

## Part Numbering System



① Category code

| Type                   | Code |
|------------------------|------|
|                        | 1    |
| Electrolytic Capacitor | E    |
| Conductive Polymer     | S    |

② Series code

| Series name | Code |   |
|-------------|------|---|
|             | 2    | 3 |
| WH          | W    | H |
| CD11GE      | G    | E |
| CD11GES     | G    | X |
| CD11GAS     | G    | W |
| CD11GHS     | G    | S |
| NR          | N    | R |
| PZ          | P    | Z |

③ Voltage code

| WV (V <sub>dc</sub> ) | Code |   |
|-----------------------|------|---|
|                       | 4    | 5 |
| 2.5                   | 0    | E |
| 3                     | 0    | D |
| 4                     | 0    | G |
| 6.3                   | 0    | J |
| 6.8                   | 0    | C |
| 7                     | 0    | Q |
| 7.5                   | 0    | A |
| 10                    | 1    | A |
| 12                    | 1    | T |
| 16                    | 1    | C |
| 25                    | 1    | E |
| 35                    | 1    | V |
| 40                    | 1    | G |
| 50                    | 1    | H |
| 63                    | 1    | J |
| 80                    | 1    | B |
| 100                   | 1    | K |
| 120                   | 2    | B |
| 160                   | 2    | C |
| 180                   | 2    | L |
| 200                   | 2    | D |
| 220                   | 2    | N |
| 250                   | 2    | E |
| 315                   | 2    | F |
| 350                   | 2    | V |
| 380                   | 2    | P |
| 400                   | 2    | G |
| 420                   | 2    | T |
| 450                   | 2    | W |
| 500                   | 2    | H |
| 550                   | 2    | J |
| 600                   | 2    | K |

④ Capacitance tolerance code

| Tol. (%) | Code |
|----------|------|
|          | 6    |
| -10~+10  | K    |
| -20~+20  | M    |
| -10~+30  | Q    |
| -10~+20  | V    |
| 0~+20    | A    |
| -5~+20   | C    |
| -10~-20  | B    |
| -5~+5    | D    |
| 0~+10    | E    |
| -5~-20   | F    |
| -15~+5   | N    |

⑤ Capacitance code

| Cap (μF) | Code |   |   |
|----------|------|---|---|
|          | 7    | 8 | 9 |
| 0.10     | R    | 1 | 0 |
| 0.22     | R    | 2 | 2 |
| 0.33     | R    | 3 | 3 |
| 0.47     | R    | 4 | 7 |
| 0.68     | R    | 6 | 8 |
| 1        | 0    | 1 | 0 |
| 2.2      | 2    | R | 2 |
| 3.3      | 3    | R | 3 |
| 4.7      | 4    | R | 7 |
| 6.8      | 6    | R | 8 |
| 10       | 1    | 0 | 0 |
| 22       | 2    | 2 | 0 |
| 33       | 3    | 3 | 0 |
| 47       | 4    | 7 | 0 |
| 68       | 6    | 8 | 0 |
| 100      | 1    | 0 | 1 |
| 220      | 2    | 2 | 1 |
| 330      | 3    | 3 | 1 |
| 470      | 4    | 7 | 1 |
| 680      | 6    | 8 | 1 |
| 1000     | 1    | 0 | 2 |
| 2200     | 2    | 2 | 2 |
| 3300     | 3    | 3 | 2 |
| 4700     | 4    | 7 | 2 |
| 6800     | 6    | 8 | 2 |
| 10000    | 1    | 0 | 3 |
| 22000    | 2    | 2 | 3 |
| 33000    | 3    | 3 | 3 |
| 68000    | 6    | 8 | 3 |

⑥ Size code

| ΦD (mm) | Code |
|---------|------|
| 10      |      |
| 4       | C    |
| 5       | D    |
| 6.3     | E    |
| 8       | F    |
| 10      | G    |
| 11      | H    |
| 12      | J    |
| 12.5    | W    |
| 13      | K    |
| 14      | X    |
| 16      | L    |
| 18      | M    |
| 19      | Z    |
| 20      | N    |
| 22      | O    |
| 25      | P    |
| 30      | Q    |
| 35      | R    |
| 40      | Y    |
| 51.6    | S    |
| 64.3    | T    |
| 76.9    | U    |
| 91      | V    |
| 100     | A    |

| L (mm) | Code |    |
|--------|------|----|
|        | 11   | 12 |
| 5      | 0    | 5  |
| 7      | 0    | 7  |
| 11     | 1    | 1  |
| 12     | 1    | 2  |
| 16     | 1    | 6  |
| 20     | 2    | 0  |
| 25     | 2    | 5  |
| 30     | 3    | 0  |
| 35     | 3    | 5  |
| 40     | 4    | 0  |
| 46     | 4    | 6  |
| 50     | 5    | 0  |
| 60     | 6    | 0  |
| 80     | 8    | 0  |
| 100    | A    | 0  |
| 115    | B    | 5  |
| 120    | C    | 0  |
| 130    | D    | 0  |
| 140    | E    | 0  |
| 160    | G    | 0  |
| 200    | K    | 0  |
| 220    | M    | 0  |
| 236    | N    | 6  |
| 250    | P    | 0  |

