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SPECIFICATION FOR APPROVAL

File No.: Q/FRK 0.GS.E.C3D-C13

Product Name DC-Link Capacitor for PCB
Product Type: C3D
Product Code D3D2K705KB00C00
Customer
Customer Code
Issue Date 2021-7

| Xiamen Faratronic Co. Ltd. | | | Approved by Customer |
|---|---|---|----------------------|
| Drafted | Checked | Approved | |
|  |  |  | |



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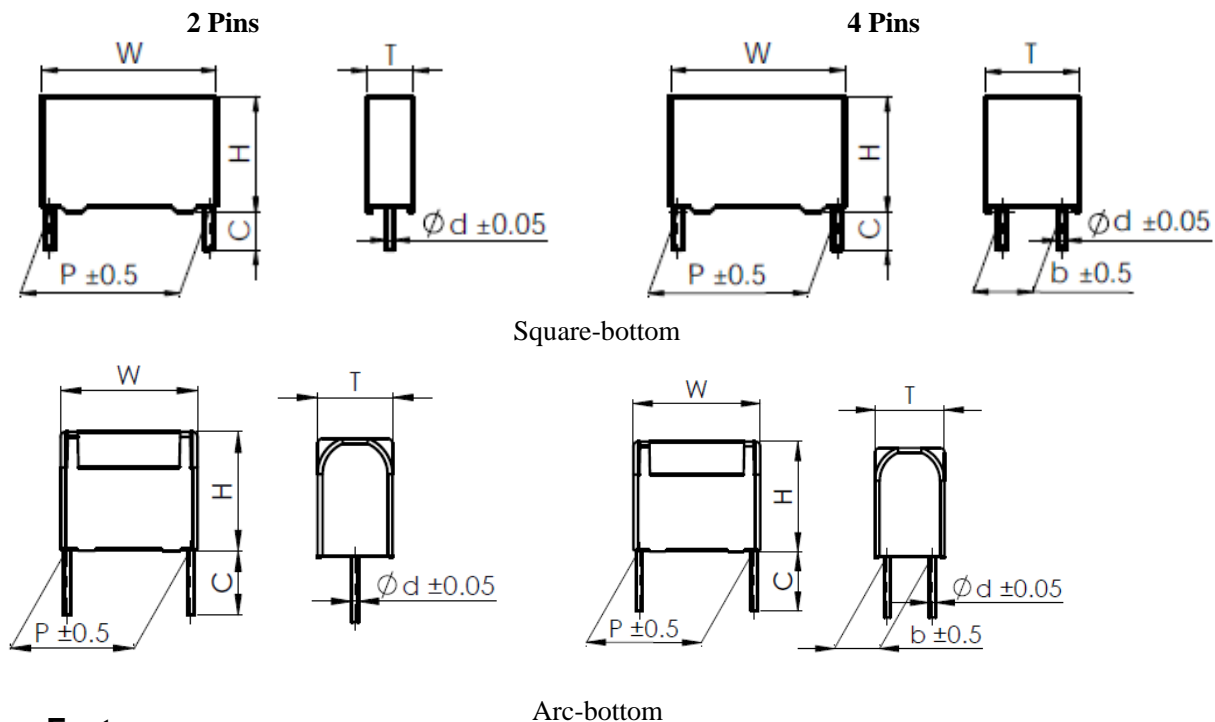


Version history

| Current version | Date | Author | Change description |
|-----------------|------|--------|--------------------|
| | | | |

DC-Link Capacitor for PCB

■ Outline Drawing



■ Features

- Metallized polypropylene structure.
- Excellent electric property.
- Plastic case (UL94 V-0), Filled with resin.
- High performance DC filtering applications
(i.e. transducers, Industrial and high-end power supplies and solar inverters)
- AEC-Q200 qualified

■ Safety Approvals

| | | | |
|---|--|------------------|---|
| ● | | TUV Rheinland | EN 61071: 2007, EN 61881-1: 2011, 450Vdc ~ 3200Vdc, 0.56μF~220μF, -40/85°C Certificate No.: R 50266108 |
| ● | | UL | UL 810 (construction only), Max. 5000Vdc, 90°C File No.: E256238, CCN: CZDS2 |

