 | 470 | 25x45 | 2.04 | 230 | 420 |
| 315 | 470 | 30x35 | 2.03 | 230 | 420 |
| 315 | 470 | 35x30 | 2.07 | 230 | 420 |
| 315 | 560 | 25x50 | 2.28 | 190 | 360 |
| 315 | 560 | 30x35 | 2.23 | 190 | 360 |
| 315 | 560 | 35x30 | 2.25 | 190 | 360 |
| 315 | 680 | 25x55 | 2.70 | 160 | 290 |
| 315 | 680 | 30x40 | 2.66 | 160 | 290 |
| 315 | 680 | 35x35 | 2.70 | 160 | 290 |
| 315 | 820 | 30x50 | 3.12 | 130 | 240 |
| 315 | 820 | 35x40 | 3.10 | 130 | 240 |

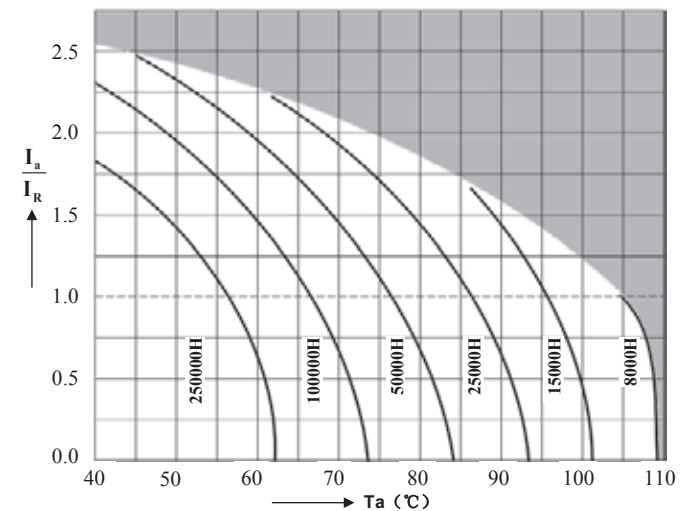
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 315 | 1000 | 30x55 | 3.64 | 110 | 200 |
| 315 | 1000 | 35x45 | 3.56 | 110 | 200 |
| 315 | 1200 | 35x50 | 4.05 | 92 | 170 |
| 315 | 1500 | 35x60 | 4.35 | 70 | 130 |
| 350 | 100 | 22x25 | 0.74 | 1080 | 1990 |
| 350 | 100 | 25x20 | 0.52 | 1080 | 1990 |
| 350 | 120 | 22x25 | 0.92 | 900 | 1660 |
| 350 | 150 | 22x30 | 1.06 | 720 | 1330 |
| 350 | 180 | 22x30 | 1.17 | 600 | 1110 |
| 350 | 180 | 25x25 | 1.17 | 600 | 1110 |
| 350 | 220 | 22x35 | 1.32 | 490 | 900 |
| 350 | 220 | 22x40 | 1.40 | 490 | 900 |
| 350 | 220 | 25x30 | 1.33 | 490 | 900 |
| 350 | 220 | 30x25 | 1.35 | 490 | 900 |
| 350 | 270 | 22x45 | 1.55 | 400 | 740 |
| 350 | 270 | 25x35 | 1.47 | 400 | 740 |
| 350 | 270 | 30x25 | 1.37 | 400 | 740 |
| 350 | 330 | 22x50 | 1.76 | 320 | 600 |
| 350 | 330 | 25x40 | 1.68 | 320 | 600 |
| 350 | 330 | 30x30 | 1.64 | 320 | 600 |
| 350 | 330 | 35x25 | 1.69 | 320 | 600 |
| 350 | 390 | 25x45 | 1.86 | 280 | 510 |
| 350 | 390 | 30x35 | 1.84 | 280 | 510 |
| 350 | 390 | 35x30 | 1.87 | 280 | 510 |
| 350 | 470 | 25x50 | 2.09 | 230 | 420 |
| 350 | 470 | 30x40 | 2.09 | 230 | 420 |
| 350 | 470 | 35x30 | 2.08 | 230 | 420 |
| 350 | 560 | 30x45 | 2.24 | 190 | 360 |
| 350 | 560 | 35x35 | 2.26 | 190 | 360 |
| 350 | 680 | 30x50 | 2.67 | 160 | 290 |
| 350 | 680 | 35x40 | 2.71 | 160 | 290 |
| 350 | 820 | 35x45 | 3.11 | 130 | 240 |
| 350 | 820 | 35x50 | 3.25 | 130 | 240 |
| 350 | 1000 | 35x55 | 3.58 | 110 | 200 |
| 350 | 1200 | 35x60 | 4.10 | 92 | 170 |
| 400 | 82 | 22x25 | 0.61 | 1310 | 2430 |
| 400 | 100 | 22x25 | 0.67 | 1080 | 1990 |
| 400 | 120 | 22x30 | 0.79 | 900 | 1660 |
| 400 | 120 | 25x25 | 0.79 | 900 | 1660 |
| 400 | 120 | 25x30 | 0.85 | 900 | 1660 |
| 400 | 150 | 22x35 | 0.95 | 720 | 1330 |
| 400 | 150 | 22x40 | 1.00 | 720 | 1330 |
| 400 | 150 | 25x25 | 0.89 | 720 | 1330 |
| 400 | 150 | 25x30 | 0.96 | 720 | 1330 |
| 400 | 150 | 30x25 | 0.99 | 720 | 1330 |
| 400 | 180 | 22x35 | 1.04 | 600 | 1110 |
| 400 | 180 | 22x40 | 1.10 | 600 | 1110 |
| 400 | 180 | 25x30 | 1.05 | 600 | 1110 |
| 400 | 180 | 25x35 | 1.12 | 600 | 1110 |
| 400 | 180 | 30x25 | 1.09 | 600 | 1110 |
| 400 | 180 | 30x30 | 1.17 | 600 | 1110 |
| 400 | 220 | 22x45 | 1.20 | 490 | 900 |
| 400 | 220 | 25x35 | 1.20 | 490 | 900 |
| 400 | 220 | 25x45 | 1.24 | 490 | 900 |
| 400 | 220 | 30x25 | 1.15 | 490 | 900 |
| 400 | 220 | 30x30 | 1.24 | 490 | 900 |
| 400 | 220 | 35x25 | 1.24 | 490 | 900 |
| 400 | 270 | 22x50 | 1.32 | 400 | 740 |
| 400 | 270 | 25x40 | 1.29 | 400 | 740 |
| 400 | 270 | 25x50 | 1.42 | 400 | 740 |
| 400 | 270 | 30x30 | 1.27 | 400 | 740 |
| 400 | 270 | 30x35 | 1.35 | 400 | 740 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 400 | 270 | 35x25 | 1.30 | 400 | 740 |
| 400 | 270 | 35x30 | 1.39 | 400 | 740 |
| 400 | 330 | 25x45 | 1.50 | 320 | 600 |
| 400 | 330 | 25x50 | 1.57 | 320 | 600 |
| 400 | 330 | 30x35 | 1.50 | 320 | 600 |
| 400 | 330 | 30x40 | 1.58 | 320 | 600 |
| 400 | 330 | 35x30 | 1.54 | 320 | 600 |
| 400 | 330 | 35x35 | 1.64 | 320 | 600 |
| 400 | 390 | 25x50 | 1.70 | 280 | 510 |
| 400 | 390 | 30x40 | 1.72 | 280 | 510 |
| 400 | 390 | 30x45 | 1.80 | 280 | 510 |
| 400 | 390 | 35x30 | 1.70 | 280 | 510 |
| 400 | 390 | 35x35 | 1.78 | 280 | 510 |
| 400 | 470 | 30x45 | 1.98 | 230 | 420 |
| 400 | 470 | 30x50 | 2.07 | 230 | 420 |
| 400 | 470 | 35x35 | 1.98 | 230 | 420 |
| 400 | 470 | 35x40 | 2.07 | 230 | 420 |
| 400 | 470 | 35x45 | 2.16 | 230 | 420 |
| 400 | 560 | 30x50 | 2.26 | 190 | 360 |
| 400 | 560 | 35x40 | 2.26 | 190 | 360 |
| 400 | 560 | 35x45 | 2.36 | 190 | 360 |
| 400 | 680 | 30x50 | 2.49 | 160 | 290 |
| 400 | 680 | 35x45 | 2.60 | 160 | 290 |
| 400 | 680 | 35x50 | 2.72 | 160 | 290 |
| 400 | 820 | 35x55 | 3.11 | 130 | 240 |
| 400 | 820 | 35x60 | 3.23 | 130 | 240 |
| 400 | 1000 | 35x55 | 3.44 | 110 | 200 |
| 400 | 1000 | 35x60 | 3.57 | 110 | 200 |
| 400 | 1200 | 35x60 | 3.91 | 92 | 170 |
| 450 | 68 | 22x25 | 0.55 | 2110 | 3900 |
| 450 | 82 | 22x25 | 0.61 | 1750 | 3230 |
| 450 | 100 | 22x30 | 0.72 | 1430 | 2650 |
| 450 | 100 | 25x25 | 0.72 | 1430 | 2650 |
| 450 | 120 | 22x35 | 0.85 | 1190 | 2210 |
| 450 | 120 | 22x40 | 0.90 | 1190 | 2210 |
| 450 | 120 | 25x30 | 0.85 | 1190 | 2210 |
| 450 | 120 | 25x35 | 0.91 | 1190 | 2210 |
| 450 | 120 | 30x25 | 0.85 | 1190 | 2210 |
| 450 | 150 | 22x40 | 1.00 | 960 | 1770 |
| 450 | 150 | 25x30 | 0.96 | 960 | 1770 |
| 450 | 150 | 25x35 | 1.02 | 960 | 1770 |
| 450 | 150 | 30x25 | 1.00 | 960 | 1770 |
| 450 | 150 | 30x30 | 1.06 | 960 | 1770 |
| 450 | 150 | 35x25 | 1.09 | 960 | 1770 |
| 450 | 180 | 22x45 | 1.16 | 790 | 1470 |
| 450 | 180 | 22x50 | 1.21 | 790 | 1470 |
| 450 | 180 | 25x35 | 1.12 | 790 | 1470 |
| 450 | 180 | 25x40 | 1.21 | 790 | 1470 |
| 450 | 180 | 30x30 | 1.21 | 790 | 1470 |
| 450 | 180 | 30x35 | 1.24 | 790 | 1470 |
| 450 | 180 | 35x25 | 1.21 | 790 | 1470 |
| 450 | 180 | 35x30 | 1.28 | 790 | 1470 |
| 450 | 220 | 25x40 | 1.24 | 650 | 1210 |
| 450 | 220 | 25x45 | 1.28 | 650 | 1210 |
| 450 | 220 | 30x30 | 1.24 | 650 | 1210 |
| 450 | 220 | 30x35 | 1.28 | 650 | 1210 |
| 450 | 220 | 35x25 | 1.24 | 650 | 1210 |
| 450 | 220 | 35x30 | 1.28 | 650 | 1210 |
| 450 | 270 | 25x50 | 1.42 | 530 | 980 |
| 450 | 270 | 30x30 | 1.28 | 530 | 980 |
| 450 | 270 | 30x35 | 1.35 | 530 | 980 |
| 450 | 270 | 35x30 | 1.39 | 530 | 980 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 450 | 270 | 35x35 | 1.48 | 530 | 980 |
| 450 | 330 | 30x40 | 1.58 | 430 | 800 |
| 450 | 330 | 30x45 | 1.66 | 430 | 800 |
| 450 | 330 | 35x30 | 1.58 | 430 | 800 |
| 450 | 330 | 35x35 | 1.66 | 430 | 800 |
| 450 | 390 | 30x45 | 1.80 | 370 | 680 |
| 450 | 390 | 30x50 | 1.89 | 370 | 680 |
| 450 | 390 | 35x40 | 1.89 | 370 | 680 |
| 450 | 390 | 35x45 | 1.97 | 370 | 680 |
| 450 | 470 | 30x50 | 2.08 | 300 | 560 |
| 450 | 470 | 35x35 | 1.97 | 300 | 560 |
| 450 | 470 | 35x40 | 2.08 | 300 | 560 |
| 450 | 470 | 35x45 | 2.16 | 300 | 560 |
| 450 | 560 | 35x50 | 2.47 | 250 | 470 |
| 450 | 560 | 35x55 | 2.57 | 250 | 470 |
| 450 | 680 | 35x50 | 2.72 | 210 | 390 |
| 450 | 680 | 35x60 | 2.94 | 210 | 390 |
| 450 | 820 | 35x60 | 3.23 | 170 | 320 |
| 450 | 820 | 35x65 | 3.35 | 170 | 320 |
| 500 | 47 | 22x25 | 0.45 | 3050 | 5640 |
| 500 | 56 | 22x30 | 0.52 | 2560 | 4740 |
| 500 | 68 | 22x30 | 0.52 | 2110 | 3900 |
| 500 | 68 | 22x35 | 0.56 | 2110 | 3900 |
| 500 | 68 | 25x25 | 0.54 | 2110 | 3900 |
| 500 | 68 | 25x30 | 0.58 | 2110 | 3900 |
| 500 | 82 | 22x35 | 0.70 | 1750 | 3230 |
| 500 | 82 | 25x30 | 0.71 | 1750 | 3230 |
| 500 | 100 | 22x40 | 0.81 | 1430 | 2650 |
| 500 | 100 | 25x35 | 0.86 | 1430 | 2650 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 500 | 100 | 30x30 | 0.85 | 1430 | 2650 |
| 500 | 120 | 22x50 | 0.98 | 1190 | 2210 |
| 500 | 120 | 25x40 | 0.95 | 1190 | 2210 |
| 500 | 120 | 30x35 | 1.00 | 1190 | 2210 |
| 500 | 120 | 35x30 | 1.03 | 1190 | 2210 |
| 500 | 150 | 22x50 | 1.10 | 960 | 1770 |
| 500 | 150 | 25x45 | 1.13 | 960 | 1770 |
| 500 | 150 | 30x40 | 1.19 | 960 | 1770 |
| 500 | 150 | 35x35 | 1.23 | 960 | 1770 |
| 500 | 180 | 25x50 | 1.24 | 790 | 1470 |
| 500 | 180 | 30x45 | 1.31 | 790 | 1470 |
| 500 | 220 | 25x55 | 1.45 | 650 | 1210 |
| 500 | 220 | 30x45 | 1.47 | 650 | 1210 |
| 500 | 220 | 35x35 | 1.45 | 650 | 1210 |
| 500 | 220 | 35x40 | 1.53 | 650 | 1210 |
| 500 | 270 | 30x50 | 1.55 | 530 | 980 |
| 500 | 270 | 35x40 | 1.62 | 530 | 980 |
| 500 | 330 | 30x55 | 1.89 | 430 | 800 |
| 500 | 390 | 35x45 | 1.85 | 370 | 680 |
| 500 | 390 | 35x55 | 2.02 | 370 | 680 |
| 500 | 470 | 35x60 | 2.28 | 300 | 560 |
| 500 | 560 | 35x65 | 2.32 | 250 | 470 |
| 500 | 680 | 40x60 | 2.45 | 210 | 390 |
| 550 | 220 | 35x35 | 1.30 | 650 | 1210 |
| 550 | 270 | 35x45 | 1.60 | 530 | 980 |
| 550 | 330 | 35x50 | 1.63 | 430 | 800 |
| 550 | 390 | 35x55 | 1.80 | 370 | 680 |
| 550 | 470 | 35x65 | 2.10 | 300 | 560 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

UL Series 105°C

Features

Standard capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Used for air conditioner, general-purpose inverter

Features

- ◆ High reliability
- ◆ Long useful life
- ◆ High ripple current capability
- ◆ Aluminum case designed explosion-proof vent
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Aluminum case designed explosion-proof vent
- ◆ Snap-in solder pins to hold component in place on PC-board



Specifications

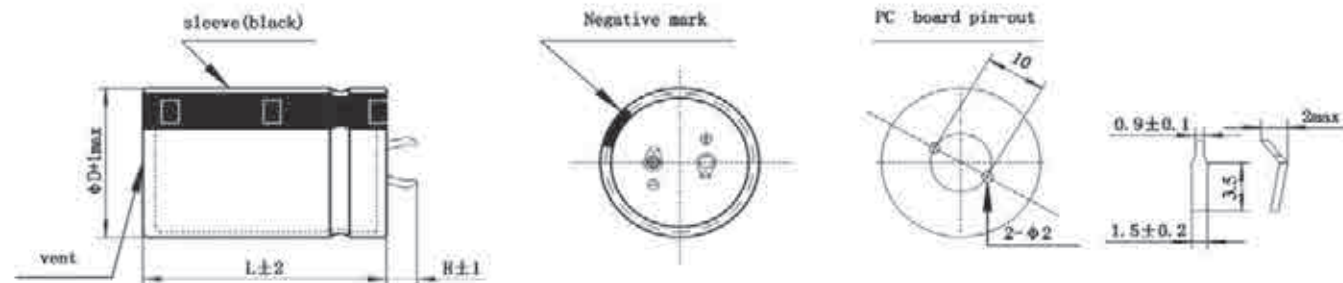
| Item | Performance Characteristics | | | |
|--|---|--|----------------------------------|--------------|
| Operating Temperature Range | -40 to +105°C | | -25 to +105°C | |
| Rated voltage V_R | 200 to 450 V DC | | 500 to 550 V DC | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | |
| Rated capacitance C_R | 68 ~ 3300 μF | | 100 ~ 1500 μF | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I \leq 3 \sqrt{CV}$ (μA) After 5 minutes with rated working voltage applied | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | |
| | W.V.(V) | 160~420 | 450~550 | |
| | D.F.(%) max | 15 | 20 | |
| Self-inductance ESL | approx. 20 nH | | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | >10000 h | Requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 20\%$ of initial value | |
| | $\tan \delta$ | ≤ 2 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Voltage Endurance test 105°C; V_R | 5000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Shelf Life 105°C | 1000 h | Post test requirements: | | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value | |
| | $\tan \delta$ | ≤ 1.3 times initial specified limit | | |
| | I_{leak} | \leq initial specified limit | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | |
| | $V_R(V)$ | 200-250 V | 315-450 V | $\geq 500 V$ |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 3 | 8 | 8 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 7 | 10 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | |

Multiplier for Ripple Current vs. Frequency

| $V_R(V)/$ Frequency(Hz) | 50(60) | 120 | 300 | 1K | 10K | 50K-100K |
|-------------------------|--------|-----|------|------|------|----------|
| $160 \leq V_R \leq 250$ | 0.81 | 1 | 1.17 | 1.32 | 1.45 | 1.5 |
| $315 \leq V_R \leq 600$ | 0.77 | 1 | 1.16 | 1.30 | 1.41 | 1.43 |

Dimensional drawings

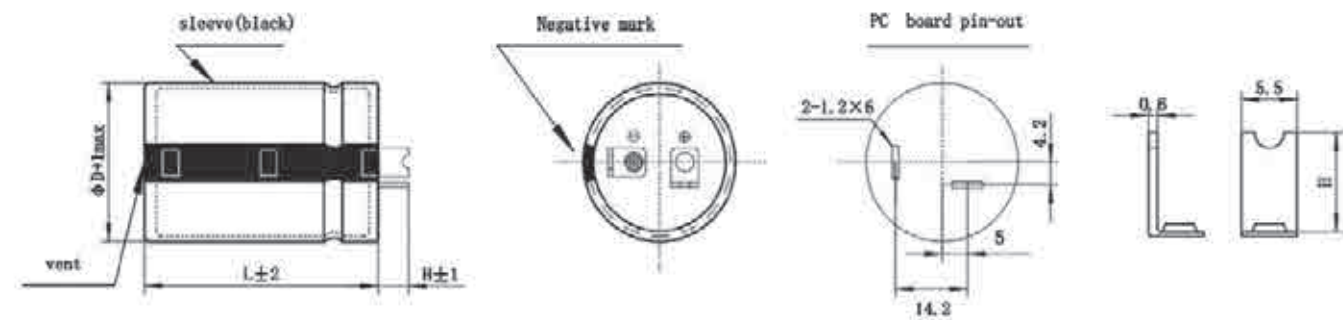
1. Standard 2 terminals



Standard snap-in terminals: length (6.0 ± 1) mm
 Also available with length of (4.0 ± 1) mm

| H | h |
|---|-----|
| 6 | 2.5 |
| 4 | 1.5 |

2. Vibration proof terminal T type



Standard terminals: Length 4.5 ± 1 mm. Also available with length of 5.5 ± 1 mm

Packing

| Capacitor diameter D(mm) | Length L(mm) | Terminal length H(mm) | Each carton packing Qty units(pcs.) | Box/carton units(pcs.) | Each box packing Qty units(pcs.) |
|--------------------------|---------------------|-----------------------|-------------------------------------|------------------------|----------------------------------|
| 20 | all | / | 720 | 6 | 120 |
| 22 | < 55 | / | 600 | 6 | 100 |
| 22 | ≥ 55 | / | 400 | 4 | 100 |
| 25 | < 65 | / | 500 | 5 | 100 |
| 25 | ≥ 65 | / | 400 | 4 | 100 |
| 30 | ≤ 36 | < 6(L=35、36) | 400 | 8 | 50 |
| 30 | $35 \leq L \leq 65$ | $\geq 6(L=35、36)$ | 300 | 6 | 50 |
| 30 | > 65 | / | 200 | 4 | 50 |
| 35 | ≤ 25 | / | 400 | 8 | 50 |
| 35 | $25 < L < 45$ | / | 300 | 6 | 50 |
| 35 | $45 \leq L \leq 85$ | / | 200 | 4 | 50 |
| 35 | > 85 | / | 100 | 2 | 50 |
| 40 | 35 | < 6 | 200 | 5 | 40 |
| 40 | 35 | ≥ 6 | 160 | 4 | 40 |
| 40 | $40 \leq L \leq 45$ | / | 160 | 4 | 40 |
| 40 | $45 < L \leq 75$ | / | 120 | 3 | 40 |
| 40 | > 75 | / | 80 | 2 | 40 |
| 45 | $40 \leq L \leq 65$ | / | 140 | 4 | 35 |
| 45 | $65 < L \leq 100$ | / | 70 | 2 | 35 |

Packing of snap-in



Case Size

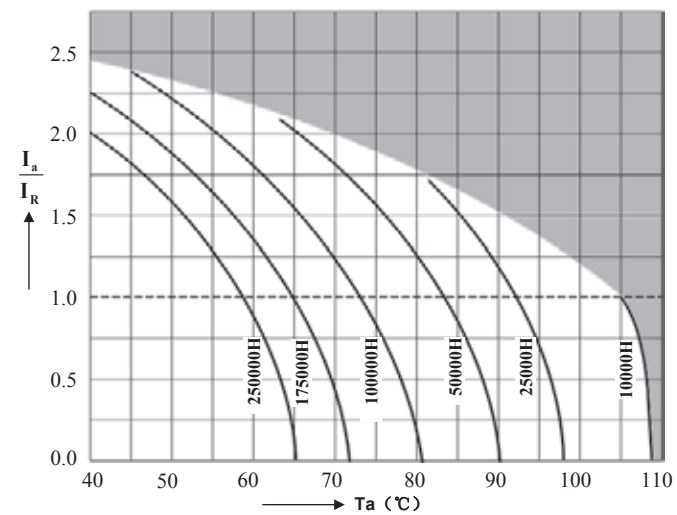
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 200 | 180 | 22x20 | 0.75 | 580 | 1110 |
| 200 | 220 | 22x25 | 0.80 | 470 | 900 |
| 200 | 270 | 22x25 | 1.31 | 390 | 740 |
| 200 | 270 | 22x30 | 1.35 | 390 | 740 |
| 200 | 270 | 25x25 | 1.35 | 390 | 740 |
| 200 | 330 | 22x25 | 1.41 | 320 | 600 |
| 200 | 330 | 22x30 | 1.53 | 320 | 600 |
| 200 | 330 | 25x25 | 1.48 | 320 | 600 |
| 200 | 390 | 22x30 | 1.63 | 270 | 510 |
| 200 | 390 | 22x35 | 1.68 | 270 | 510 |
| 200 | 390 | 25x25 | 1.63 | 270 | 510 |
| 200 | 390 | 25x30 | 1.68 | 270 | 510 |
| 200 | 390 | 30x25 | 1.68 | 270 | 510 |
| 200 | 470 | 22x30 | 1.72 | 220 | 420 |
| 200 | 470 | 22x35 | 1.84 | 220 | 420 |
| 200 | 470 | 25x25 | 1.63 | 220 | 420 |
| 200 | 470 | 25x30 | 1.75 | 220 | 420 |
| 200 | 470 | 35x25 | 1.75 | 220 | 420 |
| 200 | 560 | 22x35 | 1.95 | 190 | 360 |
| 200 | 560 | 22x40 | 2.07 | 190 | 360 |
| 200 | 560 | 25x30 | 1.84 | 190 | 360 |
| 200 | 560 | 25x35 | 1.92 | 190 | 360 |
| 200 | 560 | 30x30 | 1.84 | 190 | 360 |
| 200 | 560 | 35x25 | 1.84 | 190 | 360 |
| 200 | 680 | 22x40 | 2.22 | 150 | 290 |
| 200 | 680 | 22x45 | 2.32 | 150 | 290 |
| 200 | 680 | 25x35 | 2.11 | 150 | 290 |
| 200 | 680 | 25x40 | 2.32 | 150 | 290 |
| 200 | 680 | 30x30 | 2.11 | 150 | 290 |
| 200 | 680 | 30x35 | 2.32 | 150 | 290 |
| 200 | 680 | 35x30 | 2.32 | 150 | 290 |
| 200 | 820 | 22x50 | 2.60 | 130 | 240 |
| 200 | 820 | 25x40 | 2.37 | 130 | 240 |
| 200 | 820 | 30x30 | 2.11 | 130 | 240 |
| 200 | 820 | 30x35 | 2.37 | 130 | 240 |
| 200 | 820 | 35x30 | 2.37 | 130 | 240 |
| 200 | 1000 | 22x60 | 3.00 | 110 | 200 |
| 200 | 1000 | 25x45 | 2.63 | 110 | 200 |
| 200 | 1000 | 30x35 | 2.37 | 110 | 200 |
| 200 | 1000 | 30x40 | 2.42 | 110 | 200 |
| 200 | 1000 | 35x30 | 2.37 | 110 | 200 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 200 | 1000 | 35x35 | 2.42 | 110 | 200 |
| 200 | 1200 | 25x50 | 2.88 | 89 | 170 |
| 200 | 1200 | 30x40 | 2.55 | 89 | 170 |
| 200 | 1200 | 35x30 | 2.44 | 89 | 170 |
| 200 | 1200 | 35x35 | 2.88 | 89 | 170 |
| 200 | 1500 | 30x45 | 2.82 | 68 | 130 |
| 200 | 1500 | 30x50 | 3.00 | 68 | 130 |
| 200 | 1500 | 35x35 | 2.98 | 68 | 130 |
| 200 | 1500 | 35x40 | 3.08 | 68 | 130 |
| 200 | 1800 | 30x50 | 3.08 | 58 | 110 |
| 200 | 1800 | 35x40 | 3.18 | 58 | 110 |
| 200 | 1800 | 35x45 | 3.28 | 58 | 110 |
| 200 | 2200 | 35x50 | 3.45 | 48 | 90 |
| 200 | 2700 | 35x60 | 4.00 | 39 | 74 |
| 250 | 220 | 22x25 | 0.85 | 470 | 900 |
| 250 | 270 | 22x25 | 1.32 | 390 | 740 |
| 250 | 270 | 22x30 | 1.36 | 390 | 740 |
| 250 | 270 | 25x25 | 1.36 | 390 | 740 |
| 250 | 330 | 22x30 | 1.55 | 320 | 600 |
| 250 | 330 | 22x35 | 1.60 | 320 | 600 |
| 250 | 330 | 25x25 | 1.45 | 320 | 600 |
| 250 | 330 | 25x30 | 1.60 | 320 | 600 |
| 250 | 390 | 22x35 | 1.75 | 270 | 510 |
| 250 | 390 | 22x40 | 1.80 | 270 | 510 |
| 250 | 390 | 25x30 | 1.68 | 270 | 510 |
| 250 | 390 | 25x35 | 1.73 | 270 | 510 |
| 250 | 390 | 30x30 | 1.73 | 270 | 510 |
| 250 | 470 | 22x40 | 1.97 | 220 | 420 |
| 250 | 470 | 22x45 | 2.02 | 220 | 420 |
| 250 | 470 | 25x30 | 1.75 | 220 | 420 |
| 250 | 470 | 25x35 | 1.80 | 220 | 420 |
| 250 | 470 | 30x25 | 1.75 | 220 | 420 |
| 250 | 470 | 30x30 | 1.80 | 220 | 420 |
| 250 | 560 | 22x45 | 2.20 | 190 | 360 |
| 250 | 560 | 25x40 | 2.20 | 190 | 360 |
| 250 | 560 | 30x30 | 1.97 | 190 | 360 |
| 250 | 560 | 30x35 | 2.05 | 190 | 360 |
| 250 | 560 | 35x30 | 2.05 | 190 | 360 |
| 250 | 680 | 22x50 | 2.45 | 150 | 290 |
| 250 | 680 | 25x45 | 2.25 | 150 | 290 |
| 250 | 680 | 30x35 | 2.18 | 150 | 290 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 450 | 560 | 35x45 | 2.16 | 250 | 470 |
| 450 | 560 | 35x50 | 2.36 | 250 | 470 |
| 450 | 680 | 35x50 | 2.50 | 210 | 390 |
| 450 | 680 | 35x55 | 2.62 | 210 | 390 |
| 450 | 820 | 35x65 | 3.00 | 170 | 320 |
| 450 | 820 | 40x55 | 3.00 | 170 | 320 |
| 450 | 1000 | 35x70 | 3.10 | 140 | 270 |
| 450 | 1000 | 35x80 | 3.56 | 140 | 270 |
| 450 | 1000 | 40x70 | 3.60 | 140 | 270 |
| 450 | 1000 | 45x60 | 3.60 | 140 | 270 |
| 450 | 1200 | 40x80 | 3.95 | 120 | 220 |
| 450 | 1500 | 45x80 | 4.80 | 95 | 180 |
| 450 | 1800 | 45x90 | 5.67 | 79 | 150 |
| 500 | 47 | 22x25 | 0.40 | 2970 | 5640 |
| 500 | 56 | 22x25 | 0.43 | 2490 | 4740 |
| 500 | 56 | 22x30 | 0.47 | 2490 | 4740 |
| 500 | 56 | 25x25 | 0.47 | 2490 | 4740 |
| 500 | 68 | 22x30 | 0.52 | 2050 | 3900 |
| 500 | 68 | 22x35 | 0.55 | 2050 | 3900 |
| 500 | 68 | 25x25 | 0.52 | 2050 | 3900 |
| 500 | 68 | 25x30 | 0.55 | 2050 | 3900 |
| 500 | 82 | 22x35 | 0.61 | 1700 | 3230 |
| 500 | 82 | 25x30 | 0.61 | 1700 | 3230 |
| 500 | 100 | 22x40 | 0.72 | 1390 | 2650 |
| 500 | 100 | 25x35 | 0.72 | 1390 | 2650 |
| 500 | 100 | 30x30 | 0.72 | 1390 | 2650 |
| 500 | 120 | 22x45 | 0.74 | 1160 | 2210 |
| 500 | 120 | 25x40 | 0.74 | 1160 | 2210 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 500 | 120 | 30x35 | 0.77 | 1160 | 2210 |
| 500 | 120 | 35x30 | 0.80 | 1160 | 2210 |
| 500 | 150 | 22x50 | 0.96 | 930 | 1770 |
| 500 | 150 | 25x45 | 0.98 | 930 | 1770 |
| 500 | 150 | 30x35 | 0.92 | 930 | 1770 |
| 500 | 150 | 35x30 | 0.92 | 930 | 1770 |
| 500 | 180 | 25x50 | 1.13 | 770 | 1470 |
| 500 | 180 | 30x35 | 1.05 | 770 | 1470 |
| 500 | 180 | 35x30 | 1.10 | 770 | 1470 |
| 500 | 220 | 25x50 | 1.22 | 640 | 1210 |
| 500 | 220 | 30x45 | 1.25 | 640 | 1210 |
| 500 | 220 | 35x30 | 1.10 | 640 | 1210 |
| 500 | 220 | 35x35 | 1.23 | 640 | 1210 |
| 500 | 270 | 30x50 | 1.51 | 520 | 980 |
| 500 | 270 | 35x35 | 1.31 | 520 | 980 |
| 500 | 270 | 35x40 | 1.42 | 520 | 980 |
| 500 | 330 | 35x40 | 1.48 | 420 | 800 |
| 500 | 330 | 35x45 | 1.56 | 420 | 800 |
| 500 | 390 | 35x50 | 1.78 | 360 | 680 |
| 500 | 470 | 35x55 | 2.14 | 290 | 560 |
| 500 | 470 | 35x60 | 2.26 | 290 | 560 |
| 500 | 560 | 35x65 | 2.38 | 250 | 470 |
| 500 | 680 | 40x65 | 2.52 | 210 | 390 |
| 550 | 220 | 35x40 | 1.30 | 640 | 1210 |
| 550 | 270 | 35x50 | 1.60 | 520 | 980 |
| 550 | 330 | 35x55 | 1.63 | 420 | 800 |
| 550 | 390 | 35x60 | 1.80 | 360 | 680 |
| 550 | 470 | 35x70 | 2.10 | 290 | 560 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RS Series 85°C