⑦ Terminal code

| Specification                         | Code | Size |    |
|---------------------------------------|------|------|----|
|                                       | 13   | 14   | 15 |
| Bulk packing                          | O    | -    | -  |
| Taping (SMD Type)                     | D    | 0    | 0  |
| Φ4~8 Taping F=5.0mm                   | P    | 5    | 0  |
| Φ10~12.5 Taping F=5.0mm               | B    | 5    | 0  |
| Lead Cut L=3.5mm                      | C    | 3    | 5  |
| Lead Cut L=11.0mm                     | C    | B    | 0  |
| Lead Forming & Cut L=4.5mm            | F    | -    | -  |
| Kink & Cut L=4.5mm                    | J    | -    | -  |
| Snap-in type Terminal 4.0mm in length | K    | -    | -  |
| Three Terminals                       | T    | -    | -  |
| Ring clip mounting standard design    | A    | 0    | 0  |
| Ring clip mounting special design     | S    | -    | -  |

⑧ Sleeve/Marking code

| Sleeve/Marking | Code |
|----------------|------|
|                | 16   |
| PVC            | C    |
| PET            | T    |
| Dark blue      | B    |
| Bright red     | R    |
| Sky-blue       | S    |
| Light blue     | T    |
| Pink           | Z    |
| Black          | H    |
| Purple-blue    | V    |
| Red            | O    |

Lead Forming  
Taping Specifications

Fig.1 code: X



Fig.2 code: B



Fig.3 code: B



Fig.4 code: P



## Lead Forming

Specification Fig.1 & Fig.2 & Fig.3

| Items   | Symbol | Case size  |     |            |      |      |      |       |                |                  |                                   | Tolerance |              |  |
|---|--------|------------|-----|------------|------|------|------|-------|----------------|------------------|-----------------------------------|-----------|--------------|--|
|   |        | 4*5<br>4*7 |     | 5*5<br>5*7 |      | 5*11 |      | 6.3*5 | 6.3*7<br>6.3*9 | 6.3*11<br>6.3*12 | 8*5/7<br>8*9/11<br>8*11.5<br>8*12 |           | 8*16<br>8*20 | 10*9/12<br>10*12.5<br>10*13/16<br>10*20/25 |
| Pin Code                                      |        | X          | B   | X          | B    | X    | B    | B     | B              | B                | B                                 | B         | B            |  |
| Lead wire diameter                            | Φd     | 0.45       |     | 0.45       |      | 0.5  |      | 0.45  | 0.5            | 0.5              | 0.45/0.5                          | 0.6       | 0.6          | ±0.05                                      |
| Pitch of body                                 | P      | 12.7       |     | 12.7       |      | 12.7 |      | 12.7  | 12.7           | 12.7             | 12.7                              | 12.7      | 12.7         | ±1.0                                       |
| Feed hole pitch                               | P0     | 12.7       |     | 12.7       |      | 12.7 |      | 12.7  | 12.7           | 12.7             | 12.7                              | 12.7      | 12.7         | ±0.2                                       |
| Distance from hole center to lead             | P1     | 5.1        | 5.6 | 5.1        | 5.35 | 5.1  | 5.35 | 5.1   | 5.1            | 5.1              | 4.6                               | 4.6       | 3.85         | ±0.7                                       |
| Distance from feed hole center to body center | P2     | 6.35       |     | 6.35       |      | 6.35 |      | 6.35  | 6.35           | 6.35             | 6.35                              | 6.35      | 6.35         | ±1.0                                       |
| Lead-to-lead distance                         | F      | 2.5        | 1.5 | 2.5        | 2.0  | 2.5  | 2.0  | 2.5   | 2.5            | 2.5              | 3.5                               | 3.5       | 5.0          | ±0.5                                       |
| Height of body from tape center               | H      | 18.5       |     | 18.5       |      | 18.5 |      | 18.5  | 18.5           | 18.5             | 18.5                              | 18.5      | 18.5         | ±0.75                                      |
| Base tape width                               | W      | 18.0       |     | 18.0       |      | 18.0 |      | 18.0  | 18.0           | 18.0             | 18.0                              | 18.0      | 18.0         | ±0.5                                       |
| Adhesive tape width                           | W0     | 6.0        |     | 6.0        |      | 6.0  |      | 6.0   | 6.0            | 8.0              | 8.0                               | 8.0       | 11.0         | min  |
| Hole position                                 | W1     | 9.0        |     | 9.0        |      | 9.0  |      | 9.0   | 9.0            | 9.0              | 9.0                               | 9.0       | 9.0          | +0.75<br>-0.5                              |
| Hole down tape position                       | W2     | 3.0        |     | 3.0        |      | 3.0  |      | 3.0   | 3.0            | 3.0              | 3.0                               | 3.0       | 3.0          | max  |

