

## Part Numbering System



① Category code

| Type                   | Code |   |
|------------------------|------|---|
|                        | 2    | 3 |
| 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 |
|---------|------|
| 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 |    |    |
|---------------------------------------|------|----|----|
|                                       | 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.

## HL series

- Long life, downsized, high ripple current; For power supply applications
- Endurance: +105°C 8,000~12,000 hours
- RoHS Compliant

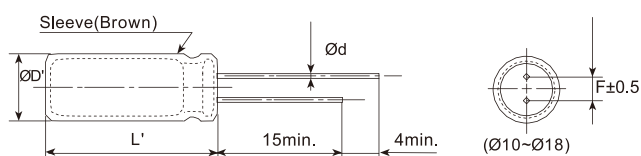
Upgrade



### SPECIFICATIONS

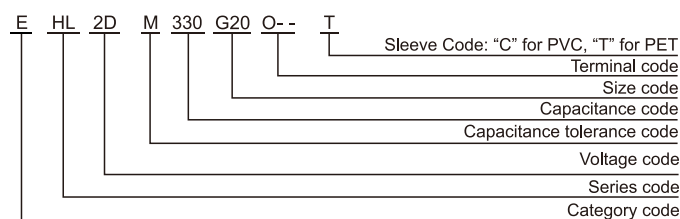
| Items  | Characteristics   |                                       |      |                   |      |      |                      |   |   |
|--|---|---------------------------------------|------|-------------------|------|------|----------------------|---|---|
| Category Temperature Range                             | -25~+105°C  |                                       |      |                   |      |      |                      |   |   |
| Rated Voltage Range                                    | 160~500 V <sub>dc</sub>   |                                       |      |                   |      |      |                      |   |   |
| Capacitance Tolerance                                  | ±20%(M) <span style="float: right;">(at 20°C, 120Hz)</span>   |                                       |      |                   |      |      |                      |   |   |
| Leakage Current  |   | After 1 minute                        |      | After 5 minutes   |      |      |                      | Where, I: Max. leakage current (μA),<br>C: Nominal capacitance (μF),<br>V: Rated voltage (V) <span style="float: right;">(at 20°C)</span> |   |
|  | CV ≤ 1000   | I ≤ 0.1CV + 40μA                      |      | I ≤ 0.03CV + 15μA |      |      |                      |   |   |
|  | CV > 1000   | I ≤ 0.04CV + 100μA                    |      | I ≤ 0.02CV + 25μA |      |      |                      |   |   |
| Dissipation Factor (tanδ)                              | Rated Voltage (V <sub>dc</sub> )  | 160                                   | 200  | 250               | 350  | 400  | 450                  | 500   | <span style="float: right;">(at 20°C, 120Hz)</span> |
|  | tanδ (max.)   | 0.18                                  | 0.18 | 0.18              | 0.24 | 0.24 | 0.24                 | 0.24  |   |
| Low Temperature Characteristics (Max. Impedance Ratio) | Rated Voltage (V <sub>dc</sub> )  | 160                                   | 200  | 250               | 350  | 400  | 450                  | 500   | <span style="float: right;">(at 120Hz)</span>       |
|  | Z(-25°C)/Z(+20°C)   | 3                                     | 3    | 3                 | 6    | 6    | 6                    | 6   |   |
| 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 a specified period of time at 105°C. |                                       |      |                   |      |      |                      |   |   |
|  | Capacitance Change  | ≤ ±20% of the initial value           |      |                   |      |      | Rated Voltage        | 160 to 400V <sub>dc</sub>   | 500V <sub>dc</sub>                                  |
|  | D.F. (tanδ)   | ≤ 200% of the initial specified value |      |                   |      |      |                      | Life time   | L ≤ 20: 10,000 hours                                |
|  | Leakage Current   | ≤ The initial specified value         |      |                   |      |      | L > 20: 12,000 hours |   | Φ ≥ 12.5: 10,000 hours                              |
| 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  | 10           | 12.5 | 16  | 18  |
| Ød  | 0.6          | 0.6  | 0.8 | 0.8 |
| F   | 5.0          | 5.0  | 7.5 | 7.5 |
| ØD' | ØD + 0.5max. |      |     |     |
| L'  | L + 2max.    |      |     |     |

### PART NUMBERING SYSTEM



### RATED RIPPLE CURRENT MULTIPLIERS

Frequency correction factor for ripple current

| Freq.(Hz) | 120 | 1k   | 10k  | 100k |
|-----------|-----|------|------|------|
| Cap.(μF)  |     |      |      |      |
| <100      | 1.0 | 1.75 | 2.25 | 2.50 |
| ≥100      | 1.0 | 1.67 | 2.05 | 2.25 |

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.

Radial Type

# HL series

■ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) |
|-----------------------|----------|---------------|------|--|
| 160(2C)               | 33       | 10*16         | 0.18 | 210  |
|                       | 47       | 10*20         | 0.18 | 300  |
|                       | 56       | 10*20         | 0.18 | 318  |
|                       | 68       | 10*25         | 0.18 | 345  |
|                       | 82       | 10*25         | 0.18 | 416  |
|                       |          | 10*30         | 0.18 | 448  |
|                       | 100      | 12.5*20       | 0.18 | 575  |
|                       | 120      | 10*35         | 0.18 | 572  |
|                       | 150      | 10*40         | 0.18 | 668  |
|                       |          | 10*45         | 0.18 | 696  |
|                       |          | 12.5*25       | 0.18 | 767  |
|                       | 180      | 10*50         | 0.18 | 788  |
|                       |          | 12.5*30       | 0.18 | 885  |
|                       |          | 16*20         | 0.18 | 858  |
|                       |          | 12.5*35       | 0.18 | 1044   |
|                       | 220      | 16*25         | 0.18 | 1022   |
|                       |          | 18*20         | 0.18 | 992  |
|                       |          | 12.5*40       | 0.18 | 1196   |
|                       | 270      | 12.5*45       | 0.18 | 1230   |
|                       |          | 12