Features

Extremely Long useful life

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Wide temperature range
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|------------------------------------|-----|------------------------------------|------|------|----|----|--|--|--|--|--|----|----|-----|-----|-----|-----|----|----|----|----|-----|-----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|
| Operating Temperature Range | -40 to +85°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated voltage V_R | 10 to 100 V DC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Surge voltage V_S | 1.15 V_R | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated capacitance C_R | 1800 to 1000000 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018x(CxV)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μ A), C : Nominal capacitance (μ F), V : Rated voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>ϕ D</th> <th>35</th> <th>51</th> <th>63.5</th> <th>76.2</th> <th>89</th> </tr> </thead> <tbody> <tr> <td>WV</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>10</td> <td>75</td> <td>100</td> <td>120</td> <td>150</td> <td>180</td> </tr> <tr> <td>16</td> <td>60</td> <td>70</td> <td>80</td> <td>120</td> <td>140</td> </tr> <tr> <td>25</td> <td>40</td> <td>50</td> <td>70</td> <td>80</td> <td>130</td> </tr> <tr> <td>35</td> <td>30</td> <td>50</td> <td>60</td> <td>70</td> <td>90</td> </tr> <tr> <td>40</td> <td>30</td> <td>50</td> <td>60</td> <td>70</td> <td>90</td> </tr> <tr> <td>50</td> <td>25</td> <td>30</td> <td>50</td> <td>60</td> <td>80</td> </tr> <tr> <td>63</td> <td>20</td> <td>25</td> <td>30</td> <td>40</td> <td>60</td> </tr> <tr> <td>80</td> <td>20</td> <td>20</td> <td>25</td> <td>30</td> <td>50</td> </tr> <tr> <td>100</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>30</td> </tr> </tbody> </table> | ϕ D | 35 | 51 | 63.5 | 76.2 | 89 | WV | | | | | | 10 | 75 | 100 | 120 | 150 | 180 | 16 | 60 | 70 | 80 | 120 | 140 | 25 | 40 | 50 | 70 | 80 | 130 | 35 | 30 | 50 | 60 | 70 | 90 | 40 | 30 | 50 | 60 | 70 | 90 | 50 | 25 | 30 | 50 | 60 | 80 | 63 | 20 | 25 | 30 | 40 | 60 | 80 | 20 | 20 | 25 | 30 | 50 | 100 | 15 | 20 | 25 | 30 | 30 |
| | ϕ D | 35 | 51 | 63.5 | 76.2 | 89 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | WV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | 75 | 100 | 120 | 150 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 16 | 60 | 70 | 80 | 120 | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 25 | 40 | 50 | 70 | 80 | 130 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 35 | 30 | 50 | 60 | 70 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 40 | 30 | 50 | 60 | 70 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 50 | 25 | 30 | 50 | 60 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 63 | 20 | 25 | 30 | 40 | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 | 20 | 20 | 25 | 30 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 15 | 20 | 25 | 30 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Self-inductance ESL | d = 35 mm: approx. 10 nH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d = 51 mm: approx. 15 nH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d \geq 63.5 mm: approx. 20 nH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Useful life 85°C; $V_R, I_{AC, R}$ | Requirements: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | $\Delta C/C \leq \pm 45\%$ of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ESR ≤ 3 times initial specified limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | $I_{leak} \leq$ initial specified limit Failure rate $\leq 1\%/1000$ hour | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Voltage Endurance test 85°C; V_R | 2000 h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Post test requirements: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DC/C $\leq \pm 15\%$ of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tbody> <tr> <td>$Z_{-25^\circ C} / Z_{20^\circ C}$</td> <td>3</td> </tr> <tr> <td>$Z_{-40^\circ C} / Z_{20^\circ C}$</td> <td>12</td> </tr> </tbody> </table> | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 3 | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

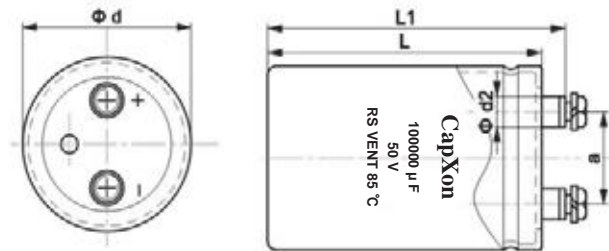
Screw

Multiplier for Ripple Current vs. Frequency

| Rated voltage (V) | Case diameter (Φ) | Frequency(Hz) | | | | |
|-------------------|-------------------|---------------|-----|------|------|------|
| | | 50 | 120 | 1K | 10K | ≥50K |
| 10 to 50 | 35 to 89 | 0.95 | 1 | 1.05 | 1.09 | 1.12 |
| 63 & 80 | 35 | 0.9 | 1 | 1.1 | 1.18 | 1.22 |
| | 50 to 89 | 0.95 | 1 | 1.05 | 1.09 | 1.12 |
| 100 | 35 | 0.8 | 1 | 1.22 | 1.3 | 1.33 |
| | 50 | 0.9 | 1 | 1.1 | 1.18 | 1.22 |
| | 63.5 to 89 | 0.95 | 1 | 1.05 | 1.09 | 1.12 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
M6:Min.reach of screw = 12mm
M8:Min.reach of screw = 16mm

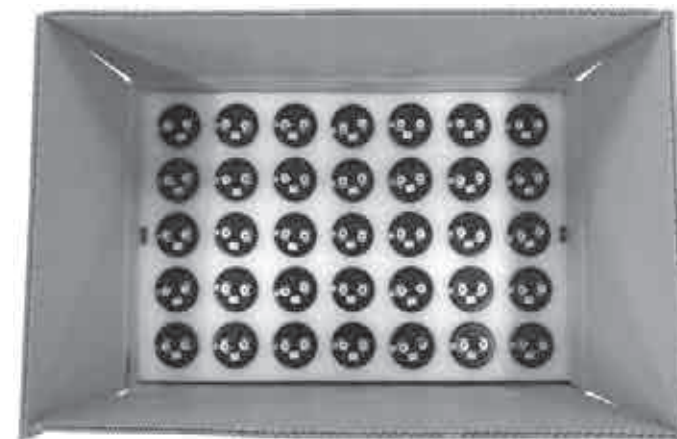
Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 35 | ≤70mm | 120 |
| | >70mm | 60 |
| 42 | ≤70mm | 120 |
| | >70mm | 60 |
| 51 | ≤70mm | 70 |
| | >70mm | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

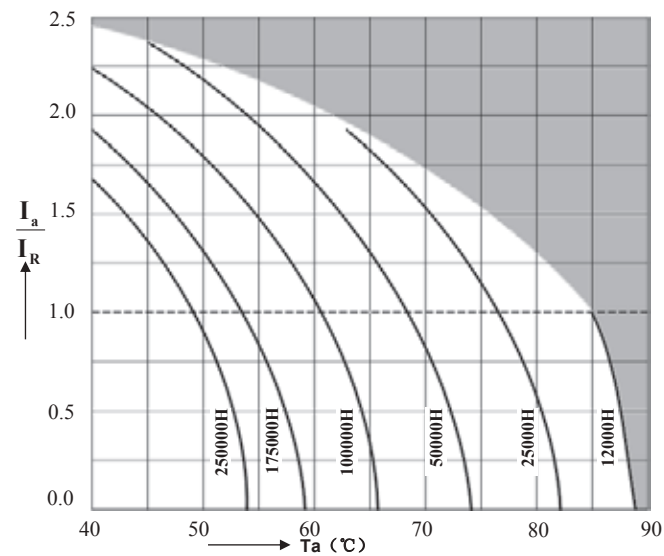
The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 80 | 22000 | 51x96 | 11.8 | 7.0 | 12 |
| 80 | 27000 | 51x96 | 13.0 | 6.5 | 11 |
| 80 | 27000 | 63.5x100 | 15.0 | 6.5 | 11 |
| 80 | 33000 | 51x115 | 14.8 | 6.0 | 11 |
| 80 | 33000 | 51x120 | 15.2 | 6.0 | 11 |
| 80 | 33000 | 63.5x100 | 15.2 | 6.0 | 11 |
| 80 | 39000 | 51x130 | 16.0 | 5.8 | 11.0 |
| 80 | 39000 | 63.5x120 | 16.5 | 5.8 | 11.0 |
| 80 | 47000 | 63.5x115 | 20.0 | 5.5 | 10.5 |
| 80 | 47000 | 63.5x120 | 20.5 | 5.5 | 10.5 |
| 80 | 47000 | 63.5x145 | 21.0 | 5.5 | 10.5 |
| 80 | 56000 | 63.5x130 | 22.0 | 5.2 | 9.5 |
| 80 | 56000 | 63.5x145 | 23.0 | 5.2 | 9.5 |
| 80 | 68000 | 76.2x115 | 22.0 | 5.0 | 9.5 |
| 80 | 68000 | 76.2x120 | 23.0 | 5.0 | 9.5 |
| 80 | 68000 | 76.2x145 | 24.0 | 5.0 | 9.5 |
| 80 | 82000 | 76.2x130 | 24.0 | 4.5 | 8.6 |
| 80 | 82000 | 76.2x140 | 24.5 | 4.5 | 8.6 |
| 80 | 82000 | 76.2x145 | 25.0 | 4.5 | 8.6 |
| 80 | 100000 | 76.2x155 | 25.5 | 4.0 | 7.6 |
| 80 | 100000 | 76.2x160 | 26.0 | 4.0 | 7.6 |
| 80 | 100000 | 89x140 | 26.0 | 4.0 | 7.6 |
| 80 | 120000 | 89x130 | 23.0 | 3.8 | 7.2 |
| 80 | 150000 | 89x155 | 29.0 | 3.5 | 6.7 |
| 80 | 150000 | 89x160 | 30.0 | 4 | 7 |
| 80 | 220000 | 89x230 | 33.0 | 3 | 6 |
| 100 | 1800 | 35x50 | 3.5 | 50 | 90 |
| 100 | 2200 | 35x50 | 4.3 | 40 | 75 |
| 100 | 2700 | 35x50 | 4.5 | 35 | 65 |
| 100 | 3300 | 35x65 | 4.8 | 28 | 53 |
| 100 | 3300 | 35x80 | 5.3 | 28 | 53 |
| 100 | 3900 | 35x80 | 5.6 | 24 | 42 |
| 100 | 4700 | 35x80 | 6.7 | 20 | 36 |
| 100 | 5600 | 35x100 | 7.2 | 18 | 29 |
| 100 | 6800 | 35x100 | 7.5 | 15 | 24 |
| 100 | 6800 | 35x105 | 8.7 | 15 | 24 |
| 100 | 6800 | 35x80 | 8.0 | 15 | 24 |
| 100 | 8200 | 35x120 | 9.5 | 12 | 20 |
| 100 | 8200 | 51x80 | 9.5 | 12 | 20 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 100 | 10000 | 35x120 | 10.0 | 12 | 18 |
| 100 | 10000 | 51x80 | 10.0 | 9 | 18 |
| 100 | 12000 | 51x80 | 10.5 | 9 | 16 |
| 100 | 15000 | 51x100 | 12.4 | 8 | 15 |
| 100 | 15000 | 51x105 | 13.0 | 8 | 15 |
| 100 | 15000 | 51x80 | 11.0 | 8.0 | 15 |
| 100 | 15000 | 51x96 | 11.5 | 8.0 | 15 |
| 100 | 18000 | 51x100 | 12.6 | 7.0 | 14 |
| 100 | 18000 | 51x115 | 14.0 | 7.0 | 14 |
| 100 | 18000 | 51x120 | 14.5 | 7.0 | 14 |
| 100 | 18000 | 63.5x100 | 15.0 | 7.0 | 14 |
| 100 | 22000 | 51x100 | 13.3 | 6.0 | 11 |
| 100 | 22000 | 51x120 | 15.5 | 6.0 | 11 |
| 100 | 22000 | 51x130 | 16.0 | 6.0 | 11 |
| 100 | 22000 | 63.5x100 | 16.5 | 6.0 | 11 |
| 100 | 22000 | 63.5x105 | 17.0 | 6.0 | 11 |
| 100 | 27000 | 63.5x115 | 18.0 | 5.5 | 10.0 |
| 100 | 27000 | 63.5x120 | 18.5 | 5.5 | 10.0 |
| 100 | 33000 | 51x140 | 18.5 | 5.0 | 9.0 |
| 100 | 33000 | 63.5x130 | 18.8 | 5.0 | 9.0 |
| 100 | 33000 | 63.5x145 | 19.0 | 5.0 | 9.0 |
| 100 | 33000 | 76.2x100 | 18.8 | 5.0 | 9.0 |
| 100 | 33000 | 76.2x105 | 19.0 | 5.0 | 9.0 |
| 100 | 39000 | 76.2x115 | 20.2 | 4.8 | 8.8 |
| 100 | 39000 | 76.2x120 | 20.5 | 4.8 | 8.8 |
| 100 | 39000 | 76.2x145 | 21.0 | 4.8 | 8.8 |
| 100 | 47000 | 63.5x140 | 22.0 | 4.5 | 8.6 |
| 100 | 47000 | 76.2x130 | 24.0 | 4.5 | 8.6 |
| 100 | 47000 | 76.2x140 | 25.0 | 4.5 | 8.6 |
| 100 | 47000 | 76.2x145 | 25.2 | 4.5 | 8.6 |
| 100 | 56000 | 76.2x155 | 26.0 | 4.3 | 8.2 |
| 100 | 68000 | 76.2x140 | 26.4 | 4.0 | 7.6 |
| 100 | 68000 | 89x130 | 26.5 | 4.0 | 7.6 |
| 100 | 68000 | 89x140 | 26.7 | 4.0 | 7.6 |
| 100 | 82000 | 89x155 | 27.0 | 3.8 | 7.2 |
| 100 | 100000 | 89x160 | 27.2 | 3.5 | 6.7 |
| 100 | 100000 | 89x170 | 27.5 | 4 | 7 |
| 100 | 150000 | 89x230 | 31.0 | 3 | 6 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RG Series 85°C

Features

Standard capacitors

Applications

- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps



Specifications

| Item | Performance Characteristics | |
|--|--|---|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C |
| Rated voltage V_R | 160 to 450 V DC | 500 to 630 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | |
| Rated capacitance C_R | 390 to 39000 μF | 1000 to 10000 μF |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | |
| | Working Voltage(VDC) | 160~450 500~550 ≥ 600 |
| | D.F. (%)max. 15 20 25 | |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | |
| | d ≥ 63.5 mm: approx. 20 nH | |
| | Capacitors with low-inductance design: | |
| | d ≥ 63.5 mm: approx. 15 nH | |
| Useful life 85°C; $V_R, I_{AC, R}$ | >6000 h | Requirements: |
| | | $\Delta C/C$ $\leq \pm 15\%$ of initial value $\tan \delta$ ≤ 1.75 times initial specified limit I_{leak} \leq initial specified limit |
| Voltage Endurance test 85°C; V_R | 2000 h | Post test requirements: |
| | | $\Delta C/C$ $\leq \pm 10\%$ of initial value $\tan \delta$ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | |
| | $V_R(V)$ | 160-450 ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 4 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | |

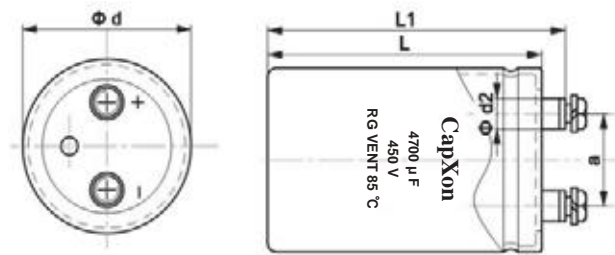
Screw

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
|---------------|-----|-----|-----|-----|-----------|
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

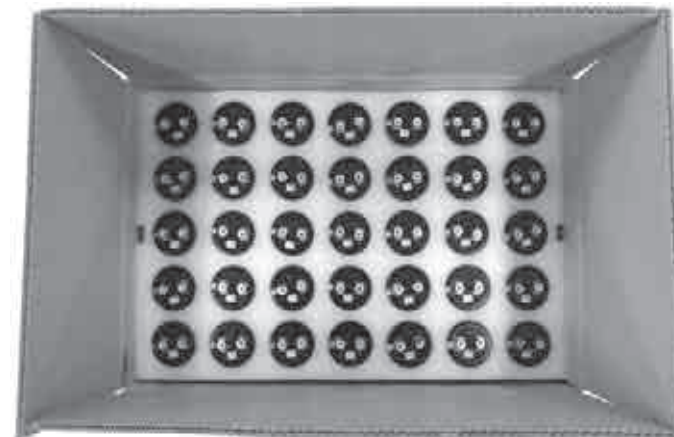
Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------------|----------------------|
| 35 | $\leq 70\text{mm}$ | 120 |
| | $> 70\text{mm}$ | 60 |
| 42 | $\leq 70\text{mm}$ | 120 |
| | $> 70\text{mm}$ | 60 |
| 51 | $\leq 70\text{mm}$ | 70 |
| | $> 70\text{mm}$ | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

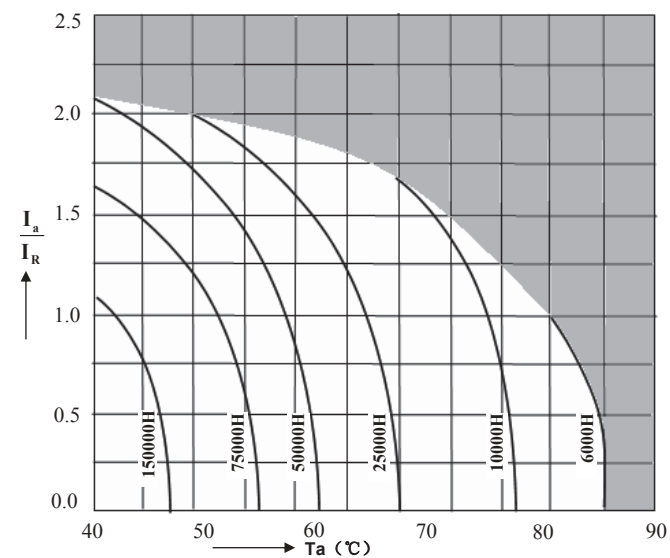
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 160 | 1000 | 35x60 | 2.8 | 120 | 200 |
| 160 | 1500 | 35x60 | 3.0 | 76 | 130 |
| 160 | 2200 | 35x100 | 4.0 | 53 | 90 |
| 160 | 3300 | 35x100 | 4.7 | 35 | 60 |
| 160 | 3900 | 51x75 | 5.3 | 30 | 51 |
| 160 | 4700 | 51x75 | 6.0 | 25 | 42 |
| 160 | 5600 | 51x96 | 7.0 | 21 | 36 |
| 160 | 6800 | 51x96 | 8.5 | 17 | 29 |
| 160 | 8200 | 51x115 | 9.2 | 14 | 24 |
| 160 | 10000 | 51x120 | 10.5 | 12 | 20 |
| 160 | 10000 | 63.5x96 | 10.5 | 12 | 20 |
| 160 | 12000 | 51x120 | 11.5 | 10 | 17 |
| 160 | 12000 | 63.5x100 | 11.7 | 10 | 17 |
| 160 | 15000 | 63.5x120 | 14.3 | 8 | 13 |
| 160 | 18000 | 63.5x130 | 15.6 | 7 | 11 |
| 160 | 22000 | 76.2x120 | 16.7 | 5 | 9 |
| 160 | 27000 | 76.2x130 | 20.2 | 4 | 7 |
| 160 | 33000 | 89x130 | 23.8 | 4 | 6 |
| 160 | 39000 | 89x157 | 27.9 | 3 | 5 |
| 200 | 1000 | 35x60 | 3.0 | 120 | 200 |
| 200 | 1500 | 35x80 | 3.3 | 76 | 130 |
| 200 | 2200 | 35x100 | 4.2 | 53 | 90 |
| 200 | 2700 | 35x120 | 4.7 | 43 | 74 |
| 200 | 3300 | 35x120 | 4.8 | 35 | 60 |
| 200 | 3300 | 51x80 | 4.9 | 35 | 60 |
| 200 | 3900 | 51x75 | 5.5 | 30 | 51 |
| 200 | 4700 | 51x96 | 6.4 | 25 | 42 |
| 200 | 5600 | 51x115 | 7.6 | 21 | 36 |
| 200 | 6800 | 51x130 | 8.8 | 17 | 29 |
| 200 | 8200 | 63.5x96 | 9.4 | 14 | 24 |
| 200 | 10000 | 63.5x120 | 11.2 | 12 | 20 |
| 200 | 10000 | 63.5x96 | 10.4 | 12 | 20 |
| 200 | 15000 | 76.2x96 | 14.4 | 8 | 13 |
| 200 | 18000 | 76.2x130 | 16.5 | 7 | 11 |
| 200 | 22000 | 76.2x155 | 19.6 | 5 | 9 |
| 200 | 22000 | 89x120 | 19.2 | 5 | 9 |
| 200 | 27000 | 89x130 | 21.5 | 4 | 7 |
| 200 | 33000 | 89x157 | 25.3 | 4 | 6 |
| 250 | 680 | 35x60 | 1.8 | 170 | 290 |
| 250 | 1000 | 35x80 | 3.3 | 120 | 200 |
| 250 | 1500 | 35x80 | 3.5 | 76 | 130 |
| 250 | 1800 | 35x100 | 3.5 | 65 | 110 |
| 250 | 2200 | 35x120 | 3.8 | 53 | 90 |
| 250 | 2200 | 51x75 | 4.0 | 53 | 90 |
| 250 | 2700 | 51x75 | 4.4 | 43 | 74 |
| 250 | 3300 | 51x96 | 5.4 | 35 | 60 |
| 250 | 3900 | 51x115 | 6.3 | 30 | 51 |
| 250 | 4700 | 51x120 | 7.0 | 25 | 42 |
| 250 | 4700 | 63.5x96 | 7.3 | 25 | 42 |
| 250 | 5600 | 63.5x96 | 7.8 | 21 | 36 |
| 250 | 6800 | 51x140 | 8.5 | 17 | 29 |
| 250 | 6800 | 63.5x115 | 9.1 | 17 | 29 |
| 250 | 6800 | 76.2x100 | 9.5 | 17 | 29 |
| 250 | 8200 | 63.5x115 | 10.0 | 14 | 24 |
| 250 | 10000 | 63.5x130 | 11.7 | 12 | 20 |
| 250 | 10000 | 76.2x115 | 12.2 | 12 | 20 |
| 250 | 12000 | 76.2x115 | 12.9 | 10 | 17 |
| 250 | 15000 | 76.2x130 | 15.1 | 8 | 13 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 250 | 15000 | 89x120 | 15.9 | 8 | 13 |
| 250 | 18000 | 76.2x155 | 17.7 | 7 | 11 |
| 250 | 22000 | 89x157 | 20.9 | 5 | 9 |
| 350 | 390 | 35x50 | 1.7 | 300 | 510 |
| 350 | 470 | 35x80 | 2.2 | 250 | 420 |
| 350 | 560 | 35x80 | 2.4 | 210 | 360 |
| 350 | 680 | 35x80 | 2.6 | 170 | 290 |
| 350 | 820 | 35x100 | 3.1 | 140 | 240 |
| 350 | 1000 | 35x100 | 3.5 | 120 | 200 |
| 350 | 1200 | 51x75 | 3.8 | 100 | 170 |
| 350 | 1500 | 51x75 | 4.3 | 76 | 130 |
| 350 | 1800 | 51x80 | 7.0 | 65 | 110 |
| 350 | 2200 | 51x96 | 8.0 | 53 | 90 |
| 350 | 2700 | 51x105 | 9.1 | 43 | 74 |
| 350 | 2700 | 63.5x80 | 9.2 | 43 | 74 |
| 350 | 3300 | 51x115 | 10.3 | 35 | 60 |
| 350 | 3300 | 63.5x96 | 10.9 | 35 | 60 |
| 350 | 3900 | 51x130 | 11.5 | 30 | 51 |
| 350 | 3900 | 63.5x100 | 11.7 | 30 | 51 |
| 350 | 4700 | 63.5x100 | 15.1 | 25 | 42 |
| 350 | 5600 | 63.5x115 | 17.5 | 21 | 36 |
| 350 | 5600 | 76.2x96 | 18.2 | 21 | 36 |
| 350 | 6800 | 63.5x140 | 20.5 | 17 | 29 |
| 350 | 6800 | 76.2x100 | 20.1 | 17 | 29 |
| 350 | 8200 | 76.2x115 | 23.4 | 14 | 24 |
| 350 | 10000 | 76.2x135 | 27.7 | 12 | 20 |
| 350 | 10000 | 89x120 | 28.7 | 12 | 20 |
| 350 | 12000 | 76.2x168 | 30.1 | 10 | 17 |
| 350 | 12000 | 89x125 | 28.9 | 10 | 17 |
| 350 | 15000 | 89x150 | 34.9 | 8 | 13 |
| 400 | 1000 | 51x75 | 3.5 | 120 | 200 |
| 400 | 1200 | 51x75 | 3.9 | 100 | 170 |
| 400 | 1500 | 51x80 | 6.6 | 76 | 130 |
| 400 | 1800 | 51x96 | 7.5 | 65 | 110 |
| 400 | 2200 | 51x105 | 8.5 | 53 | 90 |
| 400 | 2200 | 63.5x80 | 8.0 | 53 | 90 |
| 400 | 2700 | 51x118 | 9.7 | 43 | 74 |
| 400 | 2700 | 63.5x96 | 10.0 | 43 | 74 |
| 400 | 3300 | 63.5x96 | 12.6 | 35 | 60 |
| 400 | 3900 | 63.5x100 | 13.7 | 30 | 51 |
| 400 | 4700 | 63.5x115 | 16.0 | 25 | 42 |
| 400 | 4700 | 76.2x96 | 16.7 | 25 | 42 |
| 400 | 5600 | 63.5x130 | 18.4 | 21 | 36 |
| 400 | 5600 | 76.2x105 | 18.6 | 21 | 36 |
| 400 | 6800 | 76.2x110 | 20.9 | 17 | 29 |
| 400 | 8200 | 76.2x130 | 24.7 | 14 | 24 |
| 400 | 10000 | 76.2x160 | 26.9 | 12 | 20 |
| 400 | 10000 | 89x125 | 26.4 | 12 | 20 |
| 400 | 12000 | 76.2x190 | 31.8 | 10 | 17 |
| 400 | 12000 | 89x145 | 30.8 | 10 | 17 |
| 400 | 15000 | 89x236 | 38.2 | 8 | 13 |
| 450 | 1000 | 51x75 | 3.5 | 120 | 200 |
| 450 | 1200 | 51x80 | 5.4 | 100 | 170 |
| 450 | 1500 | 51x96 | 6.2 | 76 | 130 |
| 450 | 1500 | 63.5x80 | 6.3 | 76 | 130 |
| 450 | 1800 | 51x96 | 7.9 | 65 | 110 |
| 450 | 2200 | 51x118 | 8.0 | 53 | 90 |
| 450 | 2200 | 63.5x96 | 8.3 | 53 | 90 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 2700 | 63.5x100 | 11.4 | 43 | 74 |
| 450 | 3300 | 63.5x105 | 12.9 | 35 | 60 |
| 450 | 3900 | 63.5x115 | 14.6 | 30 | 51 |
| 450 | 3900 | 76.2x100 | 15.2 | 30 | 51 |
| 450 | 4700 | 63.5x135 | 17.2 | 25 | 42 |
| 450 | 4700 | 76.2x105 | 17.0 | 25 | 42 |
| 450 | 5600 | 76.2x115 | 19.3 | 21 | 36 |
| 450 | 6800 | 76.2x135 | 22.8 | 17 | 29 |
| 450 | 10000 | 76.2x190 | 29.0 | 12 | 20 |
| 450 | 10000 | 89x150 | 28.5 | 12 | 20 |
| 450 | 12000 | 89x236 | 33.0 | 10 | 17 |
| 500 | 1000 | 51x115 | 4.6 | 160 | 270 |
| 500 | 1000 | 51x85 | 4.0 | 160 | 270 |
| 500 | 1200 | 51x96 | 4.2 | 130 | 220 |
| 500 | 1500 | 51x115 | 5.1 | 110 | 180 |
| 500 | 1500 | 63.5x96 | 5.4 | 110 | 180 |
| 500 | 1800 | 51x130 | 5.9 | 88 | 150 |
| 500 | 1800 | 63.5x96 | 6.0 | 88 | 150 |
| 500 | 2200 | 63.5x115 | 7.1 | 71 | 120 |
| 500 | 2200 | 76.2x96 | 7.3 | 71 | 120 |
| 500 | 2700 | 63.5x130 | 8.3 | 58 | 98 |
| 500 | 3300 | 76.2x115 | 9.7 | 47 | 80 |
| 500 | 3900 | 76.2x130 | 11.1 | 40 | 68 |
| 500 | 4700 | 76.2x155 | 13.1 | 33 | 56 |
| 500 | 5600 | 89x145 | 13.8 | 28 | 47 |
| 500 | 6800 | 89x155 | 15.9 | 23 | 39 |
| 500 | 8200 | 89x180 | 17.2 | 19 | 32 |
| 500 | 10000 | 89x236 | 22.1 | 16 | 27 |
| 550 | 1200 | 51x115 | 4.6 | 130 | 220 |
| 550 | 1500 | 63.5x96 | 5.4 | 110 | 180 |
| 550 | 1800 | 76.2x80 | 6.1 | 88 | 150 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 550 | 2200 | 76.2x96 | 7.3 | 71 | 120 |
| 550 | 2700 | 76.2x115 | 8.7 | 58 | 98 |
| 550 | 3300 | 76.2x130 | 10.2 | 47 | 80 |
| 550 | 3900 | 76.2x155 | 12.1 | 40 | 68 |
| 550 | 4700 | 76.2x180 | 15.1 | 33 | 56 |
| 550 | 5600 | 89x155 | 14.5 | 28 | 47 |
| 600 | 1200 | 63.5x96 | 7.7 | 160 | 280 |
| 600 | 1500 | 63.5x115 | 8.3 | 130 | 220 |
| 600 | 1500 | 76.2x96 | 8.5 | 130 | 220 |
| 600 | 1800 | 63.5x130 | 10.3 | 110 | 180 |
| 600 | 1800 | 76.2x96 | 10.1 | 110 | 180 |
| 600 | 2200 | 76.2x115 | 12.0 | 88 | 150 |
| 600 | 2700 | 76.2x130 | 12.1 | 71 | 120 |
| 600 | 3000 | 76.2x155 | 15.6 | 65 | 110 |
| 600 | 3300 | 76.2x155 | 16.4 | 59 | 100 |
| 600 | 3300 | 89x130 | 16.6 | 59 | 100 |
| 600 | 3900 | 76.2x190 | 17.7 | 50 | 85 |
| 600 | 3900 | 89x145 | 17.4 | 50 | 85 |
| 600 | 4700 | 89x157 | 21.0 | 41 | 71 |
| 600 | 5600 | 89x190 | 22.8 | 35 | 59 |
| 600 | 6800 | 89x220 | 24.4 | 29 | 49 |
| 630 | 1000 | 63.5x130 | 6.0 | 190 | 330 |
| 630 | 1200 | 76.2x115 | 6.7 | 160 | 280 |
| 630 | 1500 | 76.2x130 | 8.1 | 130 | 220 |
| 630 | 1800 | 76.2x155 | 9.8 | 110 | 180 |
| 630 | 2200 | 89x130 | 10.7 | 88 | 150 |
| 630 | 2700 | 89x157 | 12.8 | 71 | 120 |
| 630 | 3300 | 89x171 | 14.7 | 59 | 100 |
| 630 | 3900 | 89x196 | 17.9 | 50 | 85 |
| 630 | 4700 | 100x220 | 21.6 | 41 | 71 |
| 630 | 5600 | 100x250 | 24.9 | 35 | 59 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RP Series 85°C