Specification Fig.4

| Items   | Symbol | Case size  |      |      |      |       |                |                  |                              |              | Tolerance     |
|---|--------|------------|------|------|------|-------|----------------|------------------|------------------------------|--------------|---------------|
|   |        | 4*5<br>4*7 | 5*5  | 5*7  | 5*11 | 6.3*5 | 6.3*7<br>6.3*9 | 6.3*11<br>6.3*12 | 8*5/7<br>8*9/11<br>8*11.5/12 | 8*16<br>8*20 |               |
| Pin Code                                      |        | P          | P    | P    | P    | P     | P              | P                | P                            | P            |               |
| Lead wire diameter                            | Φd     | 0.45       | 0.45 | 0.45 | 0.5  | 0.45  | 0.5            | 0.5              | 0.45/0.5                     | 0.6          | ±0.05         |
| Pitch of body                                 | P      | 12.7       | 12.7 | 12.7 | 12.7 | 12.7  | 12.7           | 12.7             | 12.7                         | 12.7         | ±1.0          |
| Feed hole pitch                               | P0     | 12.7       | 12.7 | 12.7 | 12.7 | 12.7  | 12.7           | 12.7             | 12.7                         | 12.7         | ±0.2          |
| Distance from hole center to lead             | P1     | 3.85       | 3.85 | 3.85 | 3.85 | 3.85  | 3.85           | 3.85             | 3.85                         | 3.85         | ±0.7          |
| Distance from feed hole center to body center | P2     | 6.35       | 6.35 | 6.35 | 6.35 | 6.35  | 6.35           | 6.35             | 6.35                         | 6.35         | ±1.0          |
| Lead-to-lead distance                         | F      | 1.5        | 2.0  | 2.0  | 2.0  | 2.5   | 2.5            | 2.5              | 3.5                          | 3.5          | ±0.5          |
| Lead to lead distance                         | F1     | 5.0        | 5.0  | 5.0  | 5.0  | 5.0   | 5.0            | 5.0              | 5.0                          | 5.0          | +0.8<br>-0.2  |
| Height of body from tape center               | H      | 18.5       | 18.5 | 18.5 | 18.5 | 18.5  | 18.5           | 18.5             | 18.5                         | 18.5         | ±0.75         |
| Lead wire clinch height                       | H0     | 16.0       | 16.0 | 16.0 | 16.0 | 16.0  | 16.0           | 16.0             | 16.0                         | 16.0         | ±0.5          |
| Base tape width                               | W      | 18.0       | 18.0 | 18.0 | 18.0 | 18.0  | 18.0           | 18.0             | 18.0                         | 18.0         | ±0.5          |
| Adhesive tape width                           | W0     | 6.0        | 6.0  | 6.0  | 6.0  | 6.0   | 6.0            | 8.0              | 8.0                          | 8.0          | min           |
| Hole position                                 | W1     | 9.0        | 9.0  | 9.0  | 9.0  | 9.0   | 9.0            | 9.0              | 9.0                          | 9.0          | +0.75<br>-0.5 |
| Hole down tape position                       | W2     | 3.0        | 3.0  | 3.0  | 3.0  | 3.0   | 3.0            | 3.0              | 3.0                          | 3.0          | max           |

### Lead Forming

#### Lead Forming & Cut

Code:C  
RANGE:  $\Phi 4\sim\Phi 18$



Code:F  
RANGE:  $\Phi 4\sim\Phi 8$



| $\Phi D$ | F   | L        | $\Phi D$ | F   | L                  |
|----------|-----|----------|----------|-----|--------------------|
| 4        | 1.5 | 3.0~12.0 | 4        | 5.0 | 3.5, 4.5, 5.0, 7.0 |
| 5        | 2.0 | 3.0~12.0 | 5        | 5.0 | 3.5, 4.5, 5.0, 7.0 |
| 6.3      | 2.5 | 3.0~12.0 | 6.3      | 5.0 | 3.5, 4.5, 5.0, 7.0 |
| 8        | 3.5 | 3.0~12.0 | 8        | 5.0 | 3.5, 4.5, 5.0, 7.0 |
| 10       | 5.0 | 3.0~12.0 | -        | -   | -                  |
| 12.5     | 5.0 | 3.0~12.0 | -        | -   | -                  |
| 16       | 7.5 | 3.0~12.0 | -        | -   | -                  |
| 18       | 7.5 | 3.0~12.0 | -        | -   | -                  |

Code:J  
RANGE:  $\Phi 10\sim\Phi 18$



| $\Phi D$ | F   | L             |
|----------|-----|---------------|
| 10       | 5.0 | 4.0, 4.5, 5.0 |
| 12.5     | 5.0 | 4.0, 4.5, 5.0 |
| 16       | 7.5 | 4.0, 4.5, 5.0 |
| 18       | 7.5 | 4.0, 4.5, 5.0 |

### Solering Recommendation

■ Flow Soldering(Radial Lead Type)



■ Reflow Soldering

- (For Polymer SMD Type)

### Recommended Reflow Profile



| Item        | Preheating                      | T1(°C) | T2(°C) | T3(°C) | t1(sec.) | t2(sec.) | t3(sec.) | Reflow cycle |
|-------------|---------------------------------|--------|--------|--------|----------|----------|----------|--------------|
| Condition 1 | 150°C to 180°C<br>Within 90sec. | ≤260   | 230    | 200    | ≤10      | ≤40      | ≤60      | 1            |
| Condition 2 |                                 | ≤250   | 230    | 200    | ≤10      | ≤40      | ≤60      | 2            |