■ Specifications

| | |
|--|--|
| Reference Standard | GB/T 17702 (IEC 61071) |
| Climatic Category | 40/85/56 |
| Operating temperature (case) | -40°C~105°C (+85°C to +105°C: decreasing factor 1.35% per °C for $U_{N, 85^{\circ}C}$) |
| $U_{N, 85^{\circ}C}$ | 500Vdc, 600Vdc, 800Vdc, 900Vdc, 1 000Vdc, 1 100Vdc, 1 200Vdc |
| Capacitance Tolerance | J ($\pm 5\%$), K ($\pm 10\%$) |
| Voltage Proof | 1.5 U_N (10s) |
| Insulation Resistance($IR \times C_N$) | $\geq 10\ 000s$ (20°C, 100V, 1min) |
| Self Inductance (L_s) | <1nH per mm of lead spacing |
| Maximum peak current \hat{I} (A) | $\hat{I} = C \cdot dV/dt$ |
| Expected lifetime | 100 000h @ U_N , $\theta_{hs} = 70^{\circ}C$ |



■ Part number code system

The 15 digits part number is formed as follow:

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| D | 3 | D | | | | | | | | | | | | |

- Digit 1 to 3 Series code C3D=D3D Automotive
- Digit 4 to 5 D.C. rated voltage 2H=500V 1U=600V 2K=800V 1X=900V
 3A=1 000V 1M=1 100V 3L=1 200V
- Digit 6 to 8 Rated capacitance value for example: 256=25×106pF=25.0μF
- Digit 9 Capacitance tolerance J=±5% K=±10%
- Digit 10 Pitch B=27.5 mm C=30.0 mm F=37.5 mm M=52.5 mm
- Digit 11 Internal use
- Digit 12 to 15 Lead form and packaging code

■ Table 1 lead form and packaging code

| Digit 12 | | Digit 13 and Digit 14 | | Digit 15 | |
|----------|------------------------------|-----------------------|--|----------|-------------------------|
| Code | Explanation | Code | Explanation | Code | Explanation |
| 0 | Two pins (bulk) | C0 B0 | Standard lead length 5.5mm lead length 20mm | 0 | Length tolerance ±1.0mm |
| 1 | Our pins (bulk) b=10.0mm | | | 2 | Length tolerance ±0.5mm |
| 2 | Four pins (bulk) b=12.7mm | | | A | Length tolerance 0~+5mm |
| 3 | Four pins (bulk) b=20.0mm | | | | |
| 4 | Four pins (bulk) b=15.0mm | | | | |
| A | four pins(bulk) b=20.3mm | | | | |
| B | four pins(bulk) b=10.2mm | | | | |
| C | four pins(bulk) b=5.1mm | | | | |
| D | four pins(bulk) b=15.2mm | | | | |



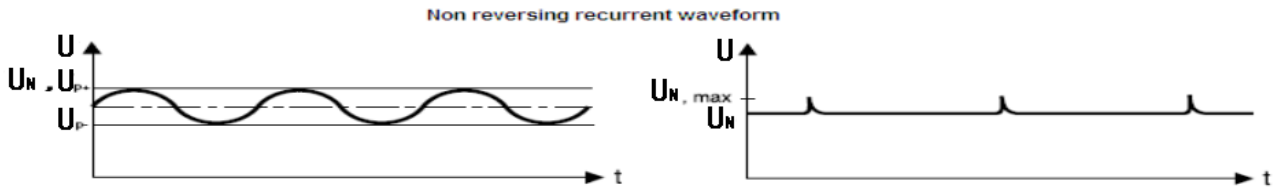
■ Technical data (mm)

| U _{N,85°C} : 800Vdc | | | | | | | | | | | | |
|------------------------------|-----------|-----------|-----------|-----------|-----------|------------|-----------------|----------------------------|-------|-----------------------|-------------------------|-----------------|
| C _N (μF) | W ±1.0 | H ±1.0 | T ±1.0 | P ±0.5 | b ±0.5 | d ±0.05 | dV/dt (V/μs) | tanδ × (10 ⁻⁴) | | ESR @10kHz (mΩ) | I _{max} (A) | Part number |
| | | | | | | | | 1kHz | 10kHz | | | |
| 7.0 | 32.0 | 30.0 | 16.0 | 27.5 | - | 0.8 | 65 | 10 | 95 | 13.0 | 10.2 | D3D2K705KB00C00 |

Note: 1. "I_{max}"=Maximum r.m.s current at 10kHz, Θ_{amb}=70°C, ΔΘ_{case}=15.0°C.

■ Typical waveforms

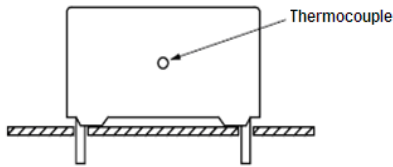
These capacitors are only suitable for DC applications. It means the voltage applied to the capacitors must be unidirectional ripple voltage.