Features

Extremely Long useful life

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Long useful life
- ◆ High reliability
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | |
|--|--|---|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C |
| Rated voltage V_R | 160 to 450 V DC | 500 to 630 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | |
| Rated capacitance C_R | 270 to 68000 μF | 100 to 10000 μF |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | |
| | Working Voltage(VDC) | 160~450 500~550 ≥ 600 |
| | D.F. (%)max. | 15 20 25 |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | |
| | d ≥ 63.5 mm: approx. 20 nH | |
| | Capacitors with low-inductance design: | |
| | d ≥ 63.5 mm: approx. 15 nH | |
| Useful life 85°C; $V_R, I_{AC,R}$ | >10000 h | Requirements: |
| | | $\Delta C/C \leq \pm 15\%$ of initial value $\tan \delta \leq 1.75$ times initial specified limit $I_{leak} \leq$ initial specified limit |
| Voltage Endurance test 85°C; V_R | 2000 h | Post test requirements: |
| | | $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1.3$ times initial specified limit $I_{leak} \leq$ initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | |
| | $V_R(V)$ | 160-450 ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 4 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | |

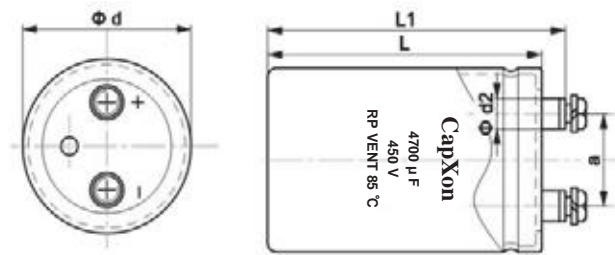
Screw

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
|---------------|-----|-----|-----|-----|-----------|
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 35 | ≤ 70 mm | 120 |
| | > 70 mm | 60 |
| 42 | ≤ 70 mm | 120 |
| | > 70 mm | 60 |
| 51 | ≤ 70 mm | 70 |
| | > 70 mm | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

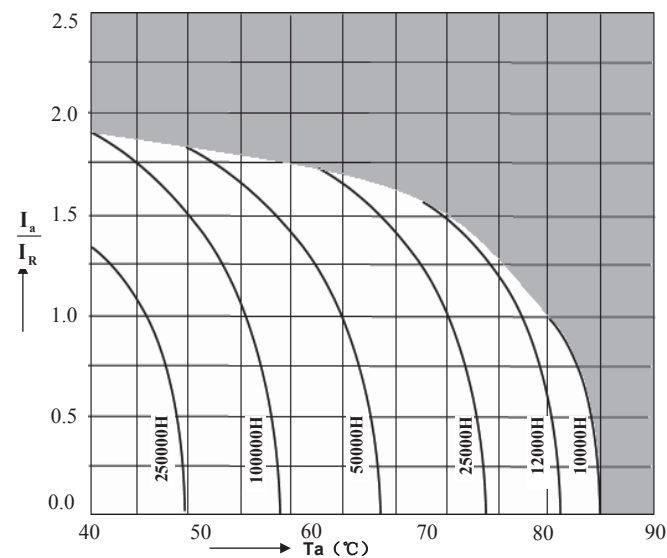
The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 5600 | 89x157 | 14.8 | 27 | 47 |
| 500 | 6800 | 89x155 | 16.0 | 22 | 39 |
| 500 | 8200 | 89x196 | 18.2 | 18 | 32 |
| 500 | 10000 | 89x220 | 22.3 | 15 | 27 |
| 550 | 100 | 35x50 | 0.7 | 1510 | 2650 |
| 550 | 180 | 35x80 | 1.1 | 840 | 1470 |
| 550 | 270 | 35x100 | 1.4 | 560 | 980 |
| 550 | 330 | 35x120 | 1.7 | 460 | 800 |
| 550 | 390 | 51x60 | 2.0 | 390 | 680 |
| 550 | 390 | 51x75 | 2.2 | 390 | 680 |
| 550 | 560 | 51x65 | 2.5 | 270 | 470 |
| 550 | 560 | 51x96 | 3.0 | 270 | 470 |
| 550 | 560 | 63.5x96 | 3.3 | 270 | 470 |
| 550 | 680 | 51x75 | 2.9 | 220 | 390 |
| 550 | 680 | 51x96 | 3.3 | 220 | 390 |
| 550 | 680 | 51x115 | 3.6 | 220 | 390 |
| 550 | 680 | 63.5x115 | 4.0 | 220 | 390 |
| 550 | 820 | 51x80 | 3.4 | 180 | 320 |
| 550 | 820 | 51x85 | 3.5 | 180 | 320 |
| 550 | 820 | 51x96 | 3.7 | 180 | 320 |
| 550 | 820 | 51x130 | 4.2 | 180 | 320 |
| 550 | 820 | 63.5x130 | 4.8 | 180 | 320 |
| 550 | 1000 | 51x96 | 4.9 | 150 | 270 |
| 550 | 1000 | 51x105 | 5.1 | 150 | 270 |
| 550 | 1200 | 51x105 | 5.8 | 130 | 220 |
| 550 | 1200 | 51x115 | 6.0 | 130 | 220 |
| 550 | 1200 | 63.5x80 | 5.8 | 130 | 220 |
| 550 | 1200 | 76.2x96 | 7.0 | 130 | 220 |
| 550 | 1500 | 51x130 | 7.4 | 100 | 180 |
| 550 | 1500 | 63.5x96 | 7.3 | 100 | 180 |
| 550 | 1500 | 76.2x115 | 8.8 | 100 | 180 |
| 550 | 1800 | 63.5x96 | 8.3 | 86 | 150 |
| 550 | 1800 | 63.5x118 | 9.1 | 86 | 150 |
| 550 | 1800 | 76.2x80 | 8.6 | 86 | 150 |
| 550 | 1800 | 76.2x96 | 9.2 | 86 | 150 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 550 | 1800 | 76.2x130 | 10.5 | 86 | 150 |
| 550 | 2200 | 63.5x118 | 9.4 | 69 | 120 |
| 550 | 2200 | 63.5x130 | 9.8 | 69 | 120 |
| 550 | 2200 | 76.2x96 | 9.5 | 69 | 120 |
| 550 | 2200 | 76.2x105 | 9.9 | 69 | 120 |
| 550 | 2200 | 76.2x155 | 11.7 | 69 | 120 |
| 550 | 2700 | 63.5x130 | 10.8 | 56 | 98 |
| 550 | 2700 | 76.2x105 | 10.9 | 56 | 98 |
| 550 | 2700 | 76.2x115 | 11.3 | 56 | 98 |
| 550 | 2700 | 76.2x130 | 12.0 | 56 | 98 |
| 550 | 3300 | 76.2x118 | 12.1 | 46 | 80 |
| 550 | 3300 | 76.2x130 | 12.6 | 46 | 80 |
| 550 | 3300 | 76.2x143 | 13.2 | 46 | 80 |
| 550 | 3900 | 76.2x143 | 14.2 | 39 | 68 |
| 550 | 3900 | 89x120 | 14.4 | 39 | 68 |
| 550 | 4700 | 76.2x155 | 16.2 | 32 | 56 |
| 550 | 4700 | 89x145 | 17.2 | 32 | 56 |
| 550 | 4700 | 89x157 | 17.8 | 32 | 56 |
| 550 | 5600 | 76.2x190 | 18.8 | 27 | 47 |
| 550 | 5600 | 89x145 | 18.2 | 27 | 47 |
| 550 | 5600 | 89x155 | 18.7 | 27 | 47 |
| 550 | 6800 | 76.2x220 | 21.8 | 22 | 39 |
| 550 | 6800 | 89x170 | 21.1 | 22 | 39 |
| 550 | 8200 | 89x197 | 25.3 | 18 | 32 |
| 630 | 1000 | 63.5x130 | 6.0 | 190 | 330 |
| 630 | 1200 | 76.2x110 | 6.8 | 160 | 280 |
| 630 | 1500 | 76.2x130 | 8.2 | 130 | 220 |
| 630 | 1800 | 76.2x150 | 9.7 | 100 | 180 |
| 630 | 2200 | 89x130 | 10.8 | 86 | 150 |
| 630 | 2700 | 89x150 | 12.7 | 69 | 120 |
| 630 | 3300 | 89x170 | 14.8 | 57 | 100 |
| 630 | 3900 | 89x190 | 17.4 | 49 | 85 |
| 630 | 4700 | 100x220 | 21.5 | 40 | 71 |
| 630 | 5600 | 100x240 | 24.8 | 34 | 59 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RX Series 85°C

Features

Extremely Long useful life

Applications

- ◆ High reliability
- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Long useful life
- ◆ High reliability
- ◆ High reliability current capability
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | |
|--|--|--|
| Operating Temperature Range | -40 to +85°C | -25 to +85°C |
| Rated voltage V_R | 160 to 450 V DC | 500 to 650 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | |
| Rated capacitance C_R | 200 to 100000 μF | 10000 to 15000 μF |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | |
| Dissipation Factor (tan δ , at 20°C, 120Hz) | Less than the value under table(%) | |
| | Working Voltage(VDC) | 160~450 500~550 ≥ 600 |
| | D.F. (%)max. | 15 20 25 |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | |
| | d ≥ 63.5 mm: approx. 20 nH | |
| | Capacitors with low-inductance design: | |
| | d ≥ 63.5 mm: approx. 15 nH | |
| Useful life 85°C; $V_R, I_{AC, R}$ | >2000 h | Requirements: |
| | | $\Delta C/C$ $\leq \pm 15\%$ of initial value tan δ ≤ 1.75 times initial specified limit I_{leak} \leq initial specified limit |
| Voltage Endurance test 85°C; V_R | 2000 h | Post test requirements: |
| | | $\Delta C/C$ $\leq \pm 10\%$ of initial value tan δ ≤ 1.3 times initial specified limit I_{leak} \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | |
| | $V_R(V)$ | 160-450 ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 4 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | |

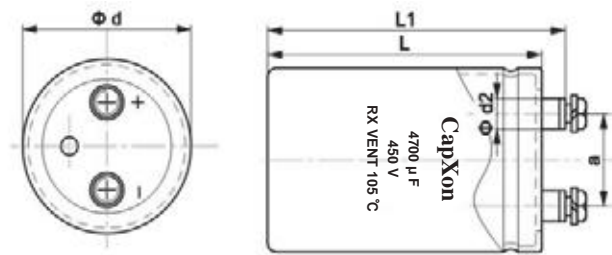
Screw

Multiplier for Ripple Current vs. Frequency

| | | | | | |
|---------------|-----|-----|-----|-----|-----------|
| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

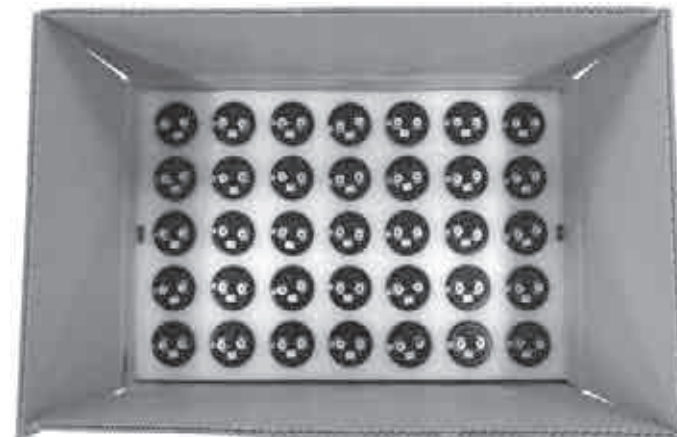
Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------------|----------------------|
| 35 | $\leq 70\text{mm}$ | 120 |
| | $> 70\text{mm}$ | 60 |
| 42 | $\leq 70\text{mm}$ | 120 |
| | $> 70\text{mm}$ | 60 |
| 51 | $\leq 70\text{mm}$ | 70 |
| | $> 70\text{mm}$ | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 160 | 1000 | 35x60 | 2.5 | 110 | 200 |
| 160 | 1500 | 35x80 | 3.3 | 68 | 130 |
| 160 | 2200 | 35x80 | 3.5 | 48 | 90 |
| 160 | 2200 | 35x100 | 3.5 | 48 | 90 |
| 160 | 3300 | 35x120 | 4.7 | 32 | 60 |
| 160 | 3300 | 51x80 | 4.8 | 32 | 60 |
| 160 | 4700 | 51x80 | 5.1 | 22 | 42 |
| 160 | 4700 | 51x100 | 6.0 | 22 | 42 |
| 160 | 6800 | 51x100 | 6.4 | 15 | 29 |
| 160 | 6800 | 51x140 | 7.0 | 15 | 29 |
| 160 | 6800 | 63.5x100 | 7.0 | 15 | 29 |
| 160 | 10000 | 63.5x100 | 9.1 | 10 | 20 |
| 160 | 10000 | 63.5x120 | 10.0 | 10 | 20 |
| 160 | 15000 | 76.2x100 | 12.1 | 7 | 13 |
| 160 | 15000 | 76.2x120 | 13.0 | 7 | 13 |
| 160 | 22000 | 76.2x140 | 17.0 | 6.0 | 11 |
| 160 | 22000 | 89x130 | 18.0 | 6.0 | 11 |
| 160 | 33000 | 89x140 | 19.3 | 5.0 | 9 |
| 160 | 47000 | 89x170 | 20.7 | 4.0 | 7 |
| 160 | 47000 | 89x220 | 23.0 | 4.0 | 7 |
| 160 | 68000 | 89x220 | 23.2 | 3.5 | 6 |
| 160 | 100000 | 100x250 | 24.5 | 3.0 | 5 |
| 200 | 680 | 35x50 | 1.9 | 150 | 290 |
| 200 | 1000 | 35x60 | 2.6 | 110 | 200 |
| 200 | 1500 | 35x80 | 3.4 | 68 | 130 |
| 200 | 2200 | 35x100 | 3.6 | 48 | 90 |
| 200 | 2200 | 35x120 | 4.0 | 48 | 90 |
| 200 | 2200 | 51x80 | 4.0 | 48 | 90 |
| 200 | 3300 | 51x80 | 4.8 | 32 | 60 |
| 200 | 3300 | 51x100 | 5.0 | 32 | 60 |
| 200 | 4700 | 51x140 | 6.5 | 22 | 42 |
| 200 | 4700 | 63.5x100 | 6.5 | 22 | 42 |
| 200 | 6800 | 51x140 | 7.4 | 15 | 29 |
| 200 | 6800 | 63.5x120 | 8.0 | 15 | 29 |
| 200 | 10000 | 63.5x120 | 10.3 | 10 | 20 |
| 200 | 10000 | 76.2x120 | 13.1 | 10 | 20 |
| 200 | 15000 | 76.2x120 | 13.4 | 7 | 13 |
| 200 | 15000 | 76.2x140 | 15.0 | 7 | 13 |
| 200 | 15000 | 76.2x160 | 16.1 | 7 | 13 |
| 200 | 22000 | 76.2x160 | 17.4 | 6 | 9 |
| 200 | 22000 | 89x140 | 17.8 | 6 | 9 |
| 200 | 33000 | 89x170 | 19.6 | 4 | 7 |
| 200 | 47000 | 89x220 | 21.0 | 3 | 5.8 |
| 200 | 68000 | 100x250 | 22.7 | 3 | 5 |
| 250 | 470 | 35x60 | 2.7 | 220 | 420 |
| 250 | 680 | 35x80 | 2.8 | 150 | 290 |
| 250 | 1000 | 35x80 | 3.0 | 110 | 200 |
| 250 | 1000 | 35x100 | 3.3 | 110 | 200 |
| 250 | 1500 | 35x100 | 3.6 | 68 | 130 |
| 250 | 1500 | 51x80 | 3.7 | 68 | 130 |
| 250 | 2200 | 51x80 | 4.1 | 48 | 90 |
| 250 | 2200 | 51x100 | 5.5 | 48 | 90 |
| 250 | 3300 | 51x100 | 5.5 | 32 | 60 |
| 250 | 3300 | 51x140 | 6.0 | 32 | 60 |
| 250 | 3300 | 63.5x100 | 6.0 | 32 | 60 |
| 250 | 4700 | 63.5x100 | 7.4 | 22 | 42 |
| 250 | 4700 | 63.5x120 | 8.0 | 22 | 42 |
| 250 | 6800 | 63.5x120 | 9.0 | 15 | 29 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 250 | 6800 | 76.2x120 | 10.0 | 15 | 29 |
| 250 | 10000 | 76.2x120 | 13.3 | 10 | 20 |
| 250 | 10000 | 76.2x160 | 14.0 | 10 | 20 |
| 250 | 10000 | 89x140 | 14.0 | 10 | 20 |
| 250 | 15000 | 89x140 | 16.5 | 7 | 13 |
| 250 | 15000 | 89x170 | 18.0 | 7 | 13 |
| 250 | 22000 | 89x170 | 18.3 | 5 | 9 |
| 250 | 22000 | 89x220 | 22.4 | 5 | 9 |
| 250 | 33000 | 89x220 | 22.5 | 3 | 6 |
| 250 | 47000 | 100x250 | 28.5 | 3 | 5 |
| 350 | 330 | 35x60 | 2.1 | 320 | 600 |
| 350 | 470 | 35x80 | 3.0 | 220 | 420 |
| 350 | 680 | 35x100 | 3.8 | 150 | 290 |
| 350 | 820 | 35x80 | 4.1 | 130 | 240 |
| 350 | 1000 | 35x100 | 4.5 | 110 | 200 |
| 350 | 1000 | 51x60 | 4.0 | 110 | 200 |
| 350 | 1000 | 51x80 | 5.7 | 110 | 200 |
| 350 | 1200 | 51x60 | 5.0 | 89 | 170 |
| 350 | 1200 | 51x83 | 5.8 | 89 | 170 |
| 350 | 1500 | 51x75 | 6.0 | 68 | 130 |
| 350 | 1500 | 51x100 | 7.0 | 68 | 130 |
| 350 | 1800 | 51x75 | 6.8 | 58 | 110 |
| 350 | 1800 | 51x90 | 7.4 | 58 | 110 |
| 350 | 1800 | 63.5x96 | 8.5 | 58 | 110 |
| 350 | 2200 | 51x105 | 8.5 | 48 | 90 |
| 350 | 2200 | 51x120 | 9.0 | 48 | 90 |
| 350 | 2700 | 51x105 | 9.4 | 39 | 74 |
| 350 | 2700 | 51x115 | 10.6 | 39 | 74 |
| 350 | 2700 | 63.5x80 | 9.8 | 39 | 74 |
| 350 | 2700 | 63.5x85 | 10.1 | 39 | 74 |
| 350 | 3300 | 51x115 | 10.8 | 32 | 60 |
| 350 | 3300 | 51x130 | 12.5 | 32 | 60 |
| 350 | 3300 | 63.5x90 | 12.0 | 32 | 60 |
| 350 | 3300 | 63.5x100 | 12.5 | 32 | 60 |
| 350 | 3900 | 63.5x100 | 13.0 | 27 | 51 |
| 350 | 3900 | 63.5x115 | 13.9 | 27 | 51 |
| 350 | 3900 | 76.2x80 | 13.0 | 27 | 51 |
| 350 | 4700 | 63.5x105 | 14.0 | 22 | 42 |
| 350 | 4700 | 63.5x115 | 14.5 | 22 | 42 |
| 350 | 4700 | 76.2x90 | 14.0 | 22 | 42 |
| 350 | 4700 | 76.2x120 | 16.0 | 22 | 42 |
| 350 | 5600 | 63.5x130 | 17.4 | 19 | 36 |
| 350 | 5600 | 63.5x150 | 19.0 | 19 | 36 |
| 350 | 5600 | 76.2x100 | 16.8 | 19 | 36 |
| 350 | 5600 | 76.2x115 | 18.0 | 19 | 36 |
| 350 | 6800 | 63.5x140 | 19.0 | 15 | 29 |
| 350 | 6800 | 63.5x155 | 19.6 | 15 | 29 |
| 350 | 6800 | 76.2x105 | 19.0 | 15 | 29 |
| 350 | 6800 | 76.2x115 | 20.0 | 15 | 29 |
| 350 | 6800 | 89x100 | 20.0 | 15 | 29 |
| 350 | 8200 | 63.5x170 | 20.7 | 13 | 24 |
| 350 | 8200 | 63.5x190 | 22.0 | 13 | 24 |
| 350 | 8200 | 76.2x120 | 20.0 | 13 | 24 |
| 350 | 8200 | 76.2x143 | 21.0 | 13 | 24 |
| 350 | 8200 | 76.2x155 | 22.5 | 13 | 24 |
| 350 | 8200 | 89x105 | 20.0 | 13 | 24 |
| 350 | 8200 | 89x120 | 22.0 | 13 | 24 |
| 350 | 10000 | 76.2x140 | 24.0 | 10 | 20 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 350 | 10000 | 76.2x155 | 25.0 | 10 | 20 |
| 350 | 10000 | 89x130 | 27.0 | 10 | 20 |
| 350 | 10000 | 89x155 | 29.0 | 10 | 20 |
| 350 | 12000 | 76.2x170 | 27.6 | 9 | 17 |
| 350 | 12000 | 89x130 | 27.5 | 9 | 17 |
| 350 | 12000 | 89x155 | 29.5 | 9 | 17 |
| 350 | 12000 | 89x170 | 31.0 | 9 | 17 |
| 350 | 15000 | 76.2x220 | 35.4 | 7 | 13 |
| 350 | 15000 | 89x155 | 33.8 | 7 | 13 |
| 350 | 15000 | 89x170 | 35.1 | 7 | 13 |
| 350 | 15000 | 89x190 | 36.0 | 7 | 13 |
| 350 | 18000 | 89x180 | 43.8 | 6 | 11 |
| 350 | 18000 | 89x220 | 44.6 | 6 | 11 |
| 350 | 18000 | 100x190 | 48.0 | 6 | 11 |
| 350 | 22000 | 89x220 | 46.7 | 5 | 9 |
| 350 | 22000 | 100x250 | 48.0 | 5 | 9 |
| 400 | 220 | 35x50 | 1.9 | 470 | 900 |
| 400 | 330 | 35x60 | 2.3 | 320 | 600 |
| 400 | 470 | 35x80 | 4.4 | 220 | 420 |
| 400 | 680 | 35x80 | 4.5 | 150 | 290 |
| 400 | 680 | 35x120 | 5.0 | 150 | 290 |
| 400 | 680 | 51x80 | 6.0 | 150 | 290 |
| 400 | 820 | 35x100 | 4.7 | 130 | 240 |
| 400 | 1000 | 51x60 | 4.8 | 110 | 200 |
| 400 | 1000 | 51x80 | 6.2 | 110 | 200 |
| 400 | 1200 | 51x70 | 5.0 | 89 | 170 |
| 400 | 1200 | 51x83 | 6.5 | 89 | 170 |
| 400 | 1500 | 51x80 | 6.4 | 68 | 130 |
| 400 | 1500 | 51x95 | 7.0 | 68 | 130 |
| 400 | 1500 | 63.5x95 | 8.0 | 68 | 130 |
| 400 | 1800 | 51x85 | 7.0 | 58 | 110 |
| 400 | 1800 | 51x95 | 7.4 | 58 | 110 |
| 400 | 2200 | 51x105 | 8.8 | 48 | 90 |
| 400 | 2200 | 51x115 | 10.0 | 48 | 90 |
| 400 | 2200 | 63.5x85 | 10.1 | 48 | 90 |
| 400 | 2200 | 63.5x100 | 11.5 | 48 | 90 |
| 400 | 2200 | 76.2x105 | 12.5 | 48 | 90 |
| 400 | 2700 | 51x115 | 10.8 | 39 | 74 |
| 400 | 2700 | 51x130 | 11.0 | 39 | 74 |
| 400 | 2700 | 63.5x90 | 11.0 | 39 | 74 |
| 400 | 2700 | 63.5x105 | 12.0 | 39 | 74 |
| 400 | 2700 | 76.2x75 | 11.6 | 39 | 74 |
| 400 | 3300 | 51x130 | 12.8 | 32 | 60 |
| 400 | 3300 | 51x150 | 14.0 | 32 | 60 |
| 400 | 3300 | 63.5x95 | 13.0 | 32 | 60 |
| 400 | 3300 | 63.5x115 | 14.0 | 32 | 60 |
| 400 | 3300 | 76.2x90 | 14.0 | 32 | 60 |
| 400 | 3300 | 76.2x105 | 14.3 | 32 | 60 |
| 400 | 3300 | 76.2x120 | 15.0 | 32 | 60 |
| 400 | 3900 | 63.5x100 | 14.2 | 27 | 51 |
| 400 | 3900 | 63.5x115 | 15.2 | 27 | 51 |
| 400 | 3900 | 76.2x90 | 15.1 | 27 | 51 |
| 400 | 3900 | 76.2x120 | 16.5 | 27 | 51 |
| 400 | 4700 | 63.5x120 | 16.0 | 22 | 42 |
| 400 | 4700 | 63.5x155 | 17.5 | 22 | 42 |
| 400 | 4700 | 76.2x105 | 15.5 | 22 | 42 |
| 400 | 5600 | 63.5x145 | 18.0 | 19 | 36 |
| 400 | 5600 | 63.5x155 | 18.2 | 19 | 36 |
| 400 | 5600 | 63.5x170 | 19.0 | 19 | 36 |
| 400 | 5600 | 76.2x105 | 17.0 | 19 | 36 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 5600 | 76.2x130 | 19.0 | 19 | 36 |
| 400 | 5600 | 89x92 | 18.0 | 19 | 36 |
| 400 | 6800 | 63.5x160 | 23.5 | 15 | 29 |
| 400 | 6800 | 63.5x190 | 24.2 | 15 | 29 |
| 400 | 6800 | 76.2x130 | 19.2 | 15 | 29 |
| 400 | 6800 | 76.2x150 | 21.5 | 15 | 29 |
| 400 | 6800 | 89x105 | 21.2 | 15 | 29 |
| 400 | 6800 | 89x120 | 22.3 | 15 | 29 |
| 400 | 8200 | 76.2x135 | 24.0 | 13 | 24 |
| 400 | 8200 | 76.2x155 | 25.0 | 13 | 24 |
| 400 | 8200 | 76.2x170 | 26.2 | 13 | 24 |
| 400 | 8200 | 89x120 | 25.0 | 13 | 24 |
| 400 | 8200 | 89x140 | 26.0 | 13 | 24 |
| 400 | 10000 | 76.2x160 | 31.6 | 10 | 20 |
| 400 | 10000 | 76.2x180 | 33.0 | 10 | 20 |
| 400 | 10000 | 89x130 | 31.0 | 10 | 20 |
| 400 | 10000 | 89x155 | 34.0 | 10 | 20 |
| 400 | 12000 | 76.2x220 | 34.0 | 9 | 17 |
| 400 | 12000 | 89x155 | 30.0 | 9 | 17 |
| 400 | 12000 | 89x170 | 31.3 | 9 | 17 |
| 400 | 15000 | 89x180 | 39.9 | 7 | 13 |
| 400 | 15000 | 89x200 | 40.7 | 7 | 13 |
| 400 | 18000 | 89x210 | 43.0 | 6 | 11 |
| 400 | 18000 | 89x240 | 45.0 | 6 | 11 |
| 400 | 22000 | 100x240 | 47.0 | 5 | 9 |
| 420 | 820 | 51x60 | 3.8 | 130 | 240 |
| 420 | 1000 | 51x70 | 5.1 | 110 | 200 |
| 420 | 1200 | 51x80 | 6.6 | 89 | 170 |
| 420 | 1800 | 51x95 | 7.6 | 58 | 110 |
| 420 | 1800 | 51x105 | 8.0 | 58 | 110 |
| 420 | 2200 | 51x115 | 10.1 | 48 | 90 |
| 420 | 2700 | 51x120 | 11.0 | 39 | 74 |
| 420 | 2700 | 63.5x90 | 11.0 | 39 | 74 |
| 420 | 3300 | 51x130 | 13.0 | 32 | 60 |
| 420 | 3300 | 63.5x105 | 13.5 | 32 | 60 |
| 420 | 3300 | 76.2x105 | 14.6 | 32 | 60 |
| 420 | 3900 | 63.5x115 | 15.8 | 27 | 51 |
| 420 | 3900 | 63.5x130 | 16.4 | 27 | 51 |
| 420 | 3900 | 76.2x90 | 15.5 | 27 | 51 |
| 420 | 4700 | 63.5x143 | 17.0 | 22 | 42 |
| 420 | 4700 | 63.5x155 | 17.8 | 22 | 42 |
| 420 | 4700 | 76.2x105 | 15.7 | 22 | 42 |
| 420 | 4700 | 76.2x143 | 17.5 | 22 | 42 |
| 420 | 5600 | 63.5x170 | 19.2 | 19 | 36 |
| 420 | 5600 | 76.2x115 | 17.5 | 19 | 36 |
| 420 | 5600 | 76.2x130 | 19.2 | 19 | 36 |
| 420 | 5600 | 89x90 | 18.1 | 19 | 36 |
| 420 | 6800 | 76.2x143 | 21.1 | 15 | 29 |
| 420 | 6800 | 76.2x155 | 22.0 | 15 | 29 |
| 420 | 6800 | 89x105 | 19.9 | 15 | 29 |
| 420 | 6800 | 89x115 | 20.5 | 15 | 29 |
| 420 | 8200 | 76.2x170 | 27.1 | 13 | 24 |
| 420 | 8200 | 89x115 | 25.0 | 13 | 24 |
| 420 | 8200 | 89x130 | 26.2 | 13 | 24 |
| 420 | 10000 | 76.2x180 | 34.0 | 10 | 20 |
| 420 | 10000 | 76.2x220 | 37.0 | 10 | 20 |
| 420 | 10000 | 89x143 | 33.0 | 10 | 20 |
| 420 | 10000 | 89x155 | 35.0 | 10 | 20 |
| 420 | 12000 | 76.2x220 | 35.0 | 9 | 17 |
| 420 | 12000 | 89x155 | 31.1 | 9 | 17 |