● (For Liquid SMD Type)

Case size:  $\Phi 6.3$ – $\Phi 10$ mm:

- Temperature at surface of capacitor shall not exceed  $T^{\circ}\text{C}$ .
- The duration for over  $200^{\circ}\text{C}$  temperature and  $T_1^{\circ}\text{C}$  at surface of capacitor shall not exceed  $t$  and  $t_1$  seconds, respectively.
- Preheat shall be done at  $100^{\circ}\text{C}$  to  $200^{\circ}\text{C}$  and for Maximum 180 seconds.



| Case size (mm) | $T(^{\circ}\text{C})$ ① | $T_1(^{\circ}\text{C})$ | $t(\text{sec.})$ ② | $t_1(\text{sec.})$ ③ | Reflow cycle |
|----------------|-------------------------|-------------------------|--------------------|----------------------|--------------|
| $\Phi 6.3$     | 250                     | 230                     | 90                 | 40                   | 1            |
| $\Phi 8$       | 240                     | 230                     | 90                 | 30                   | 1            |
| $\Phi 10$      | 235                     | 230                     | 60                 | 30                   | 1            |

- ① Peak temperature
- ② The duration over  $200^{\circ}\text{C}$  (max.)
- ③ The duration over  $T_1^{\circ}\text{C}$
- Please contact us if capacitors are subject to the conditions other than the allowable range of reflow.

Case size:  $\Phi 12.5$ – $\Phi 18$ mm:

- Temperature at surface of capacitor shall not exceed  $T^{\circ}\text{C}$ .
- The duration for over  $200^{\circ}\text{C}$  temperature and  $T_1^{\circ}\text{C}$  at surface of capacitor shall not exceed  $t$  and  $t_1$  seconds, respectively.
- Preheat shall be done at  $100^{\circ}\text{C}$  to  $180^{\circ}\text{C}$  and for Maximum 150 seconds.



| Case size (mm)          | $T(^{\circ}\text{C})$ ① | $T_1(^{\circ}\text{C})$ | $t(\text{sec.})$ ② | $t_1(\text{sec.})$ ③ | Reflow cycle |
|-------------------------|-------------------------|-------------------------|--------------------|----------------------|--------------|
| $\Phi 12.5$ – $\Phi 18$ | 240                     | 230                     | 60                 | 30                   | 1            |

- ① Peak temperature
- ② The duration over  $200^{\circ}\text{C}$  (max.)
- ③ The duration over  $T_1^{\circ}\text{C}$
- Please contact us if capacitors are subject to the conditions other than the allowable range of reflow.

### WH series

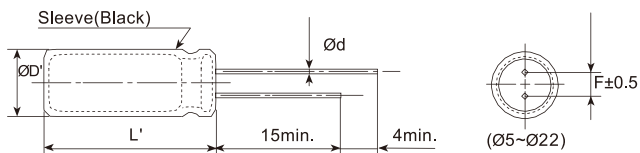
- Standard series for general purpose
- Wide temperature range from -40 °C to +105 °C
- Endurance: +105 °C 2,000 hours
- RoHS Compliant