Note:

- The peak voltage(U_{P+}) shall not be greater then the rated DC voltage(U_N).
- The peak-to-peak ripple voltage(U_{P-P}) shall not be greater then $0.3 \times (U_N)$.
- The maximum component surface temperature rise must be lower than 15°C .

■ Measuring the component temperature



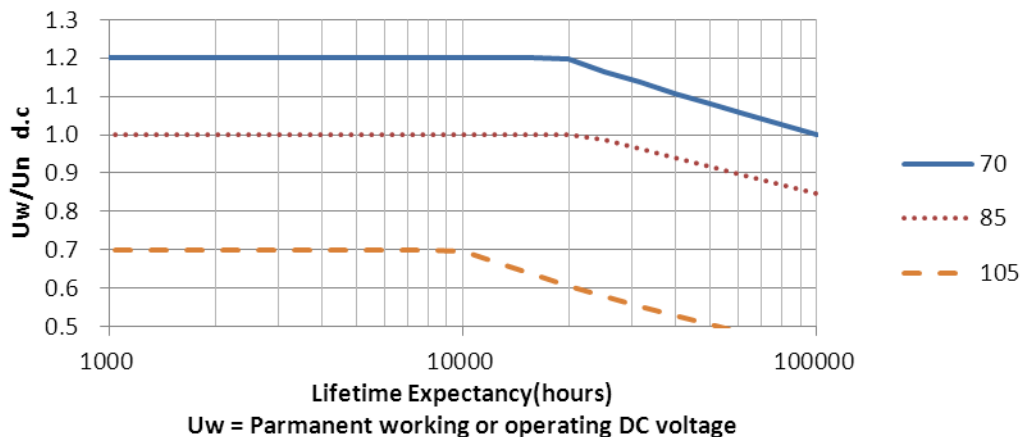
Note:

- The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c)
- The temperature rise is given by $\Delta T = T_c - T_{amb}$
- To avoid thermal radiation or convection, the capacitor must be tested in a closed area from air circulation

■ Over voltages according to IEC 61071:

- 1.1 U_N 30% of on-load-dur.
- 1.15 U_N 30min/day
- 1.2 U_N 5min/day
- 1.3 U_N 1min/day
- 1.5 U_N 100ms every time, 1000 times during the whole life of the capacitor

■ Lifetime expectancy (typical curve)





■ Test Method And Performance

| No. | Item | Performance | Testing Method IEC 61071 |
|-----|---------------------------------------|---|---|
| 1 | 5.14.2 External inspection | Legible marking and finish as specified Dimensions: see specific drawing | Check for finish, marking and overall dimensions |
| | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.14.1.1 Robustness of terminations | There shall be no visible damage | Tensile U _{a1} Wire diameter load d ≤ 0.8mm 10N 0.8 mm < d ≤ 1.2mm 20N Bending U _{b1} Wire diameter load d ≤ 0.8 mm 5N 0.8 mm < d ≤ 1.2 mm 10N 4×90°, duration 2s to 3s |
| | 5.14.1.6 Resistance to soldering heat | There shall be no visible damage. | Solder temperature: 260°C ± 5°C Immersion time: 10s ± 1s |
| | Final measurements | \ΔC/C ≤ 0.5% (relative to the initial value) Increase of tgδ: ≤ 0.005 | |
| 2 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.14.3.1 Vibration | There shall be no evidence damage | f = 10 Hz to 55 Hz a = ± 0.35 mm Test duration per axis = 10 frequency cycles (3 axes offset from each other by 90°C), 1 octave/min, the total times are 135min for 3 axes. |
| | 5.14.3.1 Impacts | There shall be no evidence damage | 1 000 times, Acceleration: 390m/s ² Pulse duration: 6ms |
| | Final measurements | \ΔC/C ≤ 0.5% (relative to the initial value) Increase of tgδ: ≤ 0.005 | |
| 3 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.9 Surge discharge test | | Test voltage: 1.1U _{NDC} Number of discharges: 5 Time lapse every 2 min (10min total) Within 5 min after the surge discharge test, the capacitor shall be subjected to a voltage test between terminals: 1.5U _{NDC} , 60s |
| | Final measurements | \ΔC/C ≤ 1.0% (relative to the initial value) tgδ: ≤ 1.2 × tgδ ₀ (the initial tgδ) + 0.0001 | |
