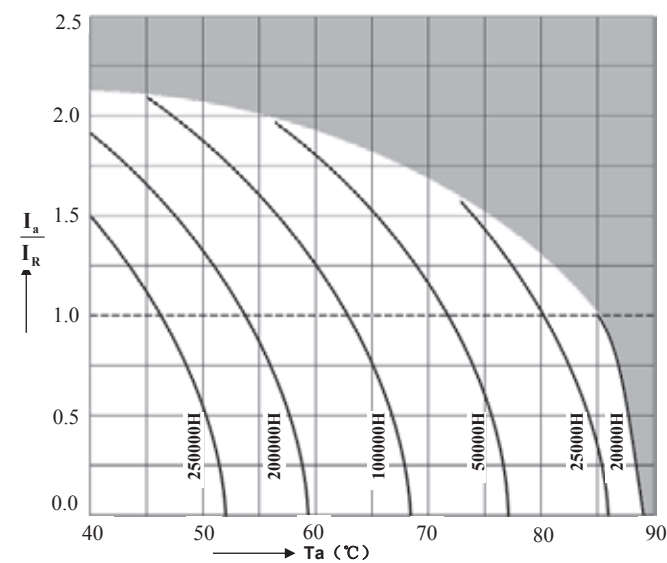
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 420 | 12000 | 89x170 | 31.7 | 9 | 17 |
| 420 | 15000 | 89x190 | 40.1 | 7 | 13 |
| 420 | 18000 | 89x220 | 43.3 | 6 | 11 |
| 450 | 220 | 35x50 | 2.0 | 470 | 900 |
| 450 | 330 | 35x60 | 2.5 | 320 | 600 |
| 450 | 470 | 35x80 | 4.5 | 220 | 420 |
| 450 | 470 | 51x75 | 4.5 | 220 | 420 |
| 450 | 680 | 35x100 | 4.6 | 150 | 290 |
| 450 | 680 | 35x120 | 5.2 | 150 | 290 |
| 450 | 680 | 51x80 | 6.2 | 150 | 290 |
| 450 | 820 | 35x110 | 6.4 | 130 | 240 |
| 450 | 820 | 51x60 | 6.0 | 130 | 240 |
| 450 | 1000 | 51x70 | 6.3 | 110 | 200 |
| 450 | 1000 | 51x80 | 6.5 | 110 | 200 |
| 450 | 1200 | 51x80 | 7.0 | 89 | 170 |
| 450 | 1200 | 51x95 | 7.3 | 89 | 170 |
| 450 | 1200 | 63.5x95 | 8.3 | 89 | 170 |
| 450 | 1500 | 51x95 | 7.5 | 68 | 130 |
| 450 | 1500 | 51x115 | 7.8 | 68 | 130 |
| 450 | 1800 | 51x105 | 8.2 | 58 | 110 |
| 450 | 1800 | 51x115 | 8.4 | 58 | 110 |
| 450 | 1800 | 63.5x80 | 8.0 | 58 | 110 |
| 450 | 1800 | 63.5x105 | 8.5 | 58 | 110 |
| 450 | 2200 | 51x115 | 10.2 | 48 | 90 |
| 450 | 2200 | 51x130 | 11.0 | 48 | 90 |
| 450 | 2200 | 63.5x90 | 10.0 | 48 | 90 |
| 450 | 2200 | 63.5x120 | 12.1 | 48 | 90 |
| 450 | 2200 | 76.2x85 | 11.0 | 48 | 90 |
| 450 | 2700 | 51x115 | 11.2 | 39 | 74 |
| 450 | 2700 | 51x130 | 12.0 | 39 | 74 |
| 450 | 2700 | 63.5x95 | 12.0 | 39 | 74 |
| 450 | 2700 | 63.5x115 | 13.0 | 39 | 74 |
| 450 | 2700 | 76.2x80 | 12.0 | 39 | 74 |
| 450 | 2700 | 76.2x130 | 14.8 | 39 | 74 |
| 450 | 3300 | 63.5x105 | 13.6 | 32 | 60 |
| 450 | 3300 | 63.5x115 | 14.0 | 32 | 60 |
| 450 | 3300 | 76.2x100 | 15.0 | 32 | 60 |
| 450 | 3300 | 76.2x120 | 16.0 | 32 | 60 |
| 450 | 3900 | 63.5x125 | 16.0 | 27 | 51 |
| 450 | 3900 | 63.5x150 | 16.6 | 27 | 51 |
| 450 | 3900 | 76.2x90 | 15.0 | 27 | 51 |
| 450 | 3900 | 76.2x115 | 17.0 | 27 | 51 |
| 450 | 3900 | 89x90 | 17.0 | 27 | 51 |
| 450 | 4700 | 63.5x145 | 18.7 | 22 | 42 |
| 450 | 4700 | 63.5x170 | 20.0 | 22 | 42 |
| 450 | 4700 | 76.2x105 | 18.0 | 22 | 42 |
| 450 | 4700 | 76.2x130 | 20.0 | 22 | 42 |
| 450 | 4700 | 89x110 | 20.0 | 22 | 42 |
| 450 | 5600 | 63.5x165 | 21.7 | 19 | 36 |
| 450 | 5600 | 63.5x190 | 23.2 | 19 | 36 |
| 450 | 5600 | 76.2x115 | 20.5 | 19 | 36 |
| 450 | 5600 | 76.2x130 | 21.6 | 19 | 36 |
| 450 | 5600 | 89x90 | 20.2 | 19 | 36 |
| 450 | 5600 | 89x120 | 22.8 | 19 | 36 |
| 450 | 6800 | 89x105 | 22.8 | 15 | 29 |
| 450 | 6800 | 89x130 | 25.0 | 15 | 29 |
| 450 | 8200 | 76.2x165 | 27.0 | 13 | 24 |
| 450 | 8200 | 76.2x180 | 30.0 | 13 | 24 |
| 450 | 8200 | 89x130 | 29.0 | 13 | 24 |
| 450 | 8200 | 89x155 | 31.0 | 13 | 24 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 10000 | 76.2x220 | 37.5 | 10 | 20 |
| 450 | 10000 | 89x155 | 36.1 | 10 | 20 |
| 450 | 10000 | 89x170 | 37.6 | 10 | 20 |
| 450 | 12000 | 76.2x220 | 39.1 | 9 | 17 |
| 450 | 12000 | 89x155 | 36.4 | 9 | 17 |
| 450 | 12000 | 89x190 | 39.9 | 9 | 17 |
| 450 | 12000 | 100x190 | 42.5 | 9 | 17 |
| 450 | 15000 | 89x220 | 43.5 | 7 | 13 |
| 450 | 15000 | 89x240 | 45.3 | 7 | 13 |
| 450 | 15000 | 100x195 | 43.9 | 7 | 13 |
| 450 | 18000 | 100x237 | 48.0 | 6 | 11 |
| 450 | 22000 | 89x236 | 48.0 | 5 | 9 |
| 500 | 1000 | 51x95 | 5.6 | 140 | 270 |
| 500 | 1000 | 51x110 | 6.0 | 140 | 270 |
| 500 | 1000 | 63.5x80 | 6.0 | 140 | 270 |
| 500 | 1200 | 51x95 | 7.1 | 120 | 220 |
| 500 | 1200 | 51x115 | 8.0 | 120 | 220 |
| 500 | 1200 | 63.5x85 | 8.1 | 120 | 220 |
| 500 | 1500 | 51x100 | 7.2 | 95 | 180 |
| 500 | 1500 | 51x115 | 7.5 | 95 | 180 |
| 500 | 1500 | 63.5x90 | 7.5 | 95 | 180 |
| 500 | 1500 | 63.5x105 | 7.8 | 95 | 180 |
| 500 | 1800 | 51x130 | 8.3 | 79 | 150 |
| 500 | 1800 | 63.5x90 | 8.2 | 79 | 150 |
| 500 | 1800 | 63.5x115 | 8.6 | 79 | 150 |
| 500 | 2200 | 51x143 | 12.1 | 63 | 120 |
| 500 | 2200 | 51x150 | 12.5 | 63 | 120 |
| 500 | 2200 | 63.5x105 | 11.5 | 63 | 120 |
| 500 | 2200 | 63.5x115 | 12.2 | 63 | 120 |
| 500 | 2700 | 63.5x115 | 13.2 | 52 | 98 |
| 500 | 2700 | 63.5x143 | 13.8 | 52 | 98 |
| 500 | 2700 | 76.2x90 | 12.2 | 52 | 98 |
| 500 | 2700 | 76.2x110 | 13.1 | 52 | 98 |
| 500 | 3300 | 63.5x130 | 14.3 | 42 | 80 |
| 500 | 3300 | 63.5x150 | 15.1 | 42 | 80 |
| 500 | 3300 | 76.2x105 | 15.1 | 42 | 80 |
| 500 | 3300 | 76.2x115 | 16.0 | 42 | 80 |
| 500 | 3900 | 63.5x170 | 17.2 | 36 | 68 |
| 500 | 3900 | 76.2x115 | 17.5 | 36 | 68 |
| 500 | 3900 | 76.2x130 | 18.2 | 36 | 68 |
| 500 | 3900 | 89x90 | 17.8 | 36 | 68 |
| 500 | 3900 | 89x120 | 19.5 | 36 | 68 |
| 500 | 4700 | 76.2x135 | 20.5 | 30 | 56 |
| 500 | 4700 | 76.2x150 | 21.8 | 30 | 56 |
| 500 | 4700 | 89x105 | 20.0 | 30 | 56 |
| 500 | 4700 | 89x130 | 22.0 | 30 | 56 |
| 500 | 5600 | 76.2x143 | 20.0 | 25 | 47 |
| 500 | 5600 | 76.2x170 | 20.8 | 25 | 47 |
| 500 | 5600 | 89x115 | 18.2 | 25 | 47 |
| 500 | 5600 | 89x130 | 19.5 | 25 | 47 |
| 500 | 6800 | 76.2x180 | 31.0 | 21 | 39 |
| 500 | 6800 | 76.2x190 | 31.5 | 21 | 39 |
| 500 | 6800 | 89x143 | 30.6 | 21 | 39 |
| 500 | 6800 | 89x170 | 31.8 | 21 | 39 |
| 500 | 8200 | 76.2x220 | 31.8 | 17 | 32 |
| 500 | 8200 | 89x155 | 32.0 | 17 | 32 |
| 500 | 8200 | 89x175 | 33.0 | 17 | 32 |
| 500 | 8200 | 100x175 | 34.1 | 17 | 32 |
| 500 | 10000 | 89x190 | 38.3 | 14 | 27 |
| 500 | 10000 | 89x220 | 39.5 | 14 | 27 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 10000 | 100x190 | 41.5 | 14 | 27 |
| 500 | 12000 | 89x220 | 39.1 | 12 | 22 |
| 500 | 12000 | 89x240 | 40.5 | 12 | 22 |
| 500 | 12000 | 100x210 | 41.6 | 12 | 22 |
| 500 | 12000 | 100x240 | 42.4 | 12 | 22 |
| 500 | 15000 | 100x250 | 43.5 | 9 | 18 |
| 550 | 1200 | 51x110 | 6.4 | 120 | 220 |
| 550 | 1200 | 63.5x110 | 8.0 | 120 | 220 |
| 550 | 1500 | 51x130 | 7.7 | 95 | 180 |
| 550 | 1500 | 63.5x130 | 9.0 | 95 | 180 |
| 550 | 1800 | 63.5x105 | 8.7 | 79 | 150 |
| 550 | 1800 | 63.5x120 | 9.0 | 79 | 150 |
| 550 | 1800 | 76.2x110 | 10.0 | 79 | 150 |
| 550 | 2200 | 63.5x120 | 10.3 | 63 | 120 |
| 550 | 2200 | 76.2x130 | 13.0 | 63 | 120 |
| 550 | 2700 | 63.5x150 | 12.5 | 52 | 98 |
| 550 | 2700 | 76.2x105 | 12.3 | 52 | 98 |
| 550 | 2700 | 76.2x155 | 16.0 | 52 | 98 |
| 550 | 3300 | 63.5x170 | 15.2 | 42 | 80 |
| 550 | 3300 | 76.2x130 | 15.6 | 42 | 80 |
| 550 | 3300 | 76.2x155 | 17.0 | 42 | 80 |
| 550 | 3900 | 76.2x140 | 18.4 | 36 | 68 |
| 550 | 3900 | 89x150 | 21.0 | 36 | 68 |
| 550 | 4700 | 76.2x170 | 22.2 | 30 | 56 |
| 550 | 4700 | 89x130 | 23.2 | 30 | 56 |
| 550 | 4700 | 89x170 | 25.0 | 30 | 56 |
| 550 | 5600 | 76.2x190 | 25.0 | 25 | 47 |
| 550 | 5600 | 89x150 | 24.5 | 25 | 47 |
| 550 | 5600 | 89x190 | 27.2 | 25 | 47 |
| 550 | 6800 | 89x170 | 27.5 | 21 | 39 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 550 | 6800 | 89x190 | 28.9 | 21 | 39 |
| 550 | 8200 | 89x220 | 36.5 | 17 | 32 |
| 550 | 8200 | 100x170 | 35.0 | 17 | 32 |
| 550 | 8200 | 100x220 | 40.0 | 17 | 32 |
| 550 | 10000 | 89x240 | 42.5 | 14 | 27 |
| 550 | 10000 | 100x200 | 42.4 | 14 | 27 |
| 550 | 10000 | 100x250 | 43.0 | 14 | 27 |
| 600 | 1200 | 63.5x95 | 7.0 | 150 | 280 |
| 600 | 1500 | 63.5x110 | 8.4 | 120 | 220 |
| 600 | 1800 | 63.5x125 | 9.7 | 95 | 180 |
| 600 | 1800 | 76.2x95 | 9.5 | 95 | 180 |
| 600 | 2200 | 63.5x145 | 11.4 | 79 | 150 |
| 600 | 2200 | 76.2x110 | 11.2 | 79 | 150 |
| 600 | 2700 | 63.5x170 | 13.5 | 63 | 120 |
| 600 | 2700 | 76.2x125 | 13.2 | 63 | 120 |
| 600 | 3300 | 76.2x145 | 15.5 | 53 | 100 |
| 600 | 3900 | 76.2x170 | 21.1 | 45 | 85 |
| 600 | 3900 | 89x130 | 19.8 | 45 | 85 |
| 600 | 4700 | 76.2x190 | 22.5 | 37 | 71 |
| 600 | 4700 | 89x150 | 24.0 | 37 | 71 |
| 600 | 5600 | 89x170 | 26.0 | 31 | 59 |
| 650 | 1000 | 63.5x100 | 7.2 | 170 | 330 |
| 650 | 1200 | 63.5x110 | 8.0 | 150 | 280 |
| 650 | 1500 | 63.5x130 | 9.2 | 120 | 220 |
| 650 | 1800 | 63.5x150 | 10.5 | 95 | 180 |
| 650 | 2200 | 63.5x170 | 12.3 | 79 | 150 |
| 650 | 2700 | 76.2x150 | 14.5 | 63 | 120 |
| 650 | 3300 | 76.2x170 | 16.8 | 53 | 100 |
| 650 | 3900 | 89x155 | 22.0 | 45 | 85 |
| 650 | 4700 | 89x190 | 28.0 | 37 | 71 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RU Series 105°C

Features

Extremely Long useful life

Applications

- ◆ High reliability
- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Long useful life
- ◆ High reliability
- ◆ High reliability current capability
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | | |
|--|--|-------------------------|--|
| Operating Temperature Range | -40 to +85°C | | -25 to +85°C |
| Rated voltage V_R | 160 to 450 V DC | | 500 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | |
| Rated capacitance C_R | 1000 to 33000 μF | | 820 to 10000 μF |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | |
| Leakage Current I_{leak} (+20°C.max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | |
| Dissipation Factor (tan δ , at 20°C, 120Hz) | Less than the value under table(%) | | |
| | Working Voltage(VDC) | 160~450 | 500~550 ≥ 600 |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | | |
| | d ≥ 63.5 mm: approx. 20 nH | | |
| | Capacitors with low-inductance design: | | |
| | d ≥ 63.5 mm: approx. 15 nH | | |
| Useful life 85°C; $V_R, I_{AC,R}$ | >12000 h | Requirements: | |
| | | $\Delta C/C$ | $\leq \pm 15\%$ of initial value |
| Voltage Endurance test 85°C; V_R | 2000 h | Post test requirements: | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value |
| | | tan δ | ≤ 1.3 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | |
| | $V_R(V)$ | 160-450 | ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 |
| Sectional specification | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - |
| | IEC 60384-4 and JIS-C-5101 | | |

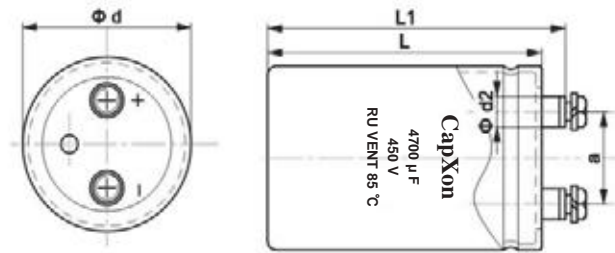
Screw

Multiplier for Ripple Current vs. Frequency

| | | | | | |
|---------------|-----|-----|-----|-----|-----------|
| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

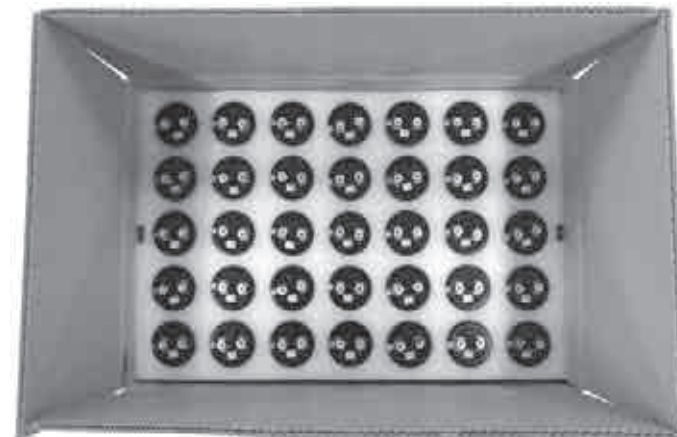
Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|---------|-------------------|---------------------|-------|
| | d±2 | L±3 | L ₁ ±3 | d ₂ max. | a±0.5 |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 35 | ≤70mm | 120 |
| | >70mm | 60 |
| 42 | ≤70mm | 120 |
| | >70mm | 60 |
| 51 | ≤70mm | 70 |
| | >70mm | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

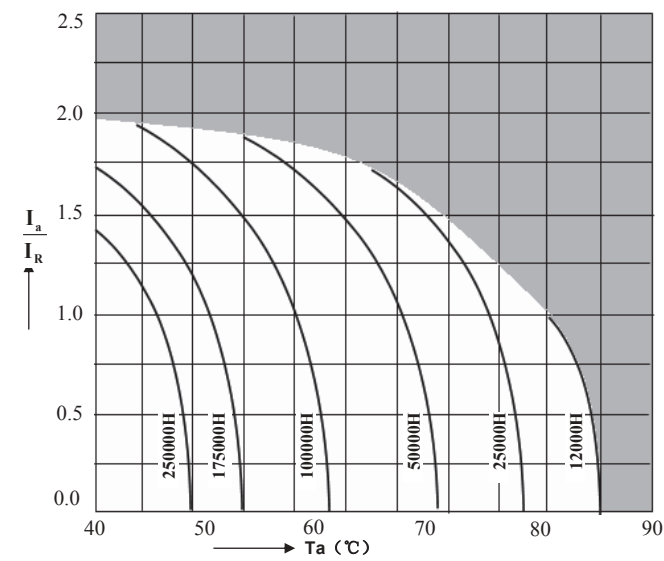
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 200 | 3300 | 51x80 | 8.6 | 33 | 60 |
| 200 | 3900 | 51x95 | 9.8 | 28 | 51 |
| 200 | 4700 | 51x105 | 11.3 | 24 | 42 |
| 200 | 4700 | 63.5x80 | 11.4 | 24 | 42 |
| 200 | 5600 | 51x115 | 12.4 | 20 | 36 |
| 200 | 5600 | 63.5x95 | 12.9 | 20 | 36 |
| 200 | 6800 | 63.5x95 | 14.0 | 16 | 29 |
| 200 | 8200 | 63.5x115 | 17.6 | 13 | 24 |
| 200 | 8200 | 76.2x95 | 18.0 | 13 | 24 |
| 200 | 10000 | 63.5x130 | 19.8 | 11 | 20 |
| 200 | 10000 | 76.2x105 | 20.0 | 11 | 20 |
| 200 | 12000 | 76.2x115 | 22.3 | 9 | 17 |
| 200 | 15000 | 76.2x140 | 27.8 | 7 | 13 |
| 200 | 15000 | 89x120 | 28.4 | 7 | 13 |
| 200 | 18000 | 76.2x155 | 30.5 | 6 | 11 |
| 200 | 18000 | 89x140 | 31.8 | 6 | 11 |
| 200 | 22000 | 76.2x190 | 34.6 | 5 | 9 |
| 200 | 22000 | 89x170 | 35.9 | 5 | 9 |
| 200 | 27000 | 76.2x220 | 39.4 | 4 | 7 |
| 200 | 27000 | 89x195 | 40.6 | 4 | 7 |
| 200 | 33000 | 89x220 | 45.9 | 3 | 6 |
| 250 | 2700 | 51x80 | 7.3 | 41 | 74 |
| 250 | 3300 | 51x80 | 8.9 | 33 | 60 |
| 250 | 3900 | 51x105 | 9.9 | 28 | 51 |
| 250 | 3900 | 63.5x80 | 10.0 | 28 | 51 |
| 250 | 4700 | 51x130 | 11.6 | 24 | 42 |
| 250 | 4700 | 63.5x95 | 11.7 | 24 | 42 |
| 250 | 5600 | 63.5x95 | 12.3 | 20 | 36 |
| 250 | 6800 | 63.5x115 | 15.4 | 16 | 29 |
| 250 | 6800 | 76.2x95 | 15.8 | 16 | 29 |
| 250 | 8200 | 63.5x130 | 17.4 | 13 | 24 |
| 250 | 8200 | 76.2x105 | 17.6 | 13 | 24 |
| 250 | 10000 | 76.2x115 | 20.2 | 11 | 20 |
| 250 | 10000 | 89x120 | 22.5 | 11 | 20 |
| 250 | 12000 | 76.2x140 | 24.2 | 9 | 17 |
| 250 | 12000 | 89x120 | 24.7 | 9 | 17 |
| 250 | 15000 | 76.2x160 | 27.5 | 7 | 13 |
| 250 | 15000 | 89x140 | 28.3 | 7 | 13 |
| 250 | 18000 | 76.2x190 | 30.6 | 6 | 11 |
| 250 | 18000 | 89x170 | 31.7 | 6 | 11 |
| 250 | 22000 | 76.2x220 | 34.8 | 5 | 9 |
| 250 | 22000 | 89x195 | 35.9 | 5 | 9 |
| 250 | 27000 | 89x220 | 40.8 | 4 | 7 |
| 350 | 1500 | 51x80 | 6.4 | 72 | 130 |
| 350 | 1800 | 51x80 | 9.5 | 61 | 110 |
| 350 | 2200 | 51x80 | 9.7 | 50 | 90 |
| 350 | 2200 | 51x95 | 10.8 | 50 | 90 |
| 350 | 2200 | 63.5x80 | 11.3 | 50 | 90 |
| 350 | 2700 | 51x95 | 12.0 | 41 | 74 |
| 350 | 2700 | 63.5x80 | 12.6 | 41 | 74 |
| 350 | 3300 | 51x115 | 14.3 | 33 | 60 |
| 350 | 3300 | 63.5x90 | 14.5 | 33 | 60 |
| 350 | 3900 | 51x130 | 16.2 | 28 | 51 |
| 350 | 3900 | 63.5x95 | 16.3 | 28 | 51 |
| 350 | 3900 | 63.5x105 | 16.6 | 28 | 51 |
| 350 | 4700 | 63.5x105 | 17.9 | 24 | 42 |
| 350 | 4700 | 76.2x95 | 19.3 | 24 | 42 |
| 350 | 5600 | 63.5x120 | 19.4 | 20 | 36 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 350 | 5600 | 76.2x95 | 20.2 | 20 | 36 |
| 350 | 6800 | 63.5x140 | 23.2 | 16 | 29 |
| 350 | 6800 | 76.2x105 | 23.1 | 16 | 29 |
| 350 | 6800 | 89x100 | 25.0 | 16 | 29 |
| 350 | 8200 | 76.2x115 | 25.1 | 13 | 24 |
| 350 | 8200 | 89x120 | 29.6 | 13 | 24 |
| 350 | 10000 | 76.2x140 | 32.1 | 11 | 20 |
| 350 | 10000 | 89x120 | 33.2 | 11 | 20 |
| 350 | 12000 | 76.2x170 | 35.3 | 9 | 17 |
| 350 | 12000 | 89x140 | 37.3 | 9 | 17 |
| 350 | 15000 | 76.2x190 | 41.0 | 7 | 13 |
| 350 | 15000 | 89x160 | 41.9 | 7 | 13 |
| 350 | 18000 | 89x195 | 48.1 | 6 | 11 |
| 350 | 22000 | 89x220 | 50.5 | 5 | 9 |
| 400 | 1000 | 51x80 | 4.6 | 110 | 200 |
| 400 | 1500 | 51x80 | 7.0 | 72 | 130 |
| 400 | 1800 | 51x95 | 10.0 | 61 | 110 |
| 400 | 2200 | 51x100 | 11.2 | 50 | 90 |
| 400 | 2200 | 63.5x80 | 11.6 | 50 | 90 |
| 400 | 2700 | 51x115 | 13.2 | 41 | 74 |
| 400 | 2700 | 63.5x95 | 13.9 | 41 | 74 |
| 400 | 3300 | 51x130 | 14.6 | 33 | 60 |
| 400 | 3300 | 63.5x105 | 15.0 | 33 | 60 |
| 400 | 3900 | 63.5x105 | 16.1 | 28 | 51 |
| 400 | 3900 | 76.2x95 | 18.3 | 28 | 51 |
| 400 | 4700 | 63.5x130 | 20.2 | 24 | 42 |
| 400 | 4700 | 76.2x95 | 20.0 | 24 | 42 |
| 400 | 5600 | 63.5x140 | 21.5 | 20 | 36 |
| 400 | 5600 | 76.2x115 | 21.8 | 20 | 36 |
| 400 | 6800 | 76.2x130 | 25.2 | 16 | 29 |
| 400 | 6800 | 89x120 | 27.3 | 16 | 29 |
| 400 | 8200 | 76.2x155 | 29.2 | 13 | 24 |
| 400 | 8200 | 89x120 | 29.1 | 13 | 24 |
| 400 | 10000 | 76.2x165 | 32.5 | 11 | 20 |
| 400 | 10000 | 89x140 | 34.7 | 11 | 20 |
| 400 | 12000 | 76.2x220 | 39.5 | 8 | 17 |
| 400 | 12000 | 89x160 | 38.0 | 8 | 17 |
| 400 | 15000 | 76.2x230 | 42.1 | 7 | 13 |
| 400 | 15000 | 89x180 | 41.6 | 7 | 13 |
| 400 | 18000 | 89x220 | 46.4 | 6 | 11 |
| 450 | 1200 | 51x80 | 7.1 | 94 | 170 |
| 450 | 1500 | 51x80 | 7.8 | 72 | 130 |
| 450 | 1800 | 51x105 | 9.6 | 61 | 110 |
| 450 | 1800 | 63.5x80 | 9.8 | 61 | 110 |
| 450 | 2200 | 51x115 | 11.0 | 50 | 90 |
| 450 | 2200 | 63.5x95 | 11.4 | 50 | 90 |
| 450 | 2700 | 63.5x95 | 12.6 | 41 | 74 |
| 450 | 2700 | 76.2x95 | 14.2 | 41 | 74 |
| 450 | 3300 | 63.5x115 | 14.4 | 33 | 60 |
| 450 | 3300 | 76.2x95 | 15.0 | 33 | 60 |
| 450 | 3900 | 63.5x130 | 16.2 | 28 | 51 |
| 450 | 3900 | 76.2x105 | 16.3 | 28 | 51 |
| 450 | 4700 | 76.2x115 | 20.4 | 24 | 42 |
| 450 | 5600 | 76.2x130 | 22.9 | 20 | 36 |
| 450 | 5600 | 89x120 | 24.2 | 20 | 36 |
| 450 | 6800 | 76.2x155 | 27.3 | 16 | 29 |
| 450 | 8200 | 76.2x190 | 29.6 | 13 | 24 |
| 450 | 8200 | 89x170 | 30.7 | 13 | 24 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 10000 | 76.2x220 | 32.6 | 11 | 20 |
| 450 | 10000 | 89x170 | 33.4 | 11 | 20 |
| 450 | 12000 | 89x195 | 37.7 | 9 | 17 |
| 500 | 820 | 51x80 | 5.1 | 180 | 320 |
| 500 | 1000 | 51x95 | 5.8 | 150 | 270 |
| 500 | 1200 | 51x95 | 6.6 | 120 | 220 |
| 500 | 1200 | 63.5x80 | 7.0 | 120 | 220 |
| 500 | 1500 | 51x115 | 7.7 | 100 | 180 |
| 500 | 1500 | 63.5x80 | 7.8 | 100 | 180 |
| 500 | 1800 | 51x130 | 8.8 | 83 | 150 |
| 500 | 1800 | 63.5x95 | 8.8 | 83 | 150 |
| 500 | 2200 | 63.5x105 | 10.0 | 67 | 120 |
| 500 | 2700 | 63.5x115 | 11.5 | 55 | 98 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 2700 | 76.2x95 | 11.9 | 55 | 98 |
| 500 | 3300 | 63.5x140 | 13.2 | 45 | 80 |
| 500 | 3300 | 76.2x115 | 13.5 | 45 | 80 |
| 500 | 3900 | 76.2x130 | 15.1 | 38 | 68 |
| 500 | 4700 | 76.2x120 | 18.7 | 31 | 56 |
| 500 | 5600 | 76.2x165 | 19.9 | 26 | 47 |
| 500 | 5600 | 89x140 | 20.8 | 26 | 47 |
| 500 | 6800 | 76.2x190 | 22.8 | 22 | 39 |
| 500 | 6800 | 89x170 | 23.5 | 22 | 39 |
| 500 | 8200 | 76.2x220 | 26.2 | 18 | 32 |
| 500 | 8200 | 89x195 | 26.6 | 18 | 32 |
| 500 | 10000 | 89x220 | 30.4 | 15 | 27 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RJ Series 85°C

Features

Long useful life

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Long useful life
- ◆ High reliability
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | | | | | | |
|--|---|----------------------|---------|------------------------------------|----|------------------------------------|----|
| Operating Temperature Range | -40 to +85°C | | | | | | |
| Rated voltage V_R | 350 to 450 V DC | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | |
| Rated capacitance C_R | 150 to 22000 μF | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | |
| | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>350~450</td> </tr> <tr> <td>D.F. (%)max.</td> <td>15</td> </tr> </table> | Working Voltage(VDC) | 350~450 | D.F. (%)max. | 15 | | |
| Working Voltage(VDC) | 350~450 | | | | | | |
| D.F. (%)max. | 15 | | | | | | |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | | | | | | |
| | d \geq 63.5 mm: approx. 20 nH | | | | | | |
| Useful life 85°C; $V_R, I_{AC, R}$ | Capacitors with low-inductance design: d \geq 63.5 mm: approx. 15 nH | | | | | | |
| | Requirements: $\Delta C/C \leq \pm 15\%$ of initial value $\tan \delta \leq 1.75$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | |
| Voltage Endurance test 85°C; V_R | 2000 h | | | | | | |
| | Post test requirements: $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1.3$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | |
| | <table border="1"> <tr> <td>$V_R(V)$</td> <td>350-450</td> </tr> <tr> <td>$Z_{-25^\circ C} / Z_{20^\circ C}$</td> <td>4</td> </tr> <tr> <td>$Z_{-40^\circ C} / Z_{20^\circ C}$</td> <td>10</td> </tr> </table> | $V_R(V)$ | 350-450 | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 |
| | $V_R(V)$ | 350-450 | | | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | | | | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | |

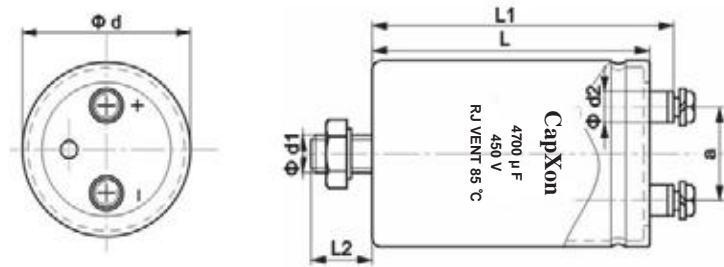
Screw

Multiplier for Ripple Current vs. Frequency

| | | | | | |
|---------------|-----|-----|-----|-----|-----------|
| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Threaded stud mounting



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

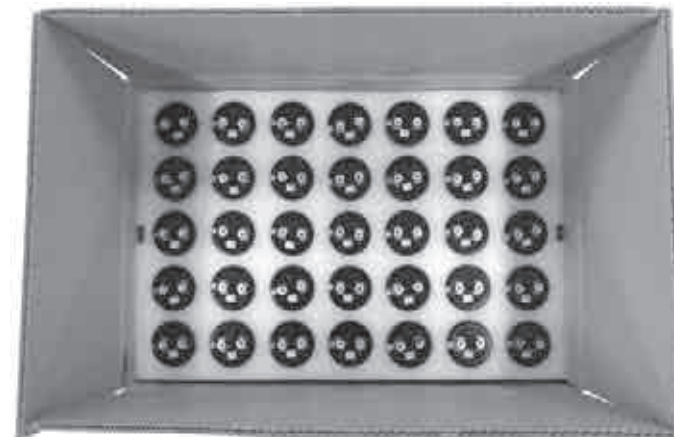
Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | | | |
|----------|---------------------------------------|-----------|-------------|---------------|-------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $L_2 + / - 1$ | d_1 | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 16 | M12 | 10.3 | 28.6 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 10.3 | 31.8 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 16 | M12 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

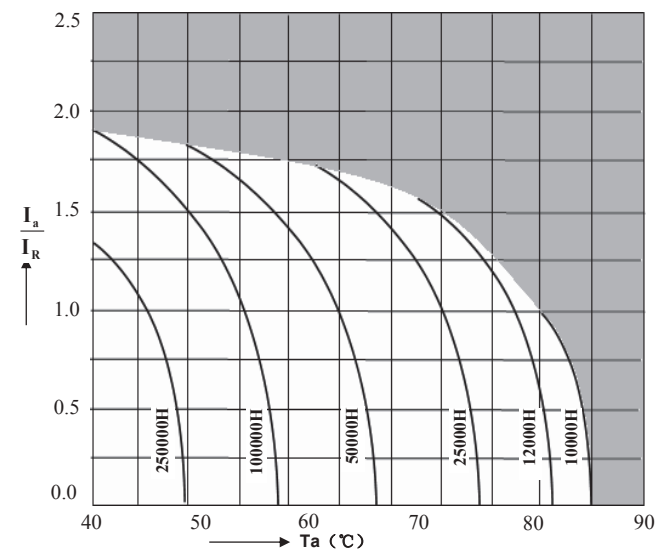
| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 350 | 2700 | 63.5x80 | 12.8 | 42 | 74 |
| 350 | 3300 | 63.5x100 | 14.2 | 34 | 60 |
| 350 | 3900 | 63.5x105 | 14.6 | 29 | 51 |
| 350 | 4700 | 63.5x120 | 15.0 | 24 | 42 |
| 350 | 4700 | 63.5x140 | 15.5 | 24 | 42 |
| 350 | 4700 | 76.2x100 | 19.7 | 24 | 42 |
| 350 | 5600 | 63.5x140 | 21.5 | 20 | 36 |
| 350 | 6800 | 76.2x120 | 22.5 | 17 | 29 |
| 350 | 6800 | 76.2x140 | 24.0 | 17 | 29 |
| 350 | 6800 | 89x100 | 23.0 | 17 | 29 |
| 350 | 8200 | 76.2x160 | 26.0 | 14 | 24 |
| 350 | 10000 | 76.2x160 | 27.5 | 11 | 20 |
| 350 | 10000 | 89x120 | 26.0 | 11 | 20 |
| 350 | 12000 | 76.2x180 | 29.0 | 10 | 17 |
| 350 | 12000 | 76.2x220 | 32.0 | 10 | 17 |
| 350 | 15000 | 89x160 | 34.0 | 8 | 13 |
| 350 | 15000 | 89x220 | 39.0 | 8 | 13 |
| 350 | 18000 | 89x220 | 40.0 | 6 | 11 |
| 350 | 22000 | 89x230 | 42.0 | 5 | 9 |
| 400 | 2700 | 63.5x105 | 10.8 | 42 | 74 |
| 400 | 3300 | 63.5x100 | 11.0 | 34 | 60 |
| 400 | 3300 | 63.5x120 | 12.0 | 34 | 60 |
| 400 | 3900 | 76.2x100 | 14.0 | 29 | 51 |
| 400 | 3900 | 76.2x105 | 14.3 | 29 | 51 |
| 400 | 4700 | 76.2x100 | 15.7 | 24 | 42 |
| 400 | 4700 | 76.2x120 | 17.0 | 24 | 42 |
| 400 | 5600 | 76.2x140 | 18.8 | 20 | 36 |
| 400 | 6800 | 76.2x140 | 22.0 | 17 | 29 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 6800 | 76.2x160 | 23.0 | 17 | 29 |
| 400 | 8200 | 76.2x160 | 23.5 | 14 | 24 |
| 400 | 10000 | 76.2x160 | 24.0 | 11 | 20 |
| 400 | 10000 | 89x130 | 25.0 | 11 | 20 |
| 400 | 12000 | 89x160 | 25.5 | 10 | 17 |
| 400 | 12000 | 89x220 | 28.5 | 10 | 17 |
| 400 | 15000 | 76.2x230 | 33.0 | 8 | 13 |
| 400 | 15000 | 89x180 | 32.0 | 8 | 13 |
| 400 | 15000 | 89x220 | 35.0 | 8 | 13 |
| 400 | 18000 | 89x240 | 38.0 | 6 | 11 |
| 450 | 1500 | 63.5x80 | 11.4 | 74 | 130 |
| 450 | 2200 | 63.5x100 | 12.5 | 52 | 90 |
| 450 | 2200 | 63.5x105 | 12.8 | 52 | 90 |
| 450 | 2200 | 63.5x120 | 13.5 | 52 | 90 |
| 450 | 2700 | 76.2x105 | 14.6 | 42 | 74 |
| 450 | 3300 | 63.5x120 | 15.0 | 34 | 60 |
| 450 | 3300 | 63.5x140 | 16.0 | 34 | 60 |
| 450 | 3300 | 76.2x120 | 17.7 | 34 | 60 |
| 450 | 3900 | 76.2x120 | 18.0 | 29 | 51 |
| 450 | 3900 | 76.2x140 | 19.0 | 29 | 51 |
| 450 | 4700 | 76.2x120 | 18.3 | 24 | 42 |
| 450 | 4700 | 76.2x140 | 19.6 | 24 | 42 |
| 450 | 4700 | 76.2x160 | 20.5 | 24 | 42 |
| 450 | 5600 | 76.2x160 | 21.0 | 20 | 36 |
| 450 | 6800 | 76.2x160 | 22.0 | 17 | 29 |
| 450 | 8200 | 76.2x220 | 25.6 | 14 | 24 |
| 450 | 10000 | 76.2x220 | 26.0 | 11 | 20 |
| 450 | 10000 | 89x170 | 26.0 | 11 | 20 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RY Series 85°C

Features

Extremely Long useful life

Applications

- ◆ High reliability
- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Long useful life
- ◆ High reliability
- ◆ High reliability current capability
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | | | | | | |
|--|---|----------------------|---------|------------------------------------|----|------------------------------------|----|
| Operating Temperature Range | -40 to +85°C | | | | | | |
| Rated voltage V_R | 350 to 450 V DC | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | |
| Rated capacitance C_R | 150 to 22000 μF | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | |
| | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>350~450</td> </tr> <tr> <td>D.F. (%)max.</td> <td>15</td> </tr> </table> | Working Voltage(VDC) | 350~450 | D.F. (%)max. | 15 | | |
| Working Voltage(VDC) | 350~450 | | | | | | |
| D.F. (%)max. | 15 | | | | | | |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | | | | | | |
| | d \geq 63.5 mm: approx. 20 nH Capacitors with low-inductance design: d \geq 63.5 mm: approx. 15 nH | | | | | | |
| Useful life 85°C; $V_R, I_{AC, R}$ | >10000 h | | | | | | |
| | Requirements: $\Delta C/C \leq \pm 15\%$ of initial value $\tan \delta \leq 1.75$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | |
| Voltage Endurance test 85°C; V_R | 2000 h | | | | | | |
| | Post test requirements: $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1.3$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | |
| | <table border="1"> <tr> <td>$V_R(V)$</td> <td>350-450</td> </tr> <tr> <td>$Z_{-25^\circ C} / Z_{20^\circ C}$</td> <td>4</td> </tr> <tr> <td>$Z_{-40^\circ C} / Z_{20^\circ C}$</td> <td>10</td> </tr> </table> | $V_R(V)$ | 350-450 | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 |
| | $V_R(V)$ | 350-450 | | | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | | | | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | |

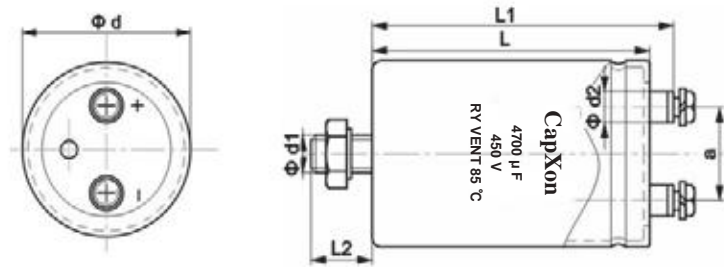
Multiplier for Ripple Current vs. Frequency

| | | | | | |
|---------------|-----|-----|-----|-----|-----------|
| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Screw

Dimensional drawings

Threaded stud mounting



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | | | |
|----------|---------------------------------------|-----------|-------------|---------------|-------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $L_2 + / - 1$ | d_1 | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 16 | M12 | 10.3 | 28.6 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 10.3 | 31.8 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 16 | M12 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

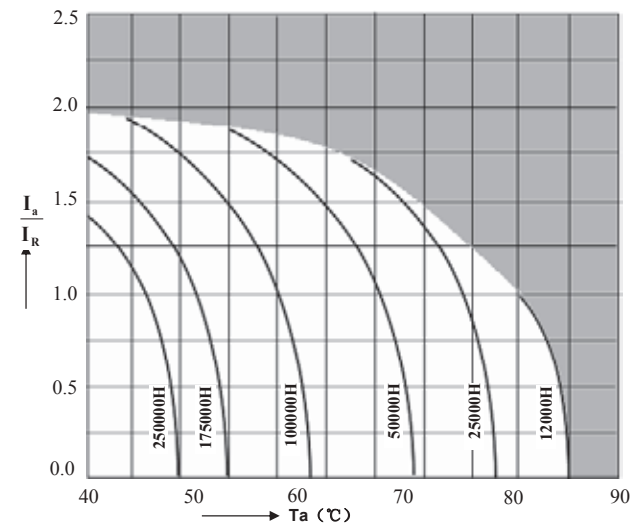
| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 350 | 2700 | 63.5x80 | 16.0 | 41 | 74 |
| 350 | 3300 | 63.5x100 | 19.0 | 33 | 60 |
| 350 | 3900 | 63.5x105 | 21.0 | 28 | 51 |
| 350 | 4700 | 63.5x120 | 22.0 | 24 | 42 |
| 350 | 4700 | 63.5x140 | 23.5 | 24 | 42 |
| 350 | 4700 | 76.2x100 | 24.0 | 24 | 42 |
| 350 | 5600 | 63.5x140 | 28.0 | 20 | 36 |
| 350 | 5600 | 76.2x105 | 30.0 | 20 | 36 |
| 350 | 6800 | 76.2x120 | 31.0 | 16 | 29 |
| 350 | 6800 | 76.2x140 | 33.0 | 16 | 29 |
| 350 | 6800 | 89x100 | 34.0 | 16 | 29 |
| 350 | 8200 | 76.2x140 | 36.0 | 13 | 24 |
| 350 | 8200 | 76.2x160 | 38.0 | 13 | 24 |
| 350 | 10000 | 76.2x160 | 42.0 | 11 | 20 |
| 350 | 10000 | 89x120 | 42.0 | 11 | 20 |
| 350 | 12000 | 76.2x180 | 45.0 | 9 | 17 |
| 350 | 12000 | 76.2x220 | 49.0 | 9 | 17 |
| 350 | 12000 | 89x145 | 51.0 | 9 | 17 |
| 350 | 15000 | 76.2x220 | 53.0 | 7 | 13 |
| 350 | 15000 | 89x160 | 53.0 | 7 | 13 |
| 350 | 15000 | 89x220 | 55.0 | 7 | 13 |
| 350 | 18000 | 89x220 | 58.0 | 6 | 11 |
| 350 | 22000 | 89x230 | 60.0 | 5 | 9 |
| 400 | 2700 | 63.5x105 | 17.0 | 41 | 74 |
| 400 | 3300 | 63.5x100 | 20.0 | 33 | 60 |
| 400 | 3300 | 63.5x120 | 21.5 | 33 | 60 |
| 400 | 3900 | 76.2x100 | 23.0 | 28 | 51 |
| 400 | 3900 | 76.2x105 | 23.5 | 28 | 51 |
| 400 | 4700 | 76.2x100 | 26.0 | 24 | 42 |
| 400 | 4700 | 76.2x120 | 28.0 | 24 | 42 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 5600 | 76.2x140 | 30.0 | 20 | 36 |
| 400 | 6800 | 76.2x140 | 33.0 | 16 | 29 |
| 400 | 6800 | 76.2x160 | 35.0 | 16 | 29 |
| 400 | 8200 | 76.2x160 | 36.5 | 13 | 24 |
| 400 | 10000 | 76.2x190 | 38.0 | 11 | 20 |
| 400 | 10000 | 89x160 | 39.0 | 11 | 20 |
| 400 | 12000 | 89x160 | 41.0 | 9 | 17 |
| 400 | 12000 | 89x220 | 46.0 | 9 | 17 |
| 400 | 15000 | 76.2x230 | 48.0 | 7 | 13 |
| 400 | 15000 | 89x180 | 52.0 | 7 | 13 |
| 400 | 15000 | 89x220 | 57.0 | 7 | 13 |
| 400 | 18000 | 89x240 | 60.0 | 6 | 11 |
| 450 | 1500 | 63.5x80 | 13.0 | 72 | 130 |
| 450 | 2200 | 63.5x100 | 14.0 | 50 | 90 |
| 450 | 2200 | 63.5x105 | 15.0 | 50 | 90 |
| 450 | 2200 | 63.5x120 | 16.0 | 50 | 90 |
| 450 | 2700 | 76.2x105 | 18.0 | 41 | 74 |
| 450 | 3300 | 63.5x140 | 23.0 | 33 | 60 |
| 450 | 3300 | 76.2x100 | 23.0 | 33 | 60 |
| 450 | 3300 | 76.2x120 | 25.0 | 33 | 60 |
| 450 | 3900 | 76.2x120 | 25.0 | 28 | 51 |
| 450 | 3900 | 76.2x140 | 26.7 | 28 | 51 |
| 450 | 4700 | 76.2x120 | 27.0 | 24 | 42 |
| 450 | 4700 | 76.2x140 | 28.0 | 24 | 42 |
| 450 | 4700 | 76.2x160 | 29.0 | 24 | 42 |
| 450 | 5600 | 76.2x160 | 31.5 | 20 | 36 |
| 450 | 6800 | 76.2x160 | 32.0 | 16 | 29 |
| 450 | 8200 | 76.2x220 | 36.0 | 13 | 24 |
| 450 | 10000 | 76.2x220 | 40.0 | 11 | 20 |
| 450 | 10000 | 89x170 | 40.0 | 11 | 20 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RK Series 105°C

Features

General capacitors

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Wide temperature range
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|------------------------------------|-----|------------------------------------|------|------|----|----|----|-----|-----|-----|-----|----|----|----|----|-----|-----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated voltage V_R | 10 to 100 V DC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Surge voltage V_S | 1.15 V_R | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated capacitance C_R | 1800 to 1000000 μ F | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μ A), C : Nominal capacitance (μ F), V : Rated voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>ϕ D</th> <th>35</th> <th>51</th> <th>63.5</th> <th>76.2</th> <th>89</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>75</td> <td>100</td> <td>120</td> <td>150</td> <td>180</td> </tr> <tr> <td>16</td> <td>60</td> <td>70</td> <td>80</td> <td>120</td> <td>140</td> </tr> <tr> <td>25</td> <td>40</td> <td>50</td> <td>70</td> <td>80</td> <td>130</td> </tr> <tr> <td>35</td> <td>30</td> <td>50</td> <td>60</td> <td>70</td> <td>90</td> </tr> <tr> <td>40</td> <td>30</td> <td>50</td> <td>60</td> <td>70</td> <td>90</td> </tr> <tr> <td>50</td> <td>25</td> <td>30</td> <td>50</td> <td>60</td> <td>80</td> </tr> <tr> <td>63</td> <td>20</td> <td>25</td> <td>30</td> <td>40</td> <td>60</td> </tr> <tr> <td>80</td> <td>20</td> <td>20</td> <td>25</td> <td>30</td> <td>50</td> </tr> <tr> <td>100</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> <td>30</td> </tr> </tbody> </table> | ϕ D | 35 | 51 | 63.5 | 76.2 | 89 | 10 | 75 | 100 | 120 | 150 | 180 | 16 | 60 | 70 | 80 | 120 | 140 | 25 | 40 | 50 | 70 | 80 | 130 | 35 | 30 | 50 | 60 | 70 | 90 | 40 | 30 | 50 | 60 | 70 | 90 | 50 | 25 | 30 | 50 | 60 | 80 | 63 | 20 | 25 | 30 | 40 | 60 | 80 | 20 | 20 | 25 | 30 | 50 | 100 | 15 | 20 | 25 | 30 | 30 |
| | ϕ D | 35 | 51 | 63.5 | 76.2 | 89 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 10 | 75 | 100 | 120 | 150 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 16 | 60 | 70 | 80 | 120 | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 25 | 40 | 50 | 70 | 80 | 130 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 35 | 30 | 50 | 60 | 70 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 40 | 30 | 50 | 60 | 70 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 50 | 25 | 30 | 50 | 60 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 63 | 20 | 25 | 30 | 40 | 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 | 20 | 20 | 25 | 30 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 15 | 20 | 25 | 30 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Self-inductance ESL | d = 35 mm: approx. 10 nH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d = 51 mm: approx. 15 nH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d \geq 63.5 mm: approx. 20 nH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | Requirements: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | $\Delta C/C \leq \pm 45\%$ of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ESR ≤ 3 times initial specified limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | $I_{leak} \leq$ initial specified limit Failure rate : $\leq 1\%/1000$ hour | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Voltage Endurance test 105°C; V_R | 2000 h | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Post test requirements: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | DC/C $\leq \pm 15\%$ of initial value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ESR ≤ 1.3 times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <tr> <td>$Z_{-25^\circ C} / Z_{20^\circ C}$</td> <td>3</td> </tr> <tr> <td>$Z_{-40^\circ C} / Z_{20^\circ C}$</td> <td>12</td> </tr> </table> | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 3 | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

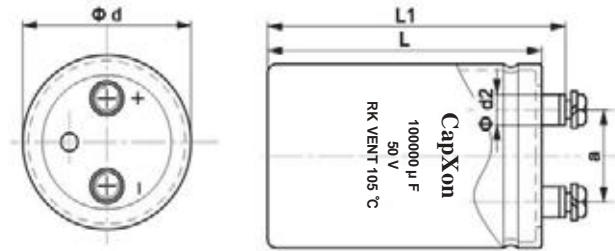
Screw

Multiplier for Ripple Current vs. Frequency

| Rated voltage (V) | Case diameter (Φ) | Frequency(Hz) | | | | |
|-------------------|-------------------|---------------|-----|------|------|------|
| | | 50 | 120 | 1K | 10K | ≥50K |
| 10 to 50 | 35 to 89 | 0.95 | 1 | 1.05 | 1.09 | 1.12 |
| 63 & 80 | 35 | 0.9 | 1 | 1.1 | 1.18 | 1.22 |
| | 50 to 89 | 0.95 | 1 | 1.05 | 1.09 | 1.12 |
| 100 | 35 | 0.8 | 1 | 1.22 | 1.3 | 1.33 |
| | 50 | 0.9 | 1 | 1.1 | 1.18 | 1.22 |
| | 63.5 to 89 | 0.95 | 1 | 1.05 | 1.09 | 1.12 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
M6:Min.reach of screw = 12mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 35 | ≤70mm | 120 |
| | >70mm | 60 |
| 42 | ≤70mm | 120 |
| | >70mm | 60 |
| 51 | ≤70mm | 70 |
| | >70mm | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 10 | 27000 | 35x50 | 4.9 | 20 | 37 |
| 10 | 33000 | 35x50 | 5.1 | 15 | 30 |
| 10 | 39000 | 35x60 | 5.9 | 13 | 26 |
| 10 | 47000 | 35x80 | 7.1 | 12 | 21 |
| 10 | 56000 | 35x80 | 8.0 | 12 | 18 |
| 10 | 68000 | 35x100 | 8.5 | 10 | 18 |
| 10 | 68000 | 51x80 | 8.5 | 10 | 20 |
| 10 | 82000 | 35x100 | 8.9 | 8.0 | 17 |
| 10 | 100000 | 35x120 | 10.7 | 7.5 | 16 |
| 10 | 100000 | 51x80 | 10.7 | 7.5 | 16 |
| 10 | 120000 | 51x80 | 11.0 | 7.2 | 14 |
| 10 | 150000 | 51x100 | 13.2 | 7.0 | 12 |
| 10 | 180000 | 51x120 | 15.7 | 6.8 | 11 |
| 10 | 220000 | 51x120 | 16.8 | 6.5 | 10 |
| 10 | 270000 | 63.5x120 | 19.6 | 6.3 | 9.0 |
| 10 | 330000 | 63.5x120 | 20.5 | 6.0 | 8.5 |
| 10 | 390000 | 76.2x120 | 21.3 | 5.8 | 8.0 |
| 10 | 470000 | 76.2x120 | 22.0 | 5.5 | 7.5 |
| 10 | 560000 | 76.2x140 | 23.6 | 5.3 | 7.0 |
| 10 | 680000 | 89x140 | 26.0 | 5.0 | 6.5 |
| 10 | 680000 | 89x170 | 27.5 | 5.0 | 6.5 |
| 10 | 1000000 | 89x220 | 30.0 | 4.8 | 6.0 |
| 16 | 18000 | 35x50 | 4.2 | 24 | 44 |
| 16 | 22000 | 35x50 | 4.7 | 21 | 36 |
| 16 | 22000 | 35x60 | 4.9 | 21 | 36 |
| 16 | 27000 | 35x50 | 5.5 | 18 | 29 |
| 16 | 33000 | 35x65 | 5.7 | 16 | 24 |
| 16 | 33000 | 35x80 | 6.7 | 16 | 24 |
| 16 | 39000 | 35x65 | 6.8 | 14 | 20 |
| 16 | 47000 | 35x80 | 7.3 | 13 | 18 |
| 16 | 47000 | 35x100 | 8.8 | 13 | 18 |
| 16 | 56000 | 35x100 | 9.0 | 12 | 16 |
| 16 | 68000 | 35x100 | 9.2 | 12 | 15 |
| 16 | 68000 | 51x80 | 9.5 | 12 | 15 |
| 16 | 82000 | 51x80 | 10.7 | 10 | 14 |
| 16 | 100000 | 51x80 | 11.0 | 9.0 | 13 |
| 16 | 100000 | 51x100 | 12.5 | 9.0 | 13 |
| 16 | 120000 | 51x100 | 13.1 | 8.0 | 12 |
| 16 | 150000 | 51x120 | 15.5 | 7.0 | 11 |
| 16 | 180000 | 51x120 | 15.7 | 6.0 | 10 |
| 16 | 220000 | 63.5x120 | 18.0 | 5.5 | 9.5 |
| 16 | 270000 | 63.5x120 | 20.0 | 5.3 | 9.0 |
| 16 | 330000 | 76.2x120 | 21.3 | 5.0 | 8.8 |
| 16 | 390000 | 76.2x120 | 21.5 | 4.8 | 8.5 |
| 16 | 470000 | 76.2x140 | 24.2 | 4.5 | 8.3 |
| 16 | 470000 | 76.2x160 | 25.5 | 4.5 | 8.3 |
| 16 | 470000 | 89x140 | 26.5 | 4.5 | 8.3 |
| 16 | 560000 | 89x140 | 28.1 | 4.2 | 8.0 |
| 16 | 680000 | 89x140 | 28.5 | 4.0 | 7.8 |
| 16 | 1000000 | 89x220 | 35.0 | 3.8 | 7.5 |
| 25 | 10000 | 35x50 | 2.9 | 27 | 53 |
| 25 | 12000 | 35x50 | 3.7 | 23 | 44 |
| 25 | 15000 | 35x50 | 5.3 | 21 | 35 |
| 25 | 15000 | 35x55 | 5.5 | 21 | 35 |
| 25 | 18000 | 35x60 | 5.5 | 19 | 29 |
| 25 | 22000 | 35x60 | 6.5 | 14 | 24 |
| 25 | 22000 | 35x80 | 7.4 | 14 | 24 |
| 25 | 27000 | 35x80 | 8.0 | 12 | 20 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 25 | 33000 | 35x80 | 8.8 | 10 | 18 |
| 25 | 33000 | 35x100 | 9.7 | 10 | 18 |
| 25 | 39000 | 35x100 | 10.0 | 9.0 | 17 |
| 25 | 47000 | 35x105 | 11.0 | 8.0 | 15 |
| 25 | 47000 | 35x120 | 11.7 | 8.0 | 15 |
| 25 | 47000 | 51x80 | 12.0 | 8.0 | 17 |
| 25 | 56000 | 51x80 | 12.5 | 7.0 | 14 |
| 25 | 68000 | 51x80 | 13.0 | 6.0 | 13 |
| 25 | 68000 | 51x100 | 14.3 | 6.0 | 13 |
| 25 | 82000 | 51x100 | 14.6 | 5.5 | 12 |
| 25 | 100000 | 51x105 | 15.0 | 5.0 | 10 |
| 25 | 100000 | 51x120 | 16.0 | 5.0 | 10.0 |
| 25 | 100000 | 63.5x100 | 16.3 | 5.0 | 10.0 |
| 25 | 120000 | 63.5x100 | 17.0 | 4.7 | 9.0 |
| 25 | 150000 | 63.5x105 | 18.0 | 4.5 | 8.0 |
| 25 | 150000 | 63.5x120 | 19.0 | 4.5 | 8.0 |
| 25 | 180000 | 63.5x120 | 19.5 | 4.3 | 7.0 |
| 25 | 220000 | 76.2x105 | 20.0 | 4.0 | 6.0 |
| 25 | 220000 | 76.2x115 | 20.8 | 4.0 | 6.0 |
| 25 | 220000 | 76.2x120 | 21.2 | 4.0 | 6.0 |
| 25 | 270000 | 76.2x120 | 21.7 | 3.7 | 5.0 |
| 25 | 330000 | 76.2x145 | 24.0 | 3.7 | 4.5 |
| 25 | 330000 | 76.2x160 | 25.0 | 3.7 | 4.5 |
| 25 | 330000 | 89x130 | 25.0 | 3.7 | 4.5 |
| 25 | 330000 | 89x140 | 26.0 | 3.7 | 4.5 |
| 25 | 390000 | 89x140 | 26.5 | 3.5 | 4.4 |
| 25 | 470000 | 89x170 | 28.0 | 3.3 | 4.3 |
| 25 | 680000 | 89x220 | 31.0 | 3.0 | 4.2 |
| 35 | 6800 | 35x50 | 2.6 | 30.0 | 59 |
| 35 | 8200 | 35x50 | 3.3 | 25.0 | 49 |
| 35 | 10000 | 35x50 | 3.6 | 20.0 | 40 |
| 35 | 10000 | 35x60 | 3.8 | 20.0 | 40 |
| 35 | 12000 | 35x60 | 4.8 | 19.0 | 33 |
| 35 | 15000 | 35x60 | 5.6 | 17.0 | 27 |
| 35 | 15000 | 35x80 | 6.0 | 17.0 | 27 |
| 35 | 18000 | 35x80 | 6.3 | 15.0 | 22 |
| 35 | 22000 | 35x80 | 7.6 | 13.0 | 18 |
| 35 | 22000 | 35x100 | 7.9 | 13.0 | 18 |
| 35 | 27000 | 35x100 | 8.2 | 11.0 | 15 |
| 35 | 33000 | 35x120 | 10.2 | 9.0 | 13 |
| 35 | 33000 | 51x80 | 10.7 | 9.0 | 13 |
| 35 | 39000 | 51x80 | 11.0 | 7.0 | 12 |
| 35 | 47000 | 51x100 | 12.5 | 5.0 | 11 |
| 35 | 56000 | 51x100 | 13.0 | 4.8 | 10.5 |
| 35 | 68000 | 51x120 | 14.5 | 4.5 | 10.0 |
| 35 | 82000 | 63.5x100 | 14.8 | 4.3 | 9.3 |
| 35 | 100000 | 63.5x120 | 17.6 | 4.1 | 9.0 |
| 35 | 120000 | 63.5x120 | 18.0 | 4.0 | 8.5 |
| 35 | 150000 | 76.2x120 | 20.0 | 3.6 | 8.0 |
| 35 | 180000 | 76.2x120 | 20.5 | 3.5 | 7.5 |
| 35 | 220000 | 76.2x140 | 23.4 | 3.3 | 7.0 |
| 35 | 220000 | 76.2x160 | 25.0 | 3.3 | 7.0 |
| 35 | 220000 | 89x130 | 24.5 | 3.3 | 7.0 |
| 35 | 220000 | 89x140 | 25.0 | 3.3 | 7.0 |
| 35 | 270000 | 89x140 | 25.5 | 3.2 | 6.5 |
| 35 | 330000 | 89x160 | 30.0 | 3.1 | 6.3 |
| 35 | 330000 | 89x170 | 31.0 | 3.1 | 6.3 |
| 35 | 470000 | 89x220 | 34.0 | 3.0 | 6.0 |