#### SPECIFICATIONS

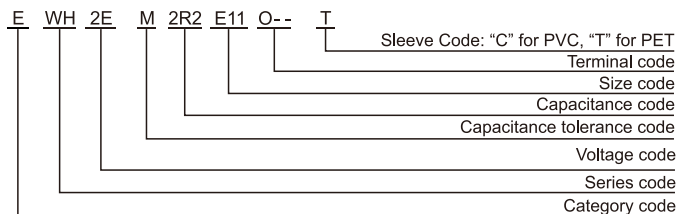
| Items  | Characteristics  |                                      |      |      |      |      |  |      |      |         |         |      |   |
|--|--|--------------------------------------|------|------|------|------|--|------|------|---------|---------|------|---|
| Category Temperature Range                             | -40~+105 °C (6.3~100 V <sub>dc</sub> )   |                                      |      |      |      |      | -25~+105°C(160~500 V <sub>dc</sub> )   |      |      |         |         |      |   |
| Rated Voltage Range                                    | 6.3~500 V <sub>dc</sub>  |                                      |      |      |      |      |  |      |      |         |         |      |   |
| Capacitance Tolerance                                  | ±20%(M) (at 20°C, 120Hz)   |                                      |      |      |      |      |  |      |      |         |         |      |   |
| Leakage Current  | 6.3~100 V <sub>dc</sub>  |                                      |      |      |      |      | 160~500 V <sub>dc</sub>  |      |      |         |         |      | Where, I:Max. leakage current (µA),<br>C:Nominal capacitance (µF),<br>V: Rated voltage (V)<br>(at 20°C) |
|  | I≤0.03CV or 4µA (at 1 minute)<br>I≤0.01CV or 3µA (at 2 minutes)<br>Whichever is greater  |                                      |      |      |      |      | CV After 1 minute After 5 minutes  |      |      |         |         |      |   |
|  |  |                                      |      |      |      |      | CV≤1,000 I≤0.1CV+40µA I≤0.03CV+15µA<br>CV>1,000 I≤0.04CV+100µA I≤0.02CV+25µA |      |      |         |         |      |   |
| Dissipation Factor (tanδ)                              | Rated Voltage(V <sub>dc</sub> )  | 6.3                                  | 10   | 16   | 25   | 35   | 50   | 63   | 100  | 160~250 | 350~400 | 450  | 500   |
|  | tanδ (max.)  | 0.26                                 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10   | 0.09 | 0.08 | 0.20    | 0.24    | 0.24 | 0.24  |
|  | When nominal capacitance exceeds 1,000µF, add 0.02 to the value above for each 1,000µF increase. (at 20°C, 120Hz)  |                                      |      |      |      |      |  |      |      |         |         |      |   |
| Low Temperature Characteristics (Max. Impedance Ratio) | Rated Voltage(V <sub>dc</sub> )  | 6.3                                  | 10   | 16   | 25   | 35   | 50   | 63   | 100  | 160~250 | 350~400 | 450  | 500   |
|  | Z(-25°C)/Z(+20°C)  | 5                                    | 4    | 3    | 2    |      |  |      | 3    | 6       | 6       | 8    |   |
|  | Z(-40°C)/Z(+20°C)  | 12                                   | 10   | 8    | 5    | 4    | 3  |      | -    | -       | -       | -    | (at 120Hz)  |
| Endurance  | The following specifications shall be satisfied when the capacitors are restored to 20°C after DC voltage plus the rated ripple current is applied for 2,000 hours at 105°C. |                                      |      |      |      |      |  |      |      |         |         |      |   |
|  | Capacitance Change   | ≤±20% of the initial value           |      |      |      |      |  |      |      |         |         |      |   |
|  | D.F. (tanδ)  | ≤200% of the initial specified value |      |      |      |      |  |      |      |         |         |      |   |
|  | Leakage Current  | ≤The initial specified value         |      |      |      |      |  |      |      |         |         |      |   |
| Shelf Life   | The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied.               |                                      |      |      |      |      |  |      |      |         |         |      |   |
|  | Capacitance Change   | ≤±20% of the initial value           |      |      |      |      |  |      |      |         |         |      |   |
|  | D.F. (tanδ)  | ≤200% of the initial specified value |      |      |      |      |  |      |      |         |         |      |   |
|  | Leakage Current  | ≤200% of the initial specified value |      |      |      |      |  |      |      |         |         |      |   |

#### DIMENSIONS[mm]



|     |            |     |     |     |      |     |     |      |
|-----|------------|-----|-----|-----|------|-----|-----|------|
| ØD  | 5          | 6.3 | 8   | 10  | 12.5 | 16  | 18  | 22   |
| Ød  | 0.5        | 0.5 | 0.5 | 0.6 | 0.6  | 0.8 | 0.8 | 0.8  |
| F   | 2.0        | 2.5 | 3.5 | 5.0 | 5.0  | 7.5 | 7.5 | 10.0 |
| ØD' | ØD+0.5max. |     |     |     |      |     |     |      |
| L'  | L+2max.    |     |     |     |      |     |     |      |

#### PART NUMBERING SYSTEM



#### RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

| Cap.(µF) \ Freq.(Hz) | 50   | 120  | 300  | 1k   | 10k  | 100k |
|----------------------|------|------|------|------|------|------|
| Cap.<10              | 0.65 | 1.00 | 1.35 | 1.75 | 2.30 | 2.50 |
| 10≤Cap.<100          | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 1.80 |
| 100≤Cap.≤1000        | 0.80 | 1.00 | 1.15 | 1.30 | 1.40 | 1.50 |
| Cap.>1000            | 0.85 | 1.00 | 1.03 | 1.05 | 1.08 | 1.08 |

The endurance of capacitors is shortened with internal heating produced by ripple current at the rate of halving the lifetime with every 5 °C rise. When long life performance is required in actual use, the rms ripple current has to be reduced.