| No. | Item | Performance | Testing Method IEC 61071 |
|-----|---|---|--|
| 4 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.11 Self-healing | | Voltage: 1.5U _{NDC} Duration: 10s If fewer than five clearing occur during this time, the voltage shall be increased slowly until five clearings have occurred since the start of the test or until the voltage has reached 2.5U _{NDC} If fewer than five clearings have occurred when the voltage has reached 2.5U _{NDC} , for a time of 10s, the test shall be finished. |
| | | $ \Delta C/C \leq 0.5\%$ (relative to the initial value) tgδ: $\leq 1.1 \times \text{tg}\delta_0 (\text{the initial tg}\delta) + 0.0001$ | |
| 5 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.13.1 Change of temperature | There shall be no evidence of deterioration | Test: Na θ _A = -40°C, θ _B = +85°C 5 cycles, Duration: t=30min |
| | Final measurements | $ \Delta C/C \leq 2.0\%$ (relative to the initial value) Increase of tgδ: ≤ 0.015 | |
| 6 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.13.2 Damp heat, steady state | There shall be no evidence of deterioration. | Temperature: 40°C ±2°C Humidity: 93±3 %RH Duration: 56 days |
| | 5.5.1 Voltage test between terminals | There shall be no permanent puncturing or flashover. | 1.5U _{NDC} , 60s |
| | 5.6.1 Voltage test between terminals and case | There shall be no permanent puncturing or flashover. | 2 000VAC, 10s |
| | Final measurements | $ \Delta C/C \leq 2.0\%$ (relative to the initial value) Increase of tgδ: ≤ 0.015 | |
| 7 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.10.1 Thermal stability test | Throughout the last 6h, the temperature of the case near of the top rise shall not increase by more than 1°C | Temperature: ambient temperature Test current: 1.1I _{rms} Test frequency: 10kHz Test time: 48h During the last 6h, the temperature of the case near of the top rise shall be measured per 1.5h. |
| | Final measurements | $ \Delta C/C \leq 2.0\%$ (relative to the initial value) tgδ: $\leq 1.2 \times \text{tg}\delta_0 (\text{the initial tg}\delta) + 0.015$ | |

| No. | Item | Performance | Testing Method IEC 61071 |
|-----|----------------------|--|--|
| 8 | Initial measurements | Capacitance at 1kHz tgδ at 10kHz | |
| | 5.15 Endurance | | Measuring procedure: (1) 1.3U _{NDC} , 85°C, 500h (2) Charging and discharging: Times: 1 000 dv/dt: according to the technical data (3) 1.3U _{NDC} , 85°C, 500h |
| | Final measurements | $ \Delta C/C \leq 3.0\%$ (relative to the initial value) Increase of tgδ: ≤ 0.015 | |



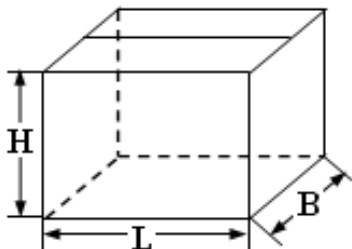
■ Marking(For Example)

| Including TUV | Without TUV |
|---|---|
|  C3D 1100VDC 2.0μF±10% SH 40/85/56 D85E0701234  E256238  EN61071 |  C3D 900VDC 85 μF±10% SH 40/85/56 D85E0701234  E256238 |
|  C3D D85E0701234 1100VDC 2.0μF±10% 40/85/56 SH  E256238  EN61071 |  C3D D85E0701234 900VDC 85μF±10% 40/85/56 SH  E256238 |

|  | Brand | C3D | Type |
|---|------------------------|---|---------------------------------|
| 1100VDC 900VDC | Rated voltage | 2.0μF ± 10% 85 μ F ± 10% | Rated capacitance and tolerance |
| SH | Self-healing capacitor | 40/85/56 | Climate category |
| 85E0701234 | Lot No. |  | UL Approved |
|  | TUV Approved | E256238 | UL Approved File No. |
| EN61071 | TUV apply standard | | |

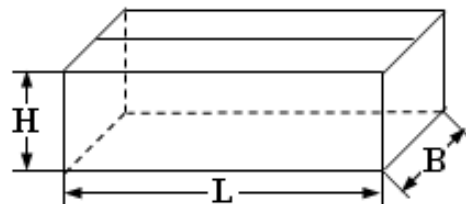
■ Packing box sizes(mm)(example)

1. Out packing box for bulk



L:375±5
B:375±5
H:265±5

2. Inner packing box for bulk



L:355±3
B:175±3
H:118±3

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