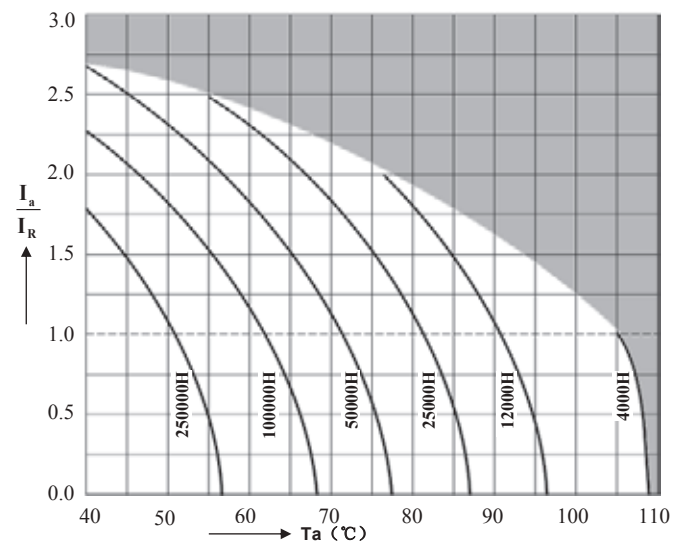
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 40 | 10000 | 35x55 | 5.3 | 17.0 | 38 |
| 40 | 15000 | 35x80 | 7.4 | 12.0 | 23 |
| 40 | 22000 | 35x105 | 9.5 | 8.5 | 17 |
| 40 | 33000 | 51x80 | 11.0 | 6.0 | 12 |
| 40 | 47000 | 51x105 | 14.0 | 5.0 | 10.0 |
| 40 | 68000 | 51x105 | 15.0 | 4.5 | 9.0 |
| 40 | 100000 | 63.5x105 | 18.0 | 4.1 | 8.2 |
| 40 | 150000 | 76.2x105 | 20.0 | 3.6 | 7.2 |
| 40 | 220000 | 76.2x143 | 24.0 | 3.3 | 5.0 |
| 50 | 3300 | 35x50 | 2.2 | 47 | 100 |
| 50 | 3900 | 35x50 | 2.8 | 42 | 85 |
| 50 | 4700 | 35x50 | 3.3 | 35 | 71 |
| 50 | 5600 | 35x50 | 3.5 | 29 | 59 |
| 50 | 6800 | 35x50 | 3.7 | 25 | 49 |
| 50 | 6800 | 35x80 | 4.5 | 25 | 49 |
| 50 | 8200 | 35x60 | 4.5 | 23 | 40 |
| 50 | 10000 | 35x60 | 5.5 | 18 | 33 |
| 50 | 10000 | 35x80 | 5.8 | 18 | 33 |
| 50 | 12000 | 35x80 | 6.0 | 15 | 28 |
| 50 | 15000 | 35x80 | 7.6 | 13 | 22 |
| 50 | 18000 | 35x100 | 8.0 | 11 | 18 |
| 50 | 22000 | 35x120 | 9.8 | 9.0 | 15 |
| 50 | 22000 | 51x80 | 10.0 | 9.0 | 18 |
| 50 | 27000 | 51x80 | 10.2 | 8.0 | 15 |
| 50 | 33000 | 51x100 | 11.2 | 7.0 | 13 |
| 50 | 33000 | 51x115 | 11.5 | 7.0 | 13 |
| 50 | 33000 | 51x120 | 12.0 | 7.0 | 13 |
| 50 | 39000 | 51x120 | 13.2 | 6.5 | 12 |
| 50 | 47000 | 51x120 | 14.5 | 6.0 | 11 |
| 50 | 47000 | 63.5x100 | 14.5 | 6.0 | 11 |
| 50 | 56000 | 63.5x100 | 14.6 | 5.8 | 9.0 |
| 50 | 68000 | 63.5x115 | 16.0 | 5.5 | 8.0 |
| 50 | 68000 | 63.5x120 | 16.6 | 5.5 | 8.0 |
| 50 | 82000 | 76.2x120 | 18.9 | 5.3 | 7.0 |
| 50 | 100000 | 76.2x120 | 19.5 | 5.0 | 7.0 |
| 50 | 120000 | 76.2x120 | 20.0 | 4.8 | 6.8 |
| 50 | 150000 | 89x130 | 22.5 | 4.5 | 6.5 |
| 50 | 150000 | 89x140 | 23.9 | 4.5 | 6.5 |
| 50 | 180000 | 89x140 | 24.2 | 4.3 | 6.3 |
| 50 | 180000 | 89x155 | 25.0 | 4.3 | 6.3 |
| 50 | 220000 | 89x170 | 26.5 | 4.0 | 6.0 |
| 50 | 330000 | 89x220 | 32.0 | 3.8 | 5.5 |
| 63 | 2200 | 35x50 | 2.1 | 65 | 120 |
| 63 | 2700 | 35x50 | 2.3 | 46 | 98 |
| 63 | 3300 | 35x50 | 2.5 | 42 | 80 |
| 63 | 3900 | 35x50 | 2.8 | 37 | 68 |
| 63 | 4700 | 35x50 | 3.5 | 30 | 56 |
| 63 | 4700 | 35x55 | 4.4 | 30 | 56 |
| 63 | 5600 | 35x60 | 4.7 | 26 | 47 |
| 63 | 6800 | 35x60 | 5.3 | 22 | 39 |
| 63 | 6800 | 35x80 | 6.0 | 22 | 39 |
| 63 | 8200 | 35x80 | 6.2 | 18 | 32 |
| 63 | 10000 | 35x80 | 7.2 | 14 | 27 |
| 63 | 10000 | 35x100 | 7.8 | 14 | 27 |
| 63 | 10000 | 35x105 | 8.1 | 14 | 27 |
| 63 | 12000 | 35x100 | 8.3 | 12 | 22 |
| 63 | 15000 | 35x120 | 8.8 | 9.5 | 19 |
| 63 | 15000 | 51x80 | 9.5 | 9.5 | 19 |
| 63 | 18000 | 51x80 | 10.0 | 9.0 | 17 |
| 63 | 22000 | 51x100 | 11.0 | 7.0 | 14 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 63 | 22000 | 51x105 | 12.0 | 7.0 | 14 |
| 63 | 27000 | 51x120 | 12.5 | 6.3 | 12 |
| 63 | 33000 | 51x120 | 14.0 | 5.5 | 11 |
| 63 | 33000 | 63.5x100 | 14.5 | 5.5 | 11 |
| 63 | 33000 | 63.5x105 | 15.0 | 5.5 | 11 |
| 63 | 39000 | 63.5x100 | 15.0 | 5.3 | 11 |
| 63 | 47000 | 63.5x105 | 17.0 | 4.8 | 10 |
| 63 | 56000 | 63.5x120 | 18.0 | 4.5 | 9.0 |
| 63 | 68000 | 63.5x140 | 19.5 | 4.3 | 8.0 |
| 63 | 68000 | 76.2x105 | 19.0 | 4.3 | 8.0 |
| 63 | 68000 | 76.2x120 | 20.0 | 4.3 | 8.0 |
| 63 | 82000 | 76.2x140 | 21.0 | 4.1 | 7.5 |
| 63 | 100000 | 76.2x140 | 22.5 | 4.0 | 7.0 |
| 63 | 100000 | 76.2x145 | 23.0 | 4.0 | 7.0 |
| 63 | 100000 | 89x130 | 24.0 | 4.0 | 7.0 |
| 63 | 120000 | 89x140 | 25.0 | 3.8 | 6.5 |
| 63 | 150000 | 89x160 | 27.0 | 3.5 | 6.0 |
| 63 | 150000 | 89x170 | 28.0 | 3.5 | 6.0 |
| 63 | 220000 | 89x220 | 29.5 | 3.3 | 5.0 |
| 80 | 2200 | 35x50 | 2.4 | 63 | 120 |
| 80 | 2700 | 35x50 | 2.7 | 45 | 98 |
| 80 | 3300 | 35x50 | 3.0 | 40 | 80 |
| 80 | 3900 | 35x60 | 3.4 | 35 | 68 |
| 80 | 4700 | 35x60 | 4.6 | 28 | 56 |
| 80 | 5600 | 35x80 | 5.0 | 25 | 47 |
| 80 | 6800 | 35x80 | 5.5 | 21 | 39 |
| 80 | 8200 | 35x100 | 6.5 | 17 | 32 |
| 80 | 10000 | 35x120 | 8.5 | 13 | 27 |
| 80 | 12000 | 51x80 | 8.6 | 12 | 22 |
| 80 | 15000 | 51x100 | 10.0 | 9.0 | 18 |
| 80 | 18000 | 51x120 | 10.5 | 8.0 | 15 |
| 80 | 22000 | 51x100 | 13.0 | 7.0 | 12 |
| 80 | 22000 | 51x120 | 13.5 | 7.0 | 12 |
| 80 | 22000 | 63.5x100 | 13.7 | 7.0 | 15 |
| 80 | 27000 | 63.5x100 | 14.0 | 6.0 | 12 |
| 80 | 33000 | 51x140 | 14.0 | 5.5 | 11 |
| 80 | 33000 | 76.2x100 | 15.0 | 5.5 | 11 |
| 80 | 39000 | 76.2x100 | 15.0 | 5.3 | 10 |
| 80 | 47000 | 63.5x140 | 16.5 | 4.8 | 9.0 |
| 80 | 47000 | 76.2x120 | 16.5 | 4.8 | 8.5 |
| 80 | 56000 | 76.2x120 | 18.5 | 4.5 | 8.0 |
| 80 | 68000 | 76.2x140 | 22.0 | 4.3 | 7.0 |
| 80 | 82000 | 89x130 | 22.5 | 4.0 | 6.5 |
| 80 | 100000 | 89x160 | 24.8 | 3.8 | 6.3 |
| 80 | 100000 | 89x170 | 25.0 | 3.8 | 6.3 |
| 80 | 150000 | 89x220 | 27.0 | 3.5 | 6.0 |
| 100 | 1000 | 35x50 | 1.4 | 65.0 | 120 |
| 100 | 1500 | 35x50 | 2.2 | 52.0 | 104 |
| 100 | 1800 | 35x50 | 2.7 | 43.0 | 85 |
| 100 | 2200 | 35x50 | 3.0 | 35.0 | 70 |
| 100 | 2200 | 35x60 | 4.1 | 35.0 | 60 |
| 100 | 2700 | 35x60 | 4.7 | 29.0 | 55 |
| 100 | 3300 | 35x80 | 5.7 | 24.0 | 48 |
| 100 | 3900 | 35x80 | 6.0 | 21.0 | 42 |
| 100 | 4700 | 35x100 | 6.5 | 18.0 | 35 |
| 100 | 4700 | 35x105 | 6.7 | 18.0 | 35 |
| 100 | 4700 | 51x80 | 6.5 | 18.0 | 35 |
| 100 | 5600 | 35x100 | 6.8 | 15.0 | 30 |
| 100 | 6800 | 35x120 | 7.0 | 12.0 | 24 |
| 100 | 6800 | 51x80 | 8.7 | 12.0 | 24 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 100 | 6800 | 51x100 | 9.5 | 12.0 | 19 |
| 100 | 8200 | 51x80 | 10.0 | 9.0 | 32 |
| 100 | 10000 | 51x100 | 10.5 | 7 | 14 |
| 100 | 10000 | 51x105 | 11.0 | 7 | 14 |
| 100 | 10000 | 51x120 | 12.5 | 7 | 14 |
| 100 | 12000 | 51x120 | 13.0 | 6 | 12 |
| 100 | 15000 | 63.5x100 | 14.5 | 5 | 10 |
| 100 | 15000 | 63.5x105 | 15.0 | 5 | 10 |
| 100 | 15000 | 63.5x120 | 16.0 | 5 | 10 |
| 100 | 18000 | 63.5x100 | 16.0 | 4.8 | 9.5 |
| 100 | 22000 | 63.5x120 | 16.5 | 4.5 | 9.0 |
| 100 | 22000 | 76.2x100 | 16.5 | 4.5 | 9.0 |
| 100 | 22000 | 76.2x105 | 17.0 | 4.5 | 9.0 |
| 100 | 22000 | 76.2x120 | 18.0 | 4.5 | 9.0 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 100 | 27000 | 76.2x120 | 18.5 | 4.3 | 8.5 |
| 100 | 33000 | 76.2x120 | 16.0 | 4.0 | 8.0 |
| 100 | 33000 | 76.2x130 | 19.5 | 4.0 | 8.0 |
| 100 | 33000 | 76.2x140 | 20.5 | 4.0 | 8.0 |
| 100 | 33000 | 76.2x145 | 21.0 | 4.0 | 8.0 |
| 100 | 39000 | 76.2x140 | 21.0 | 3.8 | 7.8 |
| 100 | 47000 | 76.2x160 | 23.0 | 3.5 | 7.5 |
| 100 | 47000 | 89x130 | 22.0 | 3.5 | 7.5 |
| 100 | 47000 | 89x140 | 23.5 | 3.5 | 7.5 |
| 100 | 56000 | 89x140 | 24.0 | 3.3 | 7.3 |
| 100 | 68000 | 89x160 | 25.5 | 3.2 | 7.0 |
| 100 | 68000 | 89x170 | 26.0 | 3.2 | 7.0 |
| 100 | 100000 | 89x220 | 28.0 | 3.0 | 6.5 |
| 100 | 100000 | 89x230 | 30.0 | 3.0 | 6.5 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RL Series 105°C

Features

Long load life

Applications

- ◆ Professional power supplies
- ◆ Frequency converters
- ◆ Uninterruptible power supplies

Features

- ◆ Outstanding reliability
- ◆ Wide temperature range
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

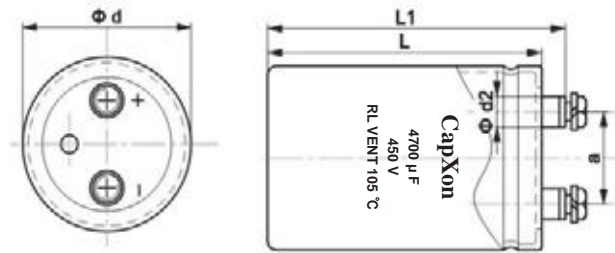
| Item | Performance Characteristics | | |
|--|--|-------------------------|---|
| Operating Temperature Range | -40 to +105°C | | -25 to +85°C |
| Rated voltage V_R | 160 to 450 V DC | | 500 V DC |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | |
| Rated capacitance C_R | 220 to 22000 μF | | 680 to 8200 μF |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | |
| Dissipation Factor (tan δ , at 20°C, 120Hz) | Less than the value under table(%) | | |
| | Working Voltage(VDC) | 160~450 | 500~550 |
| | D.F. (%)max. | 15 | 20 |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | | |
| | d \geq 63.5 mm: approx. 20 nH | | |
| | Capacitors with low-inductance design: d \geq 63.5 mm: approx. 15 nH | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | >10000 h | Requirements: | |
| | | $\Delta C/C$ | $\leq \pm 15\%$ of initial value |
| | | tan δ | ≤ 1.75 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Voltage Endurance test 105°C; V_R | 5000 h | Post test requirements: | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value |
| | | tan δ | ≤ 1.3 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | |
| | $V_R(V)$ | 160-450 | ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | |

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
|---------------|-----|-----|-----|-----|-----------|
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------------|----------------------|
| 35 | $\leq 70\text{mm}$ | 120 |
| | $> 70\text{mm}$ | 60 |
| 42 | $\leq 70\text{mm}$ | 120 |
| | $> 70\text{mm}$ | 60 |
| 51 | $\leq 70\text{mm}$ | 70 |
| | $> 70\text{mm}$ | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 160 | 680 | 35x50 | 1.6 | 150 | 290 |
| 160 | 820 | 35x80 | 2.2 | 120 | 240 |
| 160 | 1000 | 35x80 | 2.5 | 100 | 200 |
| 160 | 1200 | 35x80 | 2.7 | 87 | 170 |
| 160 | 1500 | 35x80 | 2.9 | 67 | 130 |
| 160 | 1800 | 35x100 | 3.6 | 56 | 110 |
| 160 | 2200 | 35x120 | 4.2 | 46 | 90 |
| 160 | 2700 | 35x120 | 4.6 | 38 | 74 |
| 160 | 3300 | 51x100 | 5.8 | 31 | 60 |
| 160 | 3900 | 51x120 | 6.8 | 26 | 51 |
| 160 | 4700 | 51x120 | 7.5 | 22 | 42 |
| 160 | 5600 | 51x120 | 8.3 | 18 | 36 |
| 160 | 6800 | 63.5x120 | 10.2 | 15 | 29 |
| 160 | 8200 | 76.2x100 | 11.5 | 12 | 24 |
| 160 | 10000 | 76.2x120 | 13.0 | 10 | 20 |
| 160 | 12000 | 76.2x140 | 14.5 | 9 | 17 |
| 160 | 15000 | 89x140 | 17.3 | 7 | 13 |
| 200 | 470 | 35x50 | 1.3 | 220 | 420 |
| 200 | 560 | 35x80 | 1.7 | 180 | 360 |
| 200 | 680 | 35x80 | 1.9 | 150 | 290 |
| 200 | 820 | 35x80 | 2.1 | 120 | 240 |
| 200 | 1000 | 35x100 | 2.6 | 100 | 200 |
| 200 | 1200 | 35x120 | 3.1 | 87 | 170 |
| 200 | 1500 | 35x120 | 3.5 | 67 | 130 |
| 200 | 1800 | 51x80 | 3.8 | 56 | 110 |
| 200 | 2200 | 51x100 | 4.7 | 46 | 90 |
| 200 | 2700 | 51x120 | 5.7 | 38 | 74 |
| 200 | 3300 | 51x120 | 6.2 | 31 | 60 |
| 200 | 3900 | 63.5x100 | 7.1 | 26 | 51 |
| 200 | 4700 | 63.5x120 | 8.3 | 22 | 42 |
| 200 | 5600 | 76.2x100 | 9.4 | 18 | 36 |
| 200 | 6800 | 76.2x120 | 11.0 | 15 | 29 |
| 200 | 8200 | 76.2x140 | 13.0 | 12 | 24 |
| 200 | 10000 | 89x140 | 15.8 | 10 | 20 |
| 250 | 330 | 35x50 | 1.1 | 310 | 600 |
| 250 | 390 | 35x80 | 1.5 | 260 | 510 |
| 250 | 470 | 35x80 | 1.6 | 220 | 420 |
| 250 | 560 | 35x80 | 1.8 | 180 | 360 |
| 250 | 680 | 35x100 | 2.1 | 150 | 290 |
| 250 | 820 | 35x100 | 2.3 | 120 | 240 |
| 250 | 1000 | 35x120 | 2.8 | 100 | 200 |
| 250 | 1200 | 51x80 | 3.2 | 87 | 170 |
| 250 | 1500 | 51x100 | 3.9 | 67 | 130 |
| 250 | 1800 | 51x120 | 4.6 | 56 | 110 |
| 250 | 2200 | 51x120 | 5.1 | 46 | 90 |
| 250 | 2700 | 63.5x100 | 6.0 | 38 | 74 |
| 250 | 3300 | 63.5x120 | 7.0 | 31 | 60 |
| 250 | 3900 | 76.2x100 | 7.9 | 26 | 51 |
| 250 | 4700 | 76.2x120 | 9.2 | 22 | 42 |
| 250 | 5600 | 76.2x140 | 10.7 | 18 | 36 |
| 250 | 6800 | 89x140 | 12.9 | 15 | 29 |
| 350 | 330 | 35x80 | 2.2 | 310 | 600 |
| 350 | 470 | 35x80 | 2.9 | 220 | 420 |
| 350 | 680 | 51x60 | 3.7 | 150 | 290 |
| 350 | 820 | 51x60 | 3.8 | 120 | 240 |
| 350 | 1000 | 51x75 | 6.4 | 100 | 200 |
| 350 | 1000 | 51x80 | 6.6 | 100 | 200 |
| 350 | 1200 | 51x75 | 6.6 | 87 | 170 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 350 | 1200 | 51x80 | 6.7 | 87 | 170 |
| 350 | 1500 | 51x80 | 8.0 | 67 | 130 |
| 350 | 1500 | 51x96 | 8.7 | 67 | 130 |
| 350 | 1800 | 51x96 | 8.8 | 56 | 110 |
| 350 | 1800 | 51x120 | 9.7 | 56 | 110 |
| 350 | 2200 | 51x98 | 10.1 | 46 | 90 |
| 350 | 2200 | 51x120 | 11.0 | 46 | 90 |
| 350 | 2700 | 51x98 | 10.5 | 38 | 74 |
| 350 | 2700 | 51x125 | 11.7 | 38 | 74 |
| 350 | 2700 | 63.5x85 | 11.9 | 38 | 74 |
| 350 | 2700 | 63.5x100 | 12.8 | 38 | 74 |
| 350 | 3300 | 51x118 | 11.5 | 31 | 60 |
| 350 | 3300 | 51x145 | 12.6 | 31 | 60 |
| 350 | 3300 | 63.5x100 | 13.8 | 31 | 60 |
| 350 | 3900 | 63.5x100 | 15.1 | 26 | 51 |
| 350 | 3900 | 63.5x130 | 16.9 | 26 | 51 |
| 350 | 3900 | 76.2x100 | 16.7 | 26 | 51 |
| 350 | 4700 | 63.5x115 | 17.9 | 22 | 42 |
| 350 | 4700 | 76.2x110 | 19.4 | 22 | 42 |
| 350 | 5600 | 63.5x135 | 20.5 | 18 | 36 |
| 350 | 5600 | 63.5x170 | 22.8 | 18 | 36 |
| 350 | 5600 | 76.2x125 | 22.2 | 18 | 36 |
| 350 | 5600 | 89x105 | 24.1 | 18 | 36 |
| 350 | 6800 | 63.5x189 | 26.4 | 15 | 29 |
| 350 | 6800 | 76.2x125 | 24.3 | 15 | 29 |
| 350 | 6800 | 76.2x150 | 26.3 | 15 | 29 |
| 350 | 6800 | 89x119 | 27.3 | 15 | 29 |
| 350 | 8200 | 63.5x244 | 32.5 | 12 | 24 |
| 350 | 8200 | 76.2x136 | 27.5 | 12 | 24 |
| 350 | 8200 | 76.2x170 | 30.4 | 12 | 24 |
| 350 | 8200 | 89x120 | 28.5 | 12 | 24 |
| 350 | 8200 | 89x150 | 31.4 | 12 | 24 |
| 350 | 10000 | 76.2x190 | 31.6 | 10 | 20 |
| 350 | 10000 | 76.2x220 | 33.8 | 10 | 20 |
| 350 | 10000 | 89x136 | 29.7 | 10 | 20 |
| 350 | 10000 | 89x170 | 32.7 | 10 | 20 |
| 350 | 12000 | 76.2x240 | 35.3 | 9 | 17 |
| 350 | 12000 | 89x136 | 29.8 | 9 | 17 |
| 350 | 12000 | 89x190 | 34.3 | 9 | 17 |
| 350 | 12000 | 100x190 | 36.8 | 9 | 17 |
| 350 | 15000 | 89x176 | 39.0 | 7 | 13 |
| 350 | 15000 | 89x220 | 43.0 | 7 | 13 |
| 350 | 15000 | 100x250 | 48.7 | 7 | 13 |
| 350 | 18000 | 89x186 | 40.0 | 6 | 11 |
| 350 | 18000 | 89x240 | 44.9 | 6 | 11 |
| 350 | 22000 | 89x230 | 45.2 | 5 | 9 |
| 350 | 22000 | 89x270 | 48.7 | 5 | 9 |
| 350 | 22000 | 100x250 | 50.0 | 5 | 9 |
| 400 | 220 | 35x80 | 1.7 | 460 | 900 |
| 400 | 330 | 35x80 | 2.4 | 310 | 600 |
| 400 | 470 | 35x100 | 3.2 | 220 | 420 |
| 400 | 680 | 51x60 | 3.8 | 150 | 290 |
| 400 | 680 | 51x80 | 4.3 | 150 | 290 |
| 400 | 1000 | 51x75 | 6.5 | 100 | 200 |
| 400 | 1000 | 51x80 | 6.7 | 100 | 200 |
| 400 | 1200 | 51x80 | 7.0 | 87 | 170 |
| 400 | 1200 | 51x96 | 7.7 | 87 | 170 |
| 400 | 1500 | 51x96 | 8.8 | 67 | 130 |

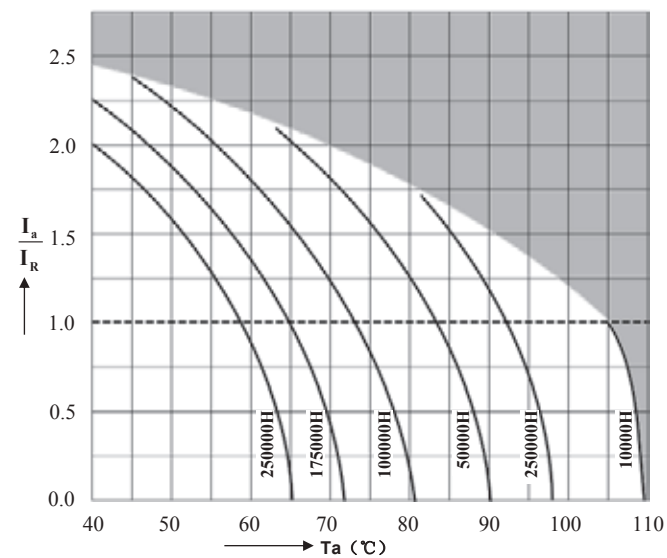
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 1500 | 51x115 | 9.5 | 67 | 130 |
| 400 | 1800 | 51x105 | 9.6 | 56 | 110 |
| 400 | 1800 | 51x140 | 10.8 | 56 | 110 |
| 400 | 1800 | 63.5x85 | 9.9 | 56 | 110 |
| 400 | 2200 | 51x105 | 10.5 | 46 | 90 |
| 400 | 2200 | 51x125 | 11.3 | 46 | 90 |
| 400 | 2200 | 63.5x85 | 10.8 | 46 | 90 |
| 400 | 2200 | 63.5x100 | 11.6 | 46 | 90 |
| 400 | 2700 | 51x145 | 13.6 | 38 | 74 |
| 400 | 2700 | 63.5x90 | 12.4 | 38 | 74 |
| 400 | 2700 | 63.5x115 | 13.7 | 38 | 74 |
| 400 | 3300 | 63.5x95 | 14.5 | 31 | 60 |
| 400 | 3300 | 63.5x130 | 16.7 | 31 | 60 |
| 400 | 3300 | 76.2x75 | 14.7 | 31 | 60 |
| 400 | 3300 | 76.2x100 | 16.5 | 31 | 60 |
| 400 | 3900 | 63.5x100 | 15.8 | 26 | 51 |
| 400 | 3900 | 63.5x150 | 18.9 | 26 | 51 |
| 400 | 3900 | 76.2x85 | 15.3 | 26 | 51 |
| 400 | 3900 | 76.2x110 | 18.3 | 26 | 51 |
| 400 | 3900 | 76.2x130 | 19.7 | 26 | 51 |
| 400 | 4700 | 63.5x120 | 18.6 | 22 | 42 |
| 400 | 4700 | 63.5x170 | 21.7 | 22 | 42 |
| 400 | 4700 | 76.2x95 | 18.6 | 22 | 42 |
| 400 | 4700 | 76.2x130 | 21.2 | 22 | 42 |
| 400 | 5600 | 63.5x135 | 22.1 | 18 | 36 |
| 400 | 5600 | 63.5x190 | 25.8 | 18 | 36 |
| 400 | 5600 | 76.2x105 | 21.9 | 18 | 36 |
| 400 | 5600 | 76.2x150 | 25.6 | 18 | 36 |
| 400 | 5600 | 89x105 | 24.3 | 18 | 36 |
| 400 | 6800 | 63.5x250 | 31.2 | 15 | 29 |
| 400 | 6800 | 76.2x125 | 25.2 | 15 | 29 |
| 400 | 6800 | 76.2x170 | 28.9 | 15 | 29 |
| 400 | 6800 | 89x105 | 25.9 | 15 | 29 |
| 400 | 6800 | 89x125 | 27.9 | 15 | 29 |
| 400 | 6800 | 89x140 | 29.3 | 15 | 29 |
| 400 | 6800 | 89x150 | 31.0 | 15 | 29 |
| 400 | 6800 | 89x155 | 31.4 | 15 | 29 |
| 400 | 8200 | 76.2x170 | 30.6 | 12 | 24 |
| 400 | 8200 | 76.2x210 | 33.7 | 12 | 24 |
| 400 | 8200 | 89x115 | 28.2 | 12 | 24 |
| 400 | 8200 | 89x125 | 29.2 | 12 | 24 |
| 400 | 8200 | 89x160 | 32.5 | 12 | 24 |
| 400 | 8200 | 89x170 | 33.4 | 12 | 24 |
| 400 | 10000 | 76.2x220 | 36.4 | 10 | 20 |
| 400 | 10000 | 89x135 | 31.9 | 10 | 20 |
| 400 | 10000 | 89x190 | 37.1 | 10 | 20 |
| 400 | 10000 | 100x190 | 39.6 | 10 | 20 |
| 400 | 12000 | 89x165 | 36.8 | 9 | 17 |
| 400 | 12000 | 89x190 | 39.1 | 9 | 17 |
| 400 | 12000 | 89x220 | 41.8 | 9 | 17 |
| 400 | 12000 | 100x220 | 44.6 | 9 | 17 |
| 400 | 15000 | 89x195 | 39.6 | 7 | 13 |
| 400 | 15000 | 89x240 | 43.5 | 7 | 13 |
| 400 | 15000 | 100x220 | 44.6 | 7 | 13 |
| 400 | 18000 | 89x235 | 44.0 | 6 | 11 |
| 400 | 18000 | 89x270 | 46.9 | 6 | 11 |
| 450 | 220 | 35x80 | 1.9 | 460 | 900 |
| 450 | 330 | 35x100 | 2.5 | 310 | 600 |
| 450 | 470 | 51x60 | 3.0 | 220 | 420 |
| 450 | 560 | 51x60 | 3.3 | 180 | 360 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 450 | 680 | 51x85 | 4.5 | 150 | 290 |
| 450 | 1000 | 51x85 | 6.9 | 100 | 200 |
| 450 | 1000 | 51x105 | 7.6 | 100 | 200 |
| 450 | 1200 | 51x85 | 7.4 | 87 | 170 |
| 450 | 1200 | 51x115 | 8.5 | 87 | 170 |
| 450 | 1500 | 51x100 | 9.1 | 67 | 130 |
| 450 | 1500 | 51x115 | 9.6 | 67 | 130 |
| 450 | 1800 | 51x100 | 9.5 | 56 | 110 |
| 450 | 1800 | 63.5x85 | 10.0 | 56 | 110 |
| 450 | 2200 | 51x120 | 11.5 | 46 | 90 |
| 450 | 2200 | 63.5x100 | 12.0 | 46 | 90 |
| 450 | 2700 | 51x143 | 13.8 | 38 | 74 |
| 450 | 2700 | 63.5x100 | 13.2 | 38 | 74 |
| 450 | 2700 | 63.5x130 | 14.8 | 38 | 74 |
| 450 | 2700 | 76.2x85 | 13.7 | 38 | 74 |
| 450 | 2700 | 76.2x115 | 15.6 | 38 | 74 |
| 450 | 3300 | 63.5x115 | 14.7 | 31 | 60 |
| 450 | 3300 | 63.5x150 | 16.6 | 31 | 60 |
| 450 | 3300 | 76.2x95 | 16.2 | 31 | 60 |
| 450 | 3300 | 76.2x130 | 18.5 | 31 | 60 |
| 450 | 3900 | 63.5x135 | 18.0 | 26 | 51 |
| 450 | 3900 | 63.5x170 | 20.0 | 26 | 51 |
| 450 | 3900 | 76.2x105 | 17.9 | 26 | 51 |
| 450 | 3900 | 76.2x130 | 19.8 | 26 | 51 |
| 450 | 3900 | 89x105 | 19.6 | 26 | 51 |
| 450 | 4700 | 63.5x165 | 21.6 | 22 | 42 |
| 450 | 4700 | 76.2x115 | 20.4 | 22 | 42 |
| 450 | 4700 | 76.2x130 | 21.5 | 22 | 42 |
| 450 | 4700 | 76.2x150 | 22.9 | 22 | 42 |
| 450 | 4700 | 89x105 | 21.5 | 22 | 42 |
| 450 | 5600 | 63.5x244 | 29.4 | 18 | 36 |
| 450 | 5600 | 76.2x135 | 22.5 | 18 | 36 |
| 450 | 5600 | 76.2x150 | 25.9 | 18 | 36 |
| 450 | 5600 | 76.2x190 | 28.8 | 18 | 36 |
| 450 | 5600 | 89x105 | 24.8 | 18 | 36 |
| 450 | 5600 | 89x125 | 26.1 | 18 | 36 |
| 450 | 5600 | 89x150 | 28.9 | 18 | 36 |
| 450 | 6800 | 76.2x170 | 29.0 | 15 | 29 |
| 450 | 6800 | 76.2x190 | 30.5 | 15 | 29 |
| 450 | 6800 | 76.2x220 | 32.6 | 15 | 29 |
| 450 | 6800 | 89x115 | 26.7 | 15 | 29 |
| 450 | 6800 | 89x125 | 27.7 | 15 | 29 |
| 450 | 6800 | 89x170 | 31.6 | 15 | 29 |
| 450 | 8200 | 76.2x195 | 33.6 | 12 | 24 |
| 450 | 8200 | 76.2x240 | 37.0 | 12 | 24 |
| 450 | 8200 | 89x145 | 32.1 | 12 | 24 |
| 450 | 8200 | 89x190 | 36.2 | 12 | 24 |
| 450 | 10000 | 89x165 | 34.9 | 10 | 20 |
| 450 | 10000 | 89x190 | 37.2 | 10 | 20 |
| 450 | 10000 | 89x220 | 39.7 | 10 | 20 |
| 450 | 10000 | 100x220 | 42.3 | 10 | 20 |
| 450 | 12000 | 89x195 | 39.4 | 9 | 17 |
| 450 | 12000 | 89x230 | 42.5 | 9 | 17 |
| 450 | 12000 | 100x250 | 47.0 | 9 | 17 |
| 450 | 15000 | 89x235 | 44.4 | 7 | 13 |
| 450 | 15000 | 89x250 | 45.7 | 7 | 13 |
| 500 | 680 | 51x75 | 4.1 | 200 | 390 |
| 500 | 1000 | 51x90 | 5.1 | 140 | 270 |
| 500 | 1200 | 51x115 | 5.9 | 110 | 220 |
| 500 | 1200 | 63.5x80 | 5.7 | 110 | 220 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 1500 | 51x135 | 7.1 | 92 | 180 |
| 500 | 1500 | 63.5x90 | 6.7 | 92 | 180 |
| 500 | 1800 | 63.5x100 | 7.8 | 77 | 150 |
| 500 | 1800 | 76.2x70 | 7.5 | 77 | 150 |
| 500 | 2200 | 63.5x120 | 8.6 | 62 | 120 |
| 500 | 2200 | 76.2x95 | 8.6 | 62 | 120 |
| 500 | 2700 | 63.5x135 | 9.8 | 50 | 98 |
| 500 | 2700 | 76.2x105 | 9.7 | 50 | 98 |
| 500 | 3300 | 63.5x165 | 11.0 | 41 | 80 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 3300 | 76.2x130 | 11.0 | 41 | 80 |
| 500 | 3900 | 76.2x145 | 13.1 | 35 | 68 |
| 500 | 3900 | 89x105 | 12.5 | 35 | 68 |
| 500 | 4700 | 76.2x165 | 14.5 | 29 | 56 |
| 500 | 4700 | 89x125 | 14.0 | 29 | 56 |
| 500 | 5600 | 89x145 | 15.9 | 24 | 47 |
| 500 | 6800 | 89x165 | 18.6 | 20 | 39 |
| 500 | 8200 | 89x205 | 20.3 | 17 | 32 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RM Series 105°C