# WH series

■ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) |
|-----------------------|----------|---------------|------|--|
| 6.3(0J)               | 33       | 5*11          | 0.26 | 54   |
|                       | 47       | 5*11          | 0.26 | 64   |
|                       | 100      | 5*11          | 0.26 | 94   |
|                       | 220      | 5*11          | 0.26 | 140  |
|                       | 330      | 6.3*11        | 0.26 | 190  |
|                       | 470      | 6.3*11        | 0.26 | 230  |
|                       | 1000     | 8*12          | 0.26 | 380  |
|                       | 2200     | 10*20         | 0.28 | 710  |
|                       | 3300     | 10*20         | 0.30 | 840  |
|                       | 4700     | 12.5*20       | 0.32 | 1090   |
|                       | 6800     | 12.5*25       | 0.36 | 1350   |
|                       | 10000    | 16*25         | 0.44 | 1650   |
|                       | 15000    | 16*35         | 0.54 | 2010   |
|                       | 22000    | 18*40         | 0.68 | 2350   |
| 10(1A)                | 22       | 5*11          | 0.19 | 46   |
|                       | 33       | 5*11          | 0.19 | 57   |
|                       | 47       | 5*11          | 0.19 | 68   |
|                       | 100      | 5*11          | 0.19 | 100  |
|                       | 220      | 6.3*11        | 0.19 | 170  |
|                       | 330      | 6.3*11        | 0.19 | 200  |
|                       | 470      | 8*11          | 0.19 | 250  |
|                       | 1000     | 10*12.5       | 0.19 | 460  |
|                       | 2200     | 10*20         | 0.21 | 760  |
|                       | 3300     | 12.5*20       | 0.23 | 1000   |
|                       | 4700     | 12.5*25       | 0.25 | 1260   |
|                       | 6800     | 16*25         | 0.29 | 1570   |
|                       | 10000    | 16*35         | 0.37 | 1890   |
|                       | 15000    | 18*35         | 0.47 | 2180   |
| 16(1C)                | 10       | 5*11          | 0.16 | 34   |
|                       | 22       | 5*11          | 0.16 | 51   |
|                       | 33       | 5*11          | 0.16 | 63   |
|                       | 47       | 5*11          | 0.16 | 75   |
|                       | 100      | 5*11          | 0.16 | 110  |
|                       | 220      | 6.3*11        | 0.16 | 180  |
|                       | 330      | 8*11          | 0.16 | 260  |
|                       | 470      | 8*12          | 0.16 | 310  |
|                       | 1000     | 10*16         | 0.16 | 560  |
|                       | 2200     | 12.5*20       | 0.18 | 920  |
|                       | 3300     | 12.5*25       | 0.20 | 1170   |
|                       | 4700     | 16*25         | 0.22 | 1480   |
|                       | 6800     | 16*30         | 0.26 | 1780   |
|                       | 10000    | 18*35         | 0.34 | 2060   |
| 25(1E)                | 4.7      | 5*11          | 0.14 | 25   |
|                       | 10       | 5*11          | 0.14 | 36   |
|                       | 22       | 5*11          | 0.14 | 54   |
|                       | 33       | 5*11          | 0.14 | 67   |
|                       | 47       | 5*11          | 0.14 | 80   |
|                       | 100      | 6.3*11        | 0.14 | 130  |
|                       | 220      | 8*11          | 0.14 | 230  |
|                       | 330      | 8*12          | 0.14 | 310  |
|                       | 470      | 10*12.5       | 0.14 | 380  |
|                       | 1000     | 10*20         | 0.14 | 680  |
|                       | 2200     | 12.5*25       | 0.16 | 1090   |
|                       | 3300     | 16*25         | 0.18 | 1400   |
|                       | 4700     | 16*30         | 0.20 | 1710   |
|                       | 6800     | 18*35         | 0.24 | 2040   |

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) |
|-----------------------|----------|---------------|------|--|
| 35(1V)                | 4.7      | 5*11          | 0.12 | 28   |
|                       | 10       | 5*11          | 0.12 | 41   |
|                       | 22       | 5*11          | 0.12 | 61   |
|                       | 33       | 5*11          | 0.12 | 75   |
|                       | 47       | 5*11          | 0.12 | 90   |
|                       | 100      | 6.3*11        | 0.12 | 150  |
|                       | 220      | 8*12          | 0.12 | 270  |
|                       | 330      | 10*12.5       | 0.12 | 350  |
|                       | 470      | 10*16         | 0.12 | 460  |
|                       | 1000     | 12.5*20       | 0.12 | 810  |
|                       | 2200     | 16*25         | 0.14 | 1260   |
|                       | 3300     | 16*35         | 0.16 | 1610   |
|                       | 4700     | 18*35         | 0.18 | 1910   |
|                       | 50(1H)   | 0.10          | 5*11 | 0.10   |
| 0.22                  |          | 5*11          | 0.10 | 2.9  |
| 0.33                  |          | 5*11          | 0.10 | 4.3  |
| 0.47                  |          | 5*11          | 0.10 | 6.2  |
| 1.0                   |          | 5*11          | 0.10 | 13   |
| 2.2                   |          | 5*11          | 0.10 | 20   |
| 3.3                   |          | 5*11          | 0.10 | 25   |
| 4.7                   |          | 5*11          | 0.10 | 30   |
| 10                    |          | 5*11          | 0.10 | 40   |
| 22                    |          | 5*11          | 0.10 | 65   |
| 33                    |          | 6.3*11        | 0.10 | 90   |
| 47                    |          | 6.3*11        | 0.10 | 110  |
| 100                   |          | 8*11          | 0.10 | 180  |
| 220                   |          | 10*12.5       | 0.10 | 300  |
| 330                   | 10*16    | 0.10          | 410  |  |
| 470                   | 10*20    | 0.10          | 530  |  |
| 1000                  | 12.5*25  | 0.10          | 950  |  |
| 2200                  | 16*35    | 0.12          | 1470 |  |
| 3300                  | 18*35    | 0.14          | 1770 |  |
| 63(1J)                | 10       | 5*11          | 0.09 | 46   |
|                       | 22       | 5*11          | 0.09 | 71   |
|                       | 33       | 6.3*11        | 0.09 | 100  |
|                       | 47       | 6.3*11        | 0.09 | 120  |
|                       | 100      | 10*12.5       | 0.09 | 215  |
|                       | 220      | 10*16         | 0.09 | 335  |
|                       | 330      | 10*20         | 0.09 | 510  |
|                       | 470      | 12.5*20       | 0.09 | 640  |
|                       | 1000     | 16*25         | 0.09 | 930  |
|                       | 100(1K)  | 0.10          | 5*11 | 0.08   |
| 0.22                  |          | 5*11          | 0.08 | 3.4  |
| 0.33                  |          | 5*11          | 0.08 | 5.0  |
| 0.47                  |          | 5*11          | 0.08 | 7.1  |
| 1.0                   |          | 5*11          | 0.08 | 15   |
| 2.2                   |          | 5*11          | 0.08 | 21   |
| 3.3                   |          | 5*11          | 0.08 | 29   |
| 4.7                   |          | 5*11          | 0.08 | 62   |
| 10                    |          | 6.3*11        | 0.08 | 54   |
| 22                    |          | 8*11          | 0.08 | 93   |
| 33                    |          | 8*12          | 0.08 | 130  |
| 47                    |          | 10*12.5       | 0.08 | 165  |
| 100                   |          | 10*20         | 0.08 | 265  |
| 220                   |          | 12.5*25       | 0.08 | 440  |