Features

Long useful life

Applications

- ◆ Frequency converters
- ◆ Professional power supplies
- ◆ Hybrid electric vehicles(HEV)
- ◆ Traction

Features

- ◆ High reliability
- ◆ long useful life
- ◆ Extremely high ripple current capability
- ◆ Wide temperature range
- ◆ All-welded construction ensures reliable electrical contact
- ◆ low-inductance design
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | | |
|--|--|-------------------------|---|
| Operating Temperature Range | -40 to +105°C (160Vdc~450Vdc) -25 to +105°C (500Vdc) | | |
| Rated voltage V_R | 160 to 500 V DC | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | |
| Rated capacitance C_R | 180 to 68000 μF | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | |
| | Working Voltage(VDC) | 160~450 | 500~550 |
| | D.F. (%)max. | 15 | 20 |
| Self-inductance ESL | d = 51 mm: approx. 16 nH | | |
| | d \geq 63.5 mm: approx. 18 nH | | |
| | Capacitors with low-inductance design: d \geq 63.5 mm: approx. 14 nH | | |
| Useful life 105°C; V_R, I_{AC}, R | >6000 h | Requirements: | |
| | | $\Delta C/C$ | $\leq \pm 15\%$ of initial value |
| | | $\tan \delta$ | ≤ 1.75 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Voltage Endurance test 105°C; V_R | 2000 h | Post test requirements: | |
| | | $\Delta C/C$ | $\leq \pm 10\%$ of initial value |
| | | $\tan \delta$ | ≤ 1.3 times initial specified limit |
| | | I_{leak} | \leq initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | |
| | $V_R(V)$ | 160-450 | ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | |

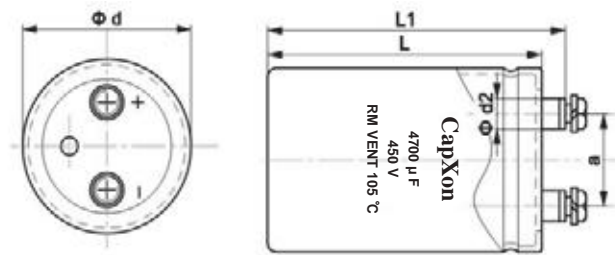
Screw

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
|---------------|-----|-----|-----|-----|-----------|
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

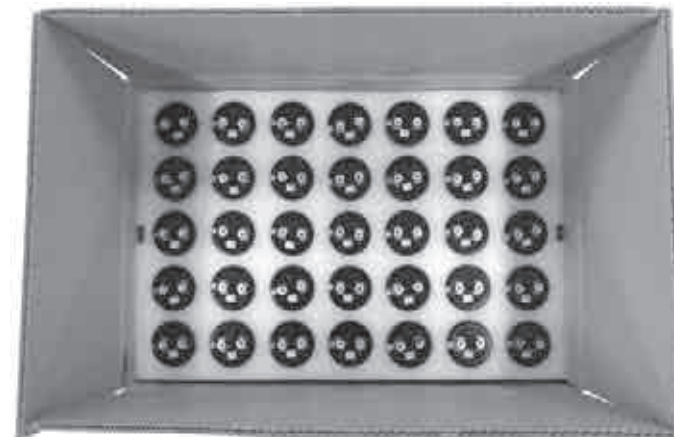
Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 35 | ≤70mm | 120 |
| | >70mm | 60 |
| 42 | ≤70mm | 120 |
| | >70mm | 60 |
| 51 | ≤70mm | 70 |
| | >70mm | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|-------------|-------------|--------------|--|-----------------------------------|----------------------------------|
| 160 | 470 | 35x50 | 1.1 | 230 | 420 |
| 160 | 560 | 35x50 | 1.3 | 200 | 360 |
| 160 | 680 | 35x50 | 1.4 | 160 | 290 |
| 160 | 820 | 35x50 | 1.5 | 130 | 240 |
| 160 | 1000 | 35x50 | 1.6 | 110 | 200 |
| 160 | 1200 | 35x60 | 2.0 | 94 | 170 |
| 160 | 1500 | 35x60 | 2.2 | 72 | 130 |
| 160 | 1800 | 35x80 | 2.6 | 61 | 110 |
| 160 | 2200 | 35x80 | 2.9 | 50 | 90 |
| 160 | 2700 | 35x100 | 3.4 | 41 | 74 |
| 160 | 3300 | 51x75 | 3.9 | 33 | 60 |
| 160 | 3900 | 51x75 | 4.0 | 28 | 51 |
| 160 | 4700 | 51x96 | 4.7 | 24 | 42 |
| 160 | 5600 | 51x96 | 5.2 | 20 | 36 |
| 160 | 6800 | 51x120 | 6.2 | 16 | 29 |
| 160 | 6800 | 63.5x96 | 6.2 | 16 | 29 |
| 160 | 8200 | 63.5x96 | 7.1 | 13 | 24 |
| 160 | 10000 | 63.5x120 | 8.5 | 11 | 20 |
| 160 | 10000 | 76.2x96 | 8.5 | 11 | 20 |
| 160 | 12000 | 76.2x100 | 9.5 | 9.2 | 17 |
| 160 | 15000 | 76.2x120 | 11.5 | 7.4 | 13 |
| 160 | 18000 | 76.2x140 | 13.5 | 6.1 | 11 |
| 160 | 22000 | 76.2x140 | 14.0 | 5.0 | 9.0 |
| 160 | 22000 | 89x130 | 14.8 | 5.0 | 9.0 |
| 160 | 27000 | 89x140 | 16.1 | 4.1 | 7.5 |
| 160 | 33000 | 89x140 | 16.6 | 3.3 | 7.0 |
| 160 | 47000 | 89x220 | 17.5 | 3.0 | 6.5 |
| 160 | 68000 | 100x250 | 19.3 | 2 | 6.0 |
| 200 | 330 | 35x50 | 1.0 | 330 | 600 |
| 200 | 390 | 35x50 | 1.1 | 280 | 510 |
| 200 | 470 | 35x50 | 1.2 | 230 | 420 |
| 200 | 560 | 35x50 | 1.4 | 200 | 360 |
| 200 | 680 | 35x50 | 1.5 | 160 | 290 |
| 200 | 820 | 35x50 | 1.6 | 130 | 240 |
| 200 | 1000 | 35x60 | 1.8 | 110 | 200 |
| 200 | 1200 | 35x60 | 2.1 | 94 | 170 |
| 200 | 1500 | 35x80 | 2.3 | 72 | 130 |
| 200 | 1800 | 35x80 | 2.7 | 61 | 110 |
| 200 | 2200 | 35x100 | 3.1 | 50 | 90 |
| 200 | 2200 | 51x75 | 3.2 | 50 | 90 |
| 200 | 2700 | 35x120 | 3.7 | 41 | 74 |
| 200 | 2700 | 51x96 | 3.7 | 41 | 74 |
| 200 | 3300 | 51x80 | 4.2 | 33 | 60 |
| 200 | 3900 | 51x100 | 5.0 | 28 | 51 |
| 200 | 4700 | 51x140 | 5.8 | 24 | 42 |
| 200 | 4700 | 63.5x96 | 5.4 | 24 | 42 |
| 200 | 5600 | 63.5x96 | 5.9 | 20 | 36 |
| 200 | 6800 | 63.5x115 | 7.0 | 16 | 29 |
| 200 | 8200 | 63.5x120 | 7.7 | 13 | 24 |
| 200 | 10000 | 76.2x115 | 9.7 | 11 | 20 |
| 200 | 12000 | 76.2x120 | 10.3 | 9 | 17 |
| 200 | 15000 | 76.2x140 | 11.6 | 7 | 13 |
| 200 | 15000 | 89x130 | 12.3 | 7 | 13 |
| 200 | 18000 | 89x140 | 13.6 | 6 | 11 |
| 200 | 22000 | 76.2x160 | 14.0 | 5.0 | 9 |
| 200 | 22000 | 89x140 | 15.2 | 5.0 | 9 |
| 200 | 33000 | 89x220 | 16.6 | 3.5 | 6 |
| 200 | 47000 | 89x250 | 19.9 | 3.0 | 5 |

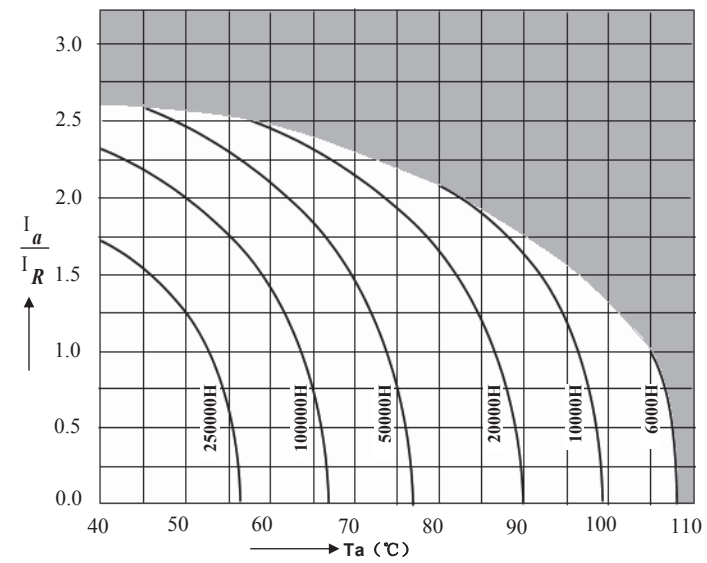
| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|-------------|-------------|--------------|--|-----------------------------------|----------------------------------|
| 250 | 270 | 35x50 | 0.9 | 410 | 740 |
| 250 | 330 | 35x50 | 1.1 | 330 | 600 |
| 250 | 390 | 35x50 | 1.2 | 280 | 510 |
| 250 | 470 | 35x50 | 1.3 | 230 | 420 |
| 250 | 560 | 35x50 | 1.5 | 200 | 360 |
| 250 | 680 | 35x60 | 1.6 | 160 | 290 |
| 250 | 820 | 35x80 | 1.7 | 130 | 240 |
| 250 | 1000 | 35x80 | 1.9 | 110 | 200 |
| 250 | 1200 | 35x80 | 2.2 | 94 | 170 |
| 250 | 1500 | 35x100 | 2.4 | 72 | 130 |
| 250 | 1500 | 51x75 | 2.5 | 72 | 130 |
| 250 | 1800 | 35x120 | 2.8 | 61 | 110 |
| 250 | 1800 | 51x75 | 2.8 | 61 | 110 |
| 250 | 2200 | 51x96 | 3.3 | 50 | 90 |
| 250 | 2700 | 51x100 | 3.8 | 41 | 74 |
| 250 | 3300 | 51x120 | 4.3 | 33 | 60 |
| 250 | 3300 | 63.5x96 | 4.3 | 33 | 60 |
| 250 | 3900 | 51x120 | 5.1 | 28 | 51 |
| 250 | 3900 | 63.5x96 | 4.7 | 28 | 51 |
| 250 | 4700 | 63.5x115 | 5.8 | 24 | 42 |
| 250 | 5600 | 63.5x120 | 6.4 | 20 | 36 |
| 250 | 6800 | 76.2x115 | 7.8 | 16 | 29 |
| 250 | 8200 | 76.2x120 | 8.5 | 13 | 24 |
| 250 | 10000 | 76.2x140 | 10.1 | 11 | 20 |
| 250 | 10000 | 89x140 | 10.3 | 11 | 20 |
| 250 | 12000 | 89x140 | 12.0 | 9 | 17 |
| 250 | 15000 | 89x157 | 12.6 | 7 | 13 |
| 250 | 22000 | 89x220 | 15.5 | 5.0 | 9 |
| 250 | 33000 | 100x250 | 17.1 | 3.3 | 6 |
| 315 | 180 | 35x50 | 0.8 | 620 | 1110 |
| 315 | 220 | 35x50 | 1.0 | 500 | 900 |
| 315 | 270 | 35x50 | 1.1 | 410 | 740 |
| 315 | 330 | 35x50 | 1.2 | 330 | 600 |
| 315 | 390 | 35x50 | 1.3 | 280 | 510 |
| 315 | 470 | 35x60 | 1.5 | 230 | 420 |
| 315 | 560 | 35x55 | 2.5 | 200 | 360 |
| 315 | 680 | 35x65 | 3.0 | 160 | 290 |
| 315 | 820 | 35x75 | 3.4 | 130 | 240 |
| 315 | 1000 | 35x80 | 3.9 | 110 | 200 |
| 315 | 1200 | 35x100 | 4.6 | 94 | 170 |
| 315 | 1500 | 51x70 | 5.5 | 72 | 130 |
| 315 | 1800 | 51x75 | 6.1 | 61 | 110 |
| 315 | 2200 | 51x90 | 7.3 | 50 | 90 |
| 315 | 2700 | 51x100 | 8.5 | 41 | 74 |
| 315 | 3300 | 63.5x85 | 10.0 | 33 | 60 |
| 315 | 3900 | 63.5x96 | 11.4 | 28 | 51 |
| 315 | 4700 | 76.2x85 | 13.2 | 24 | 42 |
| 315 | 5600 | 76.2x96 | 15.1 | 20 | 36 |
| 315 | 6800 | 76.2x110 | 17.7 | 16 | 29 |
| 315 | 8200 | 89x100 | 17.8 | 13 | 24 |
| 315 | 10000 | 89x115 | 20.2 | 11 | 20 |
| 350 | 180 | 35x50 | 0.9 | 620 | 1110 |
| 350 | 220 | 35x50 | 1.1 | 500 | 900 |
| 350 | 270 | 35x50 | 1.2 | 410 | 740 |
| 350 | 330 | 35x50 | 1.3 | 330 | 600 |
| 350 | 390 | 35x60 | 1.4 | 280 | 510 |
| 350 | 470 | 35x55 | 2.3 | 230 | 420 |
| 350 | 560 | 35x60 | 2.6 | 200 | 360 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 350 | 680 | 35x70 | 3.1 | 160 | 290 |
| 350 | 820 | 35x80 | 3.5 | 130 | 240 |
| 350 | 1000 | 35x90 | 4.1 | 110 | 200 |
| 350 | 1000 | 51x75 | 4.3 | 110 | 200 |
| 350 | 1200 | 51x65 | 4.7 | 94 | 170 |
| 350 | 1500 | 51x75 | 5.6 | 72 | 130 |
| 350 | 1800 | 51x85 | 6.5 | 61 | 110 |
| 350 | 2200 | 51x100 | 7.7 | 50 | 90 |
| 350 | 2700 | 51x105 | 8.7 | 41 | 74 |
| 350 | 2700 | 63.5x80 | 8.8 | 41 | 74 |
| 350 | 3300 | 51x130 | 10.1 | 33 | 60 |
| 350 | 3300 | 63.5x96 | 10.1 | 33 | 60 |
| 350 | 3900 | 63.5x105 | 11.2 | 28 | 51 |
| 350 | 3900 | 76.2x80 | 11.8 | 28 | 51 |
| 350 | 4700 | 63.5x130 | 12.7 | 24 | 42 |
| 350 | 4700 | 76.2x96 | 13.3 | 24 | 42 |
| 350 | 5600 | 63.5x130 | 14.2 | 20 | 36 |
| 350 | 5600 | 76.2x105 | 15.7 | 20 | 36 |
| 350 | 6800 | 76.2x125 | 18.7 | 16 | 29 |
| 350 | 6800 | 89x120 | 18.8 | 16 | 29 |
| 350 | 8200 | 76.2x143 | 19.0 | 13 | 24 |
| 350 | 8200 | 89x115 | 18.9 | 13 | 24 |
| 350 | 10000 | 76.2x160 | 19.5 | 11 | 20 |
| 350 | 10000 | 89x140 | 21.0 | 11 | 20 |
| 350 | 12000 | 76.2x190 | 24.8 | 9 | 17 |
| 350 | 12000 | 89x145 | 25.7 | 9 | 17 |
| 350 | 15000 | 76.2x220 | 29.1 | 7 | 13 |
| 350 | 15000 | 89x170 | 29.6 | 7 | 13 |
| 350 | 18000 | 89x200 | 33.2 | 6 | 11 |
| 400 | 180 | 35x50 | 1.0 | 620 | 1110 |
| 400 | 220 | 35x50 | 1.2 | 500 | 900 |
| 400 | 270 | 35x50 | 1.3 | 410 | 740 |
| 400 | 330 | 35x60 | 1.5 | 330 | 600 |
| 400 | 390 | 35x55 | 2.1 | 280 | 510 |
| 400 | 470 | 35x60 | 2.4 | 230 | 420 |
| 400 | 560 | 35x70 | 2.8 | 200 | 360 |
| 400 | 680 | 51x80 | 3.7 | 160 | 290 |
| 400 | 820 | 35x90 | 3.7 | 130 | 240 |
| 400 | 1000 | 51x65 | 4.4 | 110 | 200 |
| 400 | 1200 | 51x75 | 5.0 | 94 | 170 |
| 400 | 1500 | 51x80 | 5.8 | 72 | 130 |
| 400 | 1800 | 51x96 | 7.0 | 61 | 110 |
| 400 | 2200 | 51x115 | 8.1 | 50 | 90 |
| 400 | 2200 | 63.5x85 | 8.2 | 50 | 90 |
| 400 | 2700 | 51x130 | 9.4 | 41 | 74 |
| 400 | 2700 | 63.5x96 | 9.3 | 41 | 74 |
| 400 | 3300 | 63.5x105 | 10.8 | 33 | 60 |
| 400 | 3300 | 76.2x105 | 11.3 | 33 | 60 |
| 400 | 3900 | 63.5x118 | 11.8 | 28 | 51 |
| 400 | 3900 | 76.2x105 | 12.3 | 28 | 51 |
| 400 | 4700 | 63.5x143 | 13.5 | 24 | 42 |
| 400 | 4700 | 76.2x105 | 14.4 | 24 | 42 |
| 400 | 4700 | 89x97 | 14.9 | 24 | 42 |
| 400 | 5600 | 63.5x195 | 17.2 | 20 | 36 |
| 400 | 5600 | 76.2x130 | 15.8 | 20 | 36 |
| 400 | 5600 | 89x96 | 15.3 | 20 | 36 |
| 400 | 6800 | 76.2x143 | 19.0 | 16 | 29 |
| 400 | 6800 | 89x115 | 18.9 | 16 | 29 |
| 400 | 8200 | 76.2x170 | 20.6 | 13 | 24 |
| 400 | 8200 | 89x130 | 19.3 | 13 | 24 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 400 | 10000 | 76.2x190 | 21.8 | 11 | 20 |
| 400 | 10000 | 89x160 | 22.0 | 11 | 20 |
| 400 | 12000 | 76.2x220 | 27.0 | 9 | 17 |
| 400 | 12000 | 89x180 | 26.0 | 9 | 17 |
| 400 | 15000 | 89x200 | 29.7 | 7 | 13 |
| 450 | 220 | 35x50 | 1.2 | 500 | 900 |
| 450 | 330 | 35x55 | 1.9 | 330 | 600 |
| 450 | 390 | 35x65 | 2.3 | 280 | 510 |
| 450 | 470 | 35x75 | 2.6 | 230 | 420 |
| 450 | 560 | 35x80 | 2.9 | 200 | 360 |
| 450 | 680 | 35x100 | 3.6 | 160 | 290 |
| 450 | 680 | 51x80 | 3.8 | 160 | 290 |
| 450 | 820 | 35x110 | 4.2 | 130 | 240 |
| 450 | 1000 | 51x80 | 4.7 | 110 | 200 |
| 450 | 1200 | 51x90 | 5.4 | 94 | 170 |
| 450 | 1500 | 51x90 | 5.9 | 72 | 130 |
| 450 | 1500 | 51x105 | 6.8 | 72 | 130 |
| 450 | 1500 | 63.5x80 | 7.0 | 72 | 130 |
| 450 | 1800 | 51x130 | 7.8 | 61 | 110 |
| 450 | 1800 | 63.5x96 | 7.8 | 61 | 110 |
| 450 | 2200 | 63.5x96 | 8.6 | 50 | 90 |
| 450 | 2700 | 63.5x118 | 10.2 | 41 | 74 |
| 450 | 2700 | 76.2x96 | 10.7 | 41 | 74 |
| 450 | 3300 | 63.5x145 | 11.5 | 33 | 60 |
| 450 | 3300 | 76.2x120 | 11.0 | 33 | 60 |
| 450 | 3300 | 89x97 | 13.1 | 33 | 60 |
| 450 | 3900 | 76.2x130 | 13.4 | 28 | 51 |
| 450 | 3900 | 89x120 | 14.9 | 28 | 51 |
| 450 | 4700 | 76.2x120 | 14.5 | 24 | 42 |
| 450 | 4700 | 89x120 | 16.7 | 24 | 42 |
| 450 | 5600 | 76.2x160 | 15.9 | 20 | 36 |
| 450 | 5600 | 89x120 | 15.4 | 20 | 36 |
| 450 | 6800 | 76.2x160 | 19.1 | 16 | 29 |
| 450 | 6800 | 89x140 | 19.2 | 16 | 29 |
| 450 | 8200 | 76.2x220 | 23.1 | 13 | 24 |
| 450 | 8200 | 89x170 | 23.7 | 13 | 24 |
| 450 | 10000 | 89x200 | 24.0 | 11 | 20 |
| 500 | 330 | 51x80 | 2.8 | 440 | 800 |
| 500 | 470 | 51x60 | 2.7 | 310 | 560 |
| 500 | 680 | 51x80 | 4.1 | 220 | 390 |
| 500 | 820 | 51x85 | 4.3 | 180 | 320 |
| 500 | 1000 | 51x105 | 4.8 | 150 | 270 |
| 500 | 1200 | 51x120 | 6.0 | 120 | 220 |
| 500 | 1200 | 63.5x85 | 5.8 | 120 | 220 |
| 500 | 1500 | 51x130 | 7.0 | 100 | 180 |
| 500 | 1500 | 63.5x96 | 7.1 | 100 | 180 |
| 500 | 1800 | 63.5x105 | 7.9 | 83 | 150 |
| 500 | 2200 | 63.5x130 | 9.4 | 67 | 120 |
| 500 | 2200 | 76.2x96 | 9.5 | 67 | 120 |
| 500 | 2700 | 63.5x145 | 10.3 | 55 | 98 |
| 500 | 2700 | 76.2x105 | 10.8 | 55 | 98 |
| 500 | 2700 | 89x97 | 11.6 | 55 | 98 |
| 500 | 3300 | 63.5x170 | 13.0 | 45 | 80 |
| 500 | 3300 | 76.2x130 | 12.2 | 45 | 80 |
| 500 | 3300 | 89x120 | 13.4 | 45 | 80 |
| 500 | 3900 | 76.2x145 | 13.5 | 38 | 68 |
| 500 | 3900 | 89x120 | 15.0 | 38 | 68 |
| 500 | 4700 | 76.2x170 | 16.0 | 31 | 56 |
| 500 | 4700 | 89x145 | 16.8 | 31 | 56 |
| 500 | 5600 | 76.2x220 | 18.1 | 26 | 47 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/85°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|---|--------------------------|-------------------------|
| 500 | 5600 | 89x150 | 17.9 | 26 | 47 |
| 500 | 6800 | 89x170 | 20.8 | 22 | 39 |
| 500 | 8200 | 89x220 | 25.6 | 18 | 32 |
| 500 | 10000 | 89x250 | 30.0 | 15 | 27 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RH Series 105°C

Features

Standard capacitors

Applications

- ◆ Frequency converters
- ◆ Uninterruptible power supplies
- ◆ Uninterruptible power supplies

Features

- ◆ Outstanding reliability
- ◆ Wide temperature range
- ◆ Extra long useful life
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

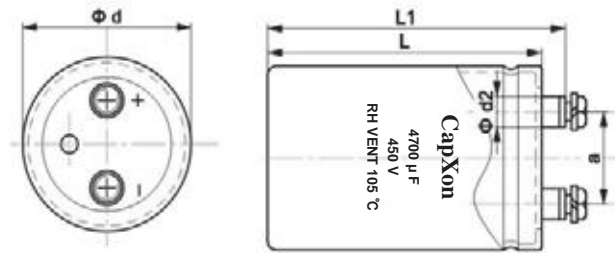
| Item | Performance Characteristics | | | | | | | | | |
|--|--|----------------------|---------|------------|------------------------------------|----|----|------------------------------------|----|---|
| Operating Temperature Range | -40 to +105°C | | | | | | | | | |
| Rated voltage V_R | 160 to 450 V DC | | | | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | | | | |
| Rated capacitance C_R | 220 to 47000 μF | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | | | | |
| Leakage Current I_{leak} (+20°C, max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) <table border="1"> <thead> <tr> <th>Working Voltage(VDC)</th> <th>160~450</th> <th>500~550</th> </tr> </thead> <tbody> <tr> <td>D.F. (%)max.</td> <td>15</td> <td>20</td> </tr> </tbody> </table> | Working Voltage(VDC) | 160~450 | 500~550 | D.F. (%)max. | 15 | 20 | | | |
| Working Voltage(VDC) | 160~450 | 500~550 | | | | | | | | |
| D.F. (%)max. | 15 | 20 | | | | | | | | |
| Self-inductance ESL | d = 51 mm: approx. 17 nH d \geq 63.5 mm: approx. 20 nH Capacitors with low-inductance design: d \geq 63.5 mm: approx. 15 nH | | | | | | | | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | >8000 h Requirements: $\Delta C/C \leq \pm 15\%$ of initial value $\tan \delta \leq 1.75$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | | | | |
| Voltage Endurance test 105°C; V_R | 2000 h Post test requirements: $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1.3$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz <table border="1"> <thead> <tr> <th>$V_R(V)$</th> <th>160-450</th> <th>≥ 500</th> </tr> </thead> <tbody> <tr> <td>$Z_{-25^\circ C} / Z_{20^\circ C}$</td> <td>4</td> <td>4</td> </tr> <tr> <td>$Z_{-40^\circ C} / Z_{20^\circ C}$</td> <td>10</td> <td>-</td> </tr> </tbody> </table> | $V_R(V)$ | 160-450 | ≥ 500 | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - |
| $V_R(V)$ | 160-450 | ≥ 500 | | | | | | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 | | | | | | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - | | | | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
|---------------|-----|-----|-----|-----|-----------|
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Ring clip/clamp mounting:



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | |
|----------|---------------------------------------|-----------|-------------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 35 | 50~120 | 56.5~126.5 | 10.3 | 12.7 |
| M5 | 51 | 80~140 | 86.5~146.5 | 10.3 | 22 |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 10.3 | 28.6 |
| M5 | 76.2/89 | 100~240 | 106.4~246.5 | 10.3 | 31.8 |
| M6 | 76.2/89 | 100~240 | 106.4~246.5 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 35 | ≤ 70 mm | 120 |
| | > 70 mm | 60 |
| 42 | ≤ 70 mm | 120 |
| | > 70 mm | 60 |
| 51 | ≤ 70 mm | 70 |
| | > 70 mm | 35 |
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

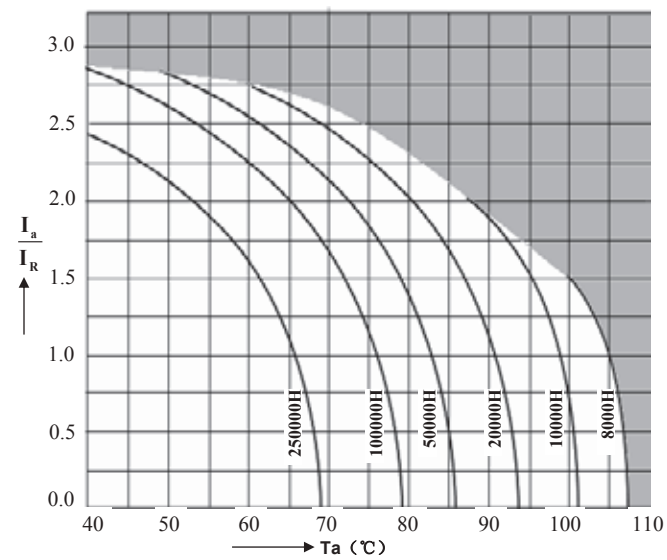
Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 160 | 1000 | 35x60 | 1.9 | 110 | 200 |
| 160 | 1500 | 35x80 | 2.5 | 68 | 130 |
| 160 | 2200 | 35x100 | 3.3 | 48 | 90 |
| 160 | 3300 | 35x120 | 4.5 | 32 | 60 |
| 160 | 3300 | 51x80 | 4.5 | 32 | 60 |
| 160 | 4700 | 51x100 | 5.5 | 22 | 42 |
| 160 | 6800 | 51x140 | 7.8 | 15 | 29 |
| 160 | 6800 | 63.5x100 | 7.5 | 15 | 29 |
| 160 | 10000 | 63.5x120 | 8.8 | 10 | 20 |
| 160 | 15000 | 76.2x120 | 10.8 | 7 | 13 |
| 160 | 22000 | 76.2x140 | 13.8 | 5 | 9 |
| 160 | 22000 | 89x130 | 14.5 | 5 | 9 |
| 160 | 33000 | 89x140 | 15.5 | 3 | 6 |
| 160 | 47000 | 89x220 | 19.2 | 3 | 5 |
| 200 | 680 | 35x50 | 1.4 | 150 | 290 |
| 200 | 1000 | 35x60 | 2.0 | 110 | 200 |
| 200 | 1500 | 35x80 | 2.5 | 68 | 130 |
| 200 | 2200 | 35x120 | 3.6 | 48 | 90 |
| 200 | 2200 | 51x80 | 3.6 | 48 | 90 |
| 200 | 3300 | 51x80 | 4.6 | 32 | 60 |
| 200 | 3300 | 51x100 | 4.8 | 32 | 60 |
| 200 | 4700 | 51x140 | 6.4 | 22 | 42 |
| 200 | 4700 | 63.5x100 | 6.2 | 22 | 42 |
| 200 | 6800 | 63.5x120 | 7.7 | 15 | 29 |
| 200 | 10000 | 76.2x120 | 10.0 | 10 | 20 |
| 200 | 15000 | 76.2x140 | 11.5 | 7 | 13 |
| 200 | 15000 | 76.2x160 | 12.2 | 7 | 13 |
| 200 | 22000 | 76.2x160 | 15.5 | 5 | 9 |
| 200 | 22000 | 89x140 | 16.5 | 5 | 9 |
| 250 | 470 | 35x60 | 1.2 | 220 | 420 |
| 250 | 680 | 35x80 | 1.7 | 150 | 290 |
| 250 | 1000 | 35x100 | 2.5 | 110 | 200 |
| 250 | 1500 | 51x80 | 2.9 | 68 | 130 |
| 250 | 2200 | 51x100 | 4.0 | 48 | 90 |
| 250 | 3300 | 51x140 | 5.3 | 32 | 60 |
| 250 | 3300 | 63.5x100 | 5.0 | 32 | 60 |
| 250 | 4700 | 63.5x120 | 6.6 | 22 | 42 |
| 250 | 6800 | 76.2x120 | 8.3 | 15 | 29 |
| 250 | 10000 | 76.2x160 | 11.0 | 10 | 20 |
| 250 | 10000 | 89x140 | 11.5 | 10 | 20 |
| 250 | 15000 | 89x170 | 14.5 | 7 | 13 |
| 250 | 22000 | 89x220 | 17.0 | 5 | 9 |
| 350 | 330 | 35x60 | 1.6 | 320 | 600 |
| 350 | 470 | 35x80 | 2.3 | 220 | 420 |
| 350 | 680 | 35x100 | 3.3 | 150 | 290 |
| 350 | 1000 | 35x120 | 4.4 | 110 | 200 |
| 350 | 1000 | 51x80 | 4.6 | 110 | 200 |
| 350 | 1500 | 51x80 | 5.7 | 68 | 130 |
| 350 | 1500 | 51x100 | 6.8 | 68 | 130 |
| 350 | 2200 | 51x105 | 7.7 | 48 | 90 |
| 350 | 2200 | 51x120 | 8.3 | 48 | 90 |
| 350 | 2200 | 51x140 | 8.8 | 48 | 90 |
| 350 | 2700 | 63.5x80 | 8.7 | 39 | 74 |
| 350 | 3300 | 63.5x100 | 10.0 | 32 | 60 |
| 350 | 3300 | 63.5x120 | 10.8 | 32 | 60 |
| 350 | 3900 | 63.5x120 | 11.5 | 27 | 51 |
| 350 | 4700 | 63.5x145 | 12.6 | 22 | 42 |
| 350 | 4700 | 76.2x105 | 12.6 | 22 | 42 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 350 | 4700 | 76.2x120 | 13.0 | 22 | 42 |
| 350 | 5600 | 76.2x130 | 14.8 | 19 | 36 |
| 350 | 6800 | 76.2x140 | 16.5 | 15 | 29 |
| 350 | 8200 | 76.2x160 | 20.0 | 13 | 24 |
| 350 | 8200 | 89x145 | 21.5 | 13 | 24 |
| 350 | 10000 | 76.2x160 | 21.5 | 10 | 20 |
| 350 | 10000 | 76.2x190 | 23.0 | 10 | 20 |
| 350 | 10000 | 89x140 | 23.0 | 10 | 20 |
| 350 | 12000 | 76.2x220 | 27.5 | 9 | 17 |
| 350 | 12000 | 89x170 | 28.5 | 9 | 17 |
| 350 | 15000 | 89x190 | 30.0 | 7 | 13 |
| 350 | 18000 | 89x220 | 34.0 | 6 | 11 |
| 400 | 220 | 35x50 | 1.4 | 470 | 900 |
| 400 | 330 | 35x60 | 1.7 | 320 | 600 |
| 400 | 470 | 35x80 | 3.3 | 220 | 420 |
| 400 | 680 | 35x120 | 3.9 | 150 | 290 |
| 400 | 680 | 51x80 | 4.1 | 150 | 290 |
| 400 | 1000 | 51x80 | 4.7 | 110 | 200 |
| 400 | 1500 | 51x105 | 6.4 | 68 | 130 |
| 400 | 1500 | 51x120 | 7.0 | 68 | 130 |
| 400 | 2200 | 51x130 | 9.1 | 48 | 90 |
| 400 | 2200 | 63.5x100 | 8.3 | 48 | 90 |
| 400 | 2700 | 63.5x100 | 10.0 | 39 | 74 |
| 400 | 3300 | 63.5x130 | 11.5 | 32 | 60 |
| 400 | 3300 | 76.2x105 | 11.7 | 32 | 60 |
| 400 | 3300 | 76.2x120 | 12.2 | 32 | 60 |
| 400 | 3900 | 76.2x120 | 13.0 | 27 | 51 |
| 400 | 4700 | 76.2x120 | 14.5 | 22 | 42 |
| 400 | 4700 | 76.2x130 | 15.0 | 22 | 42 |
| 400 | 5600 | 76.2x145 | 17.0 | 19 | 36 |
| 400 | 6800 | 76.2x160 | 19.3 | 15 | 29 |
| 400 | 6800 | 89x145 | 20.0 | 15 | 29 |
| 400 | 8200 | 89x160 | 22.0 | 13 | 24 |
| 400 | 10000 | 89x160 | 24.0 | 10 | 20 |
| 400 | 12000 | 89x180 | 28.0 | 9 | 17 |
| 400 | 15000 | 89x200 | 31.0 | 7 | 13 |
| 450 | 220 | 35x50 | 1.4 | 470 | 900 |
| 450 | 330 | 35x60 | 1.7 | 320 | 600 |
| 450 | 470 | 35x80 | 3.5 | 220 | 420 |
| 450 | 680 | 35x120 | 4.2 | 150 | 290 |
| 450 | 680 | 51x80 | 5.5 | 150 | 290 |
| 450 | 1000 | 51x80 | 5.8 | 110 | 200 |
| 450 | 1000 | 51x105 | 6.5 | 110 | 200 |
| 450 | 1500 | 51x120 | 7.1 | 68 | 130 |
| 450 | 2200 | 63.5x100 | 8.4 | 48 | 90 |
| 450 | 2200 | 63.5x120 | 9.2 | 48 | 90 |
| 450 | 2700 | 63.5x130 | 11.3 | 39 | 74 |
| 450 | 3300 | 63.5x145 | 13.2 | 32 | 60 |
| 450 | 3300 | 76.2x120 | 12.7 | 32 | 60 |
| 450 | 3900 | 76.2x145 | 15.0 | 27 | 51 |
| 450 | 4700 | 76.2x120 | 15.0 | 22 | 42 |
| 450 | 4700 | 76.2x160 | 17.0 | 22 | 42 |
| 450 | 5600 | 76.2x130 | 16.0 | 19 | 36 |
| 450 | 5600 | 76.2x160 | 17.8 | 19 | 36 |
| 450 | 5600 | 89x145 | 20.0 | 19 | 36 |
| 450 | 6800 | 76.2x160 | 20.0 | 15 | 29 |
| 450 | 6800 | 76.2x220 | 22.0 | 15 | 29 |
| 450 | 6800 | 89x170 | 23.0 | 15 | 29 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 450 | 8200 | 89x180 | 24.0 | 13 | 24 |
| 450 | 10000 | 89x200 | 27.0 | 10 | 20 |
| 450 | 12000 | 89x236 | 29.0 | 9 | 17 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RQ Series 85°C

Features

Extremely Long useful life

Applications

- ◆ Frequency converters
- ◆ Professional power supplies
- ◆ Hybrid electric vehicles(HEV)
- ◆ Traction

Features

- ◆ Long useful life
- ◆ High reliability
- ◆ Extremely high ripple current capability
- ◆ Wide temperature range
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Low-inductance design
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

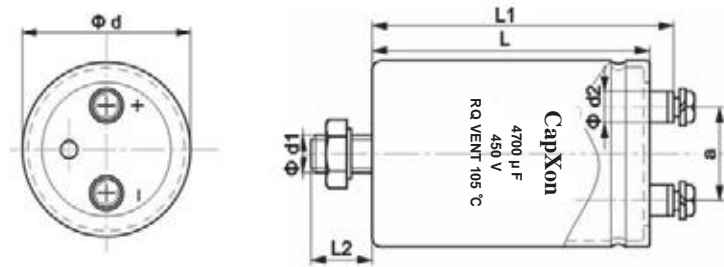
| Item | Performance Characteristics | | | | | | | | | |
|--|--|----------------------|------------|--------------|------------------------------------|---|---|------------------------------------|----|---|
| Operating Temperature Range | -40 to +105°C(160Vdc~450Vdc) | | | | | | | | | |
| Rated voltage V_R | 160 to 450 V DC | | | | | | | | | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | | | | | | | | | |
| Rated capacitance C_R | 2200 to 47000 μF | | | | | | | | | |
| Capacitance tolerance | $\pm 20\%$ (120Hz, +20°C) | | | | | | | | | |
| Leakage Current I_{leak} (+20°C.max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | | | | | | | | | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | | | | | | | | | |
| | <table border="1"> <tr> <td>Working Voltage(VDC)</td> <td>160~450</td> </tr> <tr> <td>D.F. (%)max.</td> <td>15</td> </tr> </table> | Working Voltage(VDC) | 160~450 | D.F. (%)max. | 15 | | | | | |
| Working Voltage(VDC) | 160~450 | | | | | | | | | |
| D.F. (%)max. | 15 | | | | | | | | | |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | | | | | | | | | |
| | d \geq 63.5 mm: approx. 20 nH | | | | | | | | | |
| | Capacitors with low-inductance design: d \geq 63.5 mm: approx. 15 nH | | | | | | | | | |
| Useful life 105°C; $V_R, I_{AC, R}$ | >6000 h | | | | | | | | | |
| | Requirements: $\Delta C/C \leq \pm 15\%$ of initial value $\tan \delta \leq 1.75$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | | | | |
| Voltage Endurance test 105°C; V_R | 2000 h | | | | | | | | | |
| | Post test requirements: $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1.3$ times initial specified limit $I_{leak} \leq$ initial specified limit | | | | | | | | | |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | | | | | | | | | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | | | | | | | | | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | | | | | | | | | |
| | <table border="1"> <tr> <td>$V_R(V)$</td> <td>160-450</td> <td>≥ 500</td> </tr> <tr> <td>$Z_{-25^\circ C} / Z_{20^\circ C}$</td> <td>4</td> <td>4</td> </tr> <tr> <td>$Z_{-40^\circ C} / Z_{20^\circ C}$</td> <td>10</td> <td>-</td> </tr> </table> | $V_R(V)$ | 160-450 | ≥ 500 | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - |
| | $V_R(V)$ | 160-450 | ≥ 500 | | | | | | | |
| $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 | 4 | | | | | | | | |
| $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 | - | | | | | | | | |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | | | | | | | | | |

Multiplier for Ripple Current vs. Frequency

| | | | | | |
|---------------|-----|-----|-----|-----|-----------|
| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Threaded stud mounting



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | | | |
|----------|---------------------------------------|-----------|-------------|---------------|-------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $L_2 + / - 1$ | d_1 | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 16 | M12 | 10.3 | 28.6 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 10.3 | 31.8 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 16 | M12 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

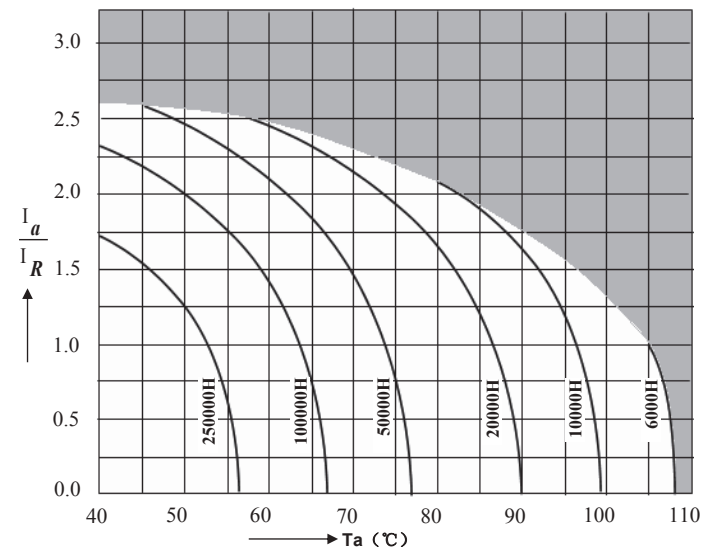
| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 160 | 6800 | 63.5x100 | 11.0 | 16 | 29 |
| 160 | 10000 | 63.5x120 | 12.5 | 11 | 20 |
| 160 | 15000 | 76.2x120 | 15.5 | 7 | 13 |
| 160 | 22000 | 76.2x140 | 20.0 | 5 | 9 |
| 160 | 22000 | 89x130 | 21.0 | 5 | 9 |
| 160 | 33000 | 89x140 | 22.0 | 3 | 6 |
| 160 | 47000 | 89x220 | 28.0 | 3 | 5 |
| 200 | 4700 | 63.5x100 | 8.8 | 24 | 42 |
| 200 | 6800 | 63.5x120 | 12.0 | 16 | 29 |
| 200 | 10000 | 76.2x120 | 13.5 | 11 | 20 |
| 200 | 15000 | 76.2x140 | 16.0 | 7 | 13 |
| 200 | 15000 | 76.2x160 | 17.0 | 7 | 13 |
| 200 | 22000 | 76.2x160 | 22.0 | 5 | 9 |
| 200 | 22000 | 89x140 | 24.0 | 5 | 9 |
| 250 | 3300 | 63.5x100 | 7.5 | 33 | 60 |
| 250 | 4700 | 63.5x120 | 9.5 | 24 | 42 |
| 250 | 6800 | 76.2x120 | 13.0 | 16 | 29 |
| 250 | 10000 | 76.2x160 | 15.0 | 11 | 20 |
| 250 | 10000 | 89x140 | 16.0 | 11 | 20 |
| 250 | 15000 | 89x170 | 20.0 | 7 | 13 |
| 250 | 22000 | 89x220 | 24.5 | 5 | 9 |
| 350 | 2700 | 63.5x80 | 16.0 | 41 | 74 |
| 350 | 3300 | 63.5x100 | 16.5 | 33 | 60 |
| 350 | 3300 | 63.5x120 | 17.5 | 33 | 60 |
| 350 | 3900 | 63.5x120 | 17.7 | 28 | 51 |
| 350 | 4700 | 63.5x145 | 18.6 | 24 | 42 |
| 350 | 4700 | 76.2x105 | 22.4 | 24 | 42 |
| 350 | 4700 | 76.2x120 | 23.0 | 24 | 42 |
| 350 | 5600 | 76.2x130 | 24.0 | 20 | 36 |
| 350 | 6800 | 76.2x140 | 26.0 | 16 | 29 |
| 350 | 8200 | 76.2x160 | 30.0 | 13 | 24 |
| 350 | 8200 | 89x145 | 34.5 | 13 | 24 |
| 350 | 10000 | 76.2x160 | 30.5 | 11 | 20 |
| 350 | 10000 | 76.2x190 | 33.0 | 11 | 20 |
| 350 | 10000 | 89x140 | 38.4 | 11 | 20 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 350 | 12000 | 76.2x220 | 35.0 | 9 | 17 |
| 350 | 12000 | 89x170 | 37.0 | 9 | 17 |
| 350 | 15000 | 89x190 | 38.0 | 7 | 13 |
| 350 | 18000 | 89x220 | 49.0 | 6 | 11 |
| 400 | 2200 | 63.5x100 | 13.5 | 50 | 90 |
| 400 | 2700 | 63.5x105 | 16.5 | 41 | 74 |
| 400 | 3300 | 63.5x130 | 17.5 | 33 | 60 |
| 400 | 3300 | 76.2x105 | 20.2 | 33 | 60 |
| 400 | 3300 | 76.2x120 | 21.0 | 33 | 60 |
| 400 | 3900 | 76.2x120 | 22.2 | 28 | 51 |
| 400 | 4700 | 76.2x120 | 23.5 | 24 | 42 |
| 400 | 4700 | 76.2x130 | 24.5 | 24 | 42 |
| 400 | 5600 | 76.2x145 | 27.0 | 20 | 36 |
| 400 | 6800 | 76.2x160 | 28.6 | 16 | 29 |
| 400 | 6800 | 89x145 | 33.0 | 16 | 29 |
| 400 | 8200 | 89x160 | 35.0 | 13 | 24 |
| 400 | 10000 | 89x160 | 39.0 | 11 | 20 |
| 400 | 12000 | 89x180 | 40.0 | 9 | 17 |
| 400 | 15000 | 89x200 | 42.0 | 7 | 13 |
| 450 | 2200 | 63.5x100 | 13.0 | 50 | 90 |
| 450 | 2200 | 63.5x120 | 14.0 | 50 | 90 |
| 450 | 2700 | 63.5x130 | 16.0 | 41 | 74 |
| 450 | 3300 | 63.5x145 | 18.5 | 33 | 60 |
| 450 | 3300 | 76.2x120 | 19.0 | 33 | 60 |
| 450 | 3900 | 76.2x145 | 22.0 | 28 | 51 |
| 450 | 4700 | 76.2x120 | 21.0 | 24 | 42 |
| 450 | 4700 | 76.2x160 | 23.0 | 24 | 42 |
| 450 | 5600 | 76.2x160 | 23.5 | 20 | 36 |
| 450 | 5600 | 89x145 | 30.5 | 20 | 36 |
| 450 | 6800 | 76.2x160 | 26.5 | 16 | 29 |
| 450 | 6800 | 76.2x220 | 30.5 | 16 | 29 |
| 450 | 6800 | 89x170 | 39.0 | 16 | 29 |
| 450 | 8200 | 89x180 | 42.0 | 13 | 24 |
| 450 | 10000 | 89x200 | 45.0 | 11 | 20 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

RT Series 85°C

Features

Extremely Long useful life

Applications

- ◆ Frequency converters
- ◆ Professional power supplies
- ◆ Traction

Features

- ◆ Outstanding reliability
- ◆ Extra long useful life
- ◆ Wide temperature range
- ◆ Version with low-inductance design available
- ◆ All-welded construction ensures reliable electrical contact
- ◆ Self-extinguishing electrolyte
- ◆ RoHS-compatible

Construction

- ◆ Charge-discharge proof, polar
- ◆ Aluminum case with insulating sleeve
- ◆ Poles with screw terminal connections
- ◆ Mounting with ring clips, clamps or threaded stud



Specifications

| Item | Performance Characteristics | |
|--|--|---|
| Operating Temperature Range | -40 to +105°C(160Vdc~450Vdc) | |
| Rated voltage V_R | 160 to 450 V DC | |
| Surge voltage V_S | $V_R \leq 315V$ 1.15 V_R $V_R > 315V$ 1.10 V_R | |
| Rated capacitance C_R | 2200 to 47000 μF | |
| Capacitance tolerance | $\pm 20\%$ (120Hz,+20°C) | |
| Leakage Current I_{leak} (+20°C,max.) | $I_{leak} = 0.018 \times (C \times V)^{0.85} + 4$ or 5mA, whichever is smaller (after 5 minutes) Where, I_{leak} : Max. leakage current (μA), C : Nominal capacitance (μF), V : Rated voltage (V) | |
| Dissipation Factor ($\tan \delta$, at 20°C, 120Hz) | Less than the value under table(%) | |
| | Working Voltage(VDC) | 160~450 |
| | D.F. (%)max. | 15 |
| Self-inductance ESL | d = 51 mm: approx. 17 nH | |
| | d \geq 63.5 mm: approx. 20 nH | |
| | Capacitors with low-inductance design: | |
| | d \geq 63.5 mm: approx. 15 nH | |
| Useful life 105°C; $V_R, I_{AC,R}$ | >8000 h | Requirements: |
| | | $\Delta C/C \leq \pm 15\%$ of initial value $\tan \delta \leq 1.75$ times initial specified limit $I_{leak} \leq$ initial specified limit |
| Voltage Endurance test 105°C; V_R | 2000 h | Post test requirements: |
| | | $\Delta C/C \leq \pm 10\%$ of initial value $\tan \delta \leq 1.3$ times initial specified limit $I_{leak} \leq$ initial specified limit |
| Vibration Resistance test | To IEC 60068-2-6, test Fc: | |
| | Displacement amplitude 0.75 mm, frequency range 10 ... 55 Hz, acceleration max. 10 g, duration 3x2 h. Capacitor mounted by its body which is rigidly clamped to the work surface. | |
| Characteristics at low temperature | Max. impedance ratio at 120 Hz | |
| | $V_R(V)$ | 160-450 ≥ 500 |
| | $Z_{-25^\circ C} / Z_{20^\circ C}$ | 4 4 |
| | $Z_{-40^\circ C} / Z_{20^\circ C}$ | 10 - |
| Sectional specification | IEC 60384-4 and JIS-C-5101 | |

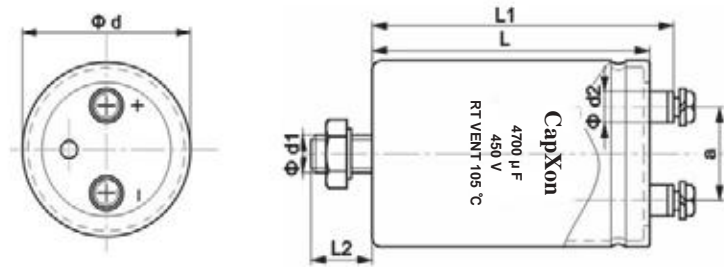
Screw

Multiplier for Ripple Current vs. Frequency

| Frequency(Hz) | 50 | 120 | 300 | 1K | $\geq 3K$ |
|---------------|-----|-----|-----|-----|-----------|
| Multiplier | 0.8 | 1 | 1.2 | 1.3 | 1.4 |

Dimensional drawings

Threaded stud mounting



M5:Min.reach of screw = 8mm
 M6:Min.reach of screw = 12mm
 M8:Min.reach of screw = 16mm

Dimensions

| Terminal | Dimensions(mm) with insulating sleeve | | | | | | |
|----------|---------------------------------------|-----------|-------------|---------------|-------|-------------------|-------------|
| | $d \pm 2$ | $L \pm 3$ | $L_1 \pm 3$ | $L_2 + / - 1$ | d_1 | $d_2 \text{max.}$ | $a \pm 0.5$ |
| M5 | 63.5 | 80~140 | 86.5~146.5 | 16 | M12 | 10.3 | 28.6 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 10.3 | 31.8 |
| M5/M6 | 76.2/89 | 100~240 | 106.4~246.5 | 16 | M12 | 17.5 | 31.8 |
| M8 | 100 | 100~240 | 110~250 | 16 | M12 | 17.5 | 41.5 |

Packing

| Capacitor diameter d(mm) | length l(mm) | Packing units (pcs.) |
|--------------------------|--------------|----------------------|
| 63.5 | all | 24 |
| 76.2 | all | 15 |
| 89 | all | 12 |
| 100 | all | 6 |

Packing of screw



Accessories

The following items are included in the delivery package, but are not fastened to the capacitors.

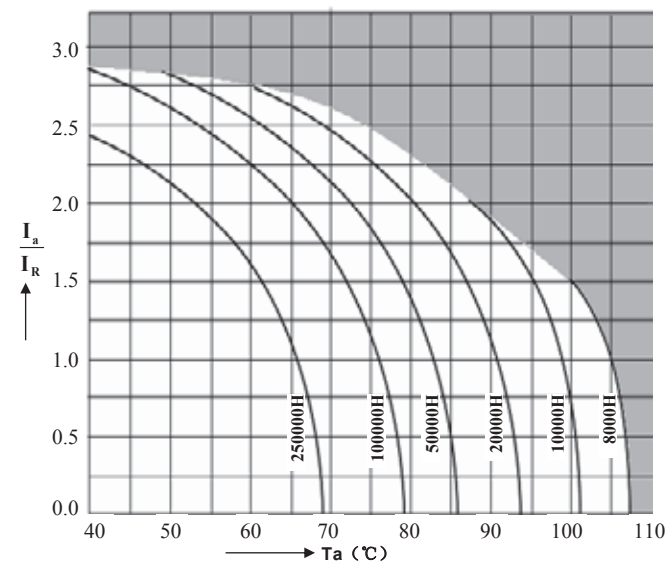
| | Thread | Maximum torque |
|---------------|--------|----------------|
| For terminals | M5 | 2 Nm |
| | M6 | 2.5 Nm |
| | M8 | 5.0 Nm |
| For mounting | M12 | 10 Nm |

Case Size

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 160 | 6800 | 63.5x100 | 12.0 | 15 | 29 |
| 160 | 10000 | 63.5x120 | 13.8 | 10 | 20 |
| 160 | 15000 | 76.2x120 | 17.0 | 7 | 13 |
| 160 | 22000 | 76.2x140 | 22.0 | 5 | 9 |
| 160 | 22000 | 89x130 | 23.0 | 5 | 9 |
| 160 | 33000 | 89x140 | 24.0 | 3 | 6 |
| 160 | 47000 | 89x220 | 31.0 | 3 | 5 |
| 200 | 4700 | 63.5x100 | 9.7 | 22 | 42 |
| 200 | 6800 | 63.5x120 | 13.5 | 15 | 29 |
| 200 | 10000 | 76.2x120 | 15.0 | 10 | 20 |
| 200 | 15000 | 76.2x140 | 17.5 | 7 | 13 |
| 200 | 15000 | 76.2x160 | 18.5 | 7 | 13 |
| 200 | 22000 | 76.2x160 | 24.0 | 5 | 9 |
| 200 | 22000 | 89x140 | 26.0 | 5 | 9 |
| 250 | 3300 | 63.5x100 | 8.3 | 32 | 60 |
| 250 | 4700 | 63.5x120 | 10.5 | 22 | 42 |
| 250 | 6800 | 76.2x120 | 14.5 | 15 | 29 |
| 250 | 10000 | 76.2x160 | 16.5 | 10 | 20 |
| 250 | 10000 | 89x140 | 17.5 | 10 | 20 |
| 250 | 15000 | 89x170 | 22.0 | 7 | 13 |
| 250 | 22000 | 89x220 | 27.0 | 5 | 9 |
| 350 | 2700 | 63.5x80 | 17.5 | 39 | 74 |
| 350 | 3300 | 63.5x100 | 18.0 | 32 | 60 |
| 350 | 3300 | 63.5x120 | 19.0 | 32 | 60 |
| 350 | 3900 | 63.5x120 | 19.5 | 27 | 51 |
| 350 | 4700 | 63.5x145 | 20.5 | 22 | 42 |
| 350 | 4700 | 76.2x105 | 24.6 | 22 | 42 |
| 350 | 4700 | 76.2x120 | 25.5 | 22 | 42 |
| 350 | 5600 | 76.2x130 | 26.5 | 19 | 36 |
| 350 | 6800 | 76.2x140 | 28.5 | 15 | 29 |
| 350 | 8200 | 76.2x160 | 33.0 | 13 | 24 |
| 350 | 8200 | 89x145 | 39.0 | 13 | 24 |
| 350 | 10000 | 76.2x160 | 33.5 | 10 | 20 |
| 350 | 10000 | 76.2x190 | 36.0 | 10 | 20 |
| 350 | 10000 | 89x140 | 42.0 | 10 | 20 |

| WV (Vdc) | Cap (uF) | Size (mm) | Rated Ripple current (Arms/105°C /120Hz) | Typ. ESR 20°C 120Hz (mΩ) | MAX ESR 20°C 120Hz (mΩ) |
|----------|----------|-----------|--|--------------------------|-------------------------|
| 350 | 12000 | 76.2x220 | 38.0 | 9 | 17 |
| 350 | 12000 | 89x170 | 40.0 | 9 | 17 |
| 350 | 15000 | 89x190 | 42.0 | 7 | 13 |
| 350 | 18000 | 89x220 | 51.0 | 6 | 11 |
| 400 | 2200 | 63.5x100 | 14.8 | 48 | 90 |
| 400 | 2700 | 63.5x105 | 18.2 | 39 | 74 |
| 400 | 3300 | 63.5x130 | 19.3 | 32 | 60 |
| 400 | 3300 | 76.2x105 | 22.0 | 32 | 60 |
| 400 | 3300 | 76.2x120 | 23.0 | 32 | 60 |
| 400 | 3900 | 76.2x120 | 24.0 | 27 | 51 |
| 400 | 4700 | 76.2x120 | 25.8 | 22 | 42 |
| 400 | 4700 | 76.2x130 | 27.0 | 22 | 42 |
| 400 | 5600 | 76.2x145 | 30.0 | 19 | 36 |
| 400 | 6800 | 76.2x160 | 31.5 | 15 | 29 |
| 400 | 6800 | 89x145 | 36.0 | 15 | 29 |
| 400 | 8200 | 89x160 | 38.5 | 13 | 24 |
| 400 | 10000 | 89x160 | 43.0 | 10 | 20 |
| 400 | 12000 | 89x180 | 44.0 | 9 | 17 |
| 400 | 15000 | 89x200 | 46.0 | 7 | 13 |
| 450 | 2200 | 63.5x100 | 15.0 | 48 | 90 |
| 450 | 2200 | 63.5x120 | 16.0 | 48 | 90 |
| 450 | 2700 | 63.5x130 | 18.5 | 39 | 74 |
| 450 | 3300 | 63.5x145 | 21.5 | 32 | 60 |
| 450 | 3300 | 76.2x120 | 22.0 | 32 | 60 |
| 450 | 3900 | 76.2x145 | 25.5 | 27 | 51 |
| 450 | 4700 | 76.2x120 | 24.3 | 22 | 42 |
| 450 | 4700 | 76.2x160 | 26.5 | 22 | 42 |
| 450 | 5600 | 76.2x160 | 27.3 | 19 | 36 |
| 450 | 5600 | 89x145 | 35.0 | 19 | 36 |
| 450 | 6800 | 76.2x160 | 30.7 | 15 | 29 |
| 450 | 6800 | 76.2x220 | 35.0 | 15 | 29 |
| 450 | 6800 | 89x170 | 45.0 | 15 | 29 |
| 450 | 8200 | 89x180 | 48.0 | 13 | 24 |
| 450 | 10000 | 89x200 | 50.0 | 10 | 20 |

Useful life



depending on ambient temperature T_a versus under ripple current operating conditions

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