Radial Type



# WH series

■ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ    | Rated ripple current (mArms/105°C, 120Hz) |     |
|-----------------------|----------|---------------|---------|---|-----|
| 100(1K)               | 330      | 16*25         | 0.08    | 540                                       |     |
|                       | 470      | 16*30         | 0.08    | 715                                       |     |
|                       | 1000     | 18*40         | 0.08    | 985                                       |     |
| 160(2C)               | 3.3      | 6.3*11        | 0.20    | 32  |     |
|                       | 4.7      | 6.3*11        | 0.20    | 38  |     |
|                       | 10       | 8*12          | 0.20    | 65  |     |
|                       |          | 10*12         | 0.20    | 76  |     |
|                       |          | 10*12         | 0.20    | 98  |     |
|                       | 22       | 10*16         | 0.20    | 108                                       |     |
|                       |          | 10*20         | 0.20    | 120                                       |     |
|                       |          | 10*16         | 0.20    | 158                                       |     |
|                       | 33       | 10*20         | 0.20    | 165                                       |     |
|                       |          | 10*20         | 0.20    | 182                                       |     |
|                       |          | 12.5*20       | 0.20    | 205                                       |     |
|                       | 47       | 12.5*20       | 0.20    | 265                                       |     |
|                       |          | 12.5*25       | 0.20    | 318                                       |     |
|                       |          | 16*25         | 0.20    | 335                                       |     |
|                       | 220      | 16*30         | 0.20    | 568                                       |     |
| 330                   |          | 18*35         | 0.20    | 710                                       |     |
| 470                   |          | 18*40         | 0.20    | 870                                       |     |
| 200(2D)               | 1        | 6.3*11        | 0.20    | 16  |     |
|                       | 2.2      | 6.3*11        | 0.20    | 22  |     |
|                       | 3.3      | 6.3*11        | 0.20    | 32  |     |
|                       | 4.7      | 8*12          | 0.20    | 48  |     |
|                       |          | 8*12          | 0.20    | 78  |     |
|                       |          | 10*12         | 0.20    | 82  |     |
|                       | 10       | 10*16         | 0.20    | 86  |     |
|                       |          | 10*16         | 0.20    | 128                                       |     |
|                       |          | 10*20         | 0.20    | 132                                       |     |
|                       | 22       | 10*20         | 0.20    | 185                                       |     |
|                       |          | 12.5*20       | 0.20    | 194                                       |     |
|                       |          | 12.5*20       | 0.20    | 225                                       |     |
|                       | 47       | 12.5*25       | 0.20    | 308                                       |     |
|                       |          | 82            | 12.5*25 | 0.20                                      | 318 |
|                       |          | 100           | 16*25   | 0.20                                      | 345 |
|                       | 150      | 16*25         | 0.20    | 446                                       |     |
|                       |          | 180           | 16*30   | 0.20                                      | 560 |
|                       |          | 220           | 16*35   | 0.20                                      | 678 |
|                       | 330      | 18*30         | 0.20    | 695                                       |     |
|                       |          | 330           | 18*35   | 0.20                                      | 755 |
|                       |          | 470           | 18*45   | 0.20                                      | 938 |
| 250(2E)               | 2.2      | 6.3*11        | 0.20    | 22  |     |
|                       | 3.3      | 6.3*11        | 0.20    | 32  |     |
|                       |          | 8*12          | 0.20    | 34  |     |
|                       |          | 6.3*11        | 0.20    | 38  |     |
|                       | 4.7      | 8*12          | 0.20    | 48  |     |
|                       |          | 10*12         | 0.20    | 75  |     |
|                       |          | 10*16         | 0.20    | 84  |     |
|                       | 10       | 10*20         | 0.20    | 128                                       |     |
|                       |          | 12.5*20       | 0.20    | 145                                       |     |
|                       |          | 10*20         | 0.20    | 150                                       |     |
|                       | 22       | 12.5*20       | 0.20    | 185                                       |     |
|                       |          | 12.5*20       | 0.20    | 232                                       |     |
|                       |          | 12.5*25       | 0.20    | 245                                       |     |
|                       | 33       | 16*25         | 0.20    | 370                                       |     |
|                       |          | 16*30         | 0.20    | 400                                       |     |
| 16*35                 |          | 0.20          | 468     |   |     |
| 150                   | 18*35    | 0.20          | 660     |   |     |
|                       | 220      | 18*40         | 0.20    | 702                                       |     |
|                       | 330      | 18*40         | 0.20    | 730                                       |     |

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ    | Rated ripple current (mArms/105°C, 120Hz) |     |
|-----------------------|----------|---------------|---------|---|-----|
| 350(2V)               | 0.47     | 6.3*11        | 0.24    | 11  |     |
|                       | 1        | 6.3*11        | 0.24    | 16  |     |
|                       | 2.2      | 8*12          | 0.24    | 26  |     |
|                       | 3.3      | 8*12          | 0.24    | 34  |     |
|                       |          | 10*12         | 0.24    | 38  |     |
|                       |          | 8*12          | 0.24    | 48  |     |
|                       | 4.7      | 10*12         | 0.24    | 52  |     |
|                       |          | 10*12         | 0.24    | 68  |     |
|                       |          | 10*16         | 0.24    | 82  |     |
|                       | 10       | 10*20         | 0.24    | 88  |     |
|                       |          | 22            | 12.5*20 | 0.24                                      | 154 |
|                       |          | 33            | 12.5*20 | 0.24                                      | 184 |
|                       | 47       | 16*20         | 0.24    | 198                                       |     |
|                       |          | 16*25         | 0.24    | 250                                       |     |
|                       |          | 68            | 16*25   | 0.24                                      | 336 |
| 100                   | 18*30    | 0.24          | 398     |   |     |
| 400(2G)               | 1        | 6.3*11        | 0.24    | 16  |     |
|                       | 2.2      | 6.3*11        | 0.24    | 30  |     |
|                       | 3.3      | 8*12          | 0.24    | 34  |     |
|                       |          | 8*12          | 0.24    | 35  |     |
|                       |          | 10*12         | 0.24    | 38  |     |
|                       | 4.7      | 8*12          | 0.24    | 48  |     |
|                       |          | 10*12         | 0.24    | 52  |     |
|                       |          | 10*16         | 0.24    | 98  |     |
|                       | 10       | 10*20         | 0.24    | 115                                       |     |
|                       |          | 22            | 12.5*25 | 0.24                                      | 192 |
|                       |          | 33            | 16*20   | 0.24                                      | 258 |
|                       | 47       | 16*25         | 0.24    | 305                                       |     |
|                       |          | 68            | 16*30   | 0.24                                      | 465 |
|                       |          | 82            | 18*25   | 0.24                                      | 445 |
|                       | 100      | 18*25         | 0.24    | 474                                       |     |
| 16*40                 |          | 0.24          | 544     |   |     |
| 120                   |          | 18*30         | 0.24    | 532                                       |     |
| 150                   | 18*35    | 0.24          | 588     |   |     |
| 150                   | 18*40    | 0.24          | 668     |   |     |
| 450(2W)               | 0.47     | 8*12          | 0.24    | 11  |     |
|                       | 1        | 8*12          | 0.24    | 18  |     |
|                       | 2.2      | 8*12          | 0.24    | 25  |     |
|                       | 3.3      | 10*12         | 0.24    | 32  |     |
|                       |          | 10*12         | 0.24    | 36  |     |
|                       |          | 10*16         | 0.24    | 40  |     |
|                       | 4.7      | 10*20         | 0.24    | 55  |     |
|                       |          | 10*20         | 0.24    | 90  |     |
|                       |          | 12.5*20       | 0.24    | 100                                       |     |
|                       | 22       | 12.5*25       | 0.24    | 168                                       |     |
|                       |          | 16*20         | 0.24    | 185                                       |     |
|                       |          | 33            | 16*25   | 0.24                                      | 215 |
|                       | 47       | 16*30         | 0.24    | 344                                       |     |
|                       |          | 68            | 18*30   | 0.24                                      | 455 |
|                       |          | 82            | 18*30   | 0.24                                      | 472 |
| 100                   | 18*35    | 0.24          | 530     |   |     |
|                       | 120      | 18*40         | 0.24    | 582                                       |     |
|                       | 150      | 18*50         | 0.24    | 700                                       |     |
| 500(2H)               | 4.7      | 10*20         | 0.24    | 60  |     |
|                       | 10       | 12.5*20       | 0.24    | 115                                       |     |
|                       | 15       | 12.5*25       | 0.24    | 140                                       |     |
|                       | 22       | 16*25         | 0.24    | 185                                       |     |
|                       | 33       | 18*25         | 0.24    | 215                                       |     |
|                       | 47       | 18*35         | 0.24    | 345                                       |     |
|                       | 68       | 18*40         | 0.24    | 455                                       |     |
|                       | 82       | 18*50         | 0.24    | 520                                       |     |
|                       | 100      | 22*40         | 0.24    | 550                                       |     |
|                       | 120      | 22*46         | 0.24    | 580                                       |     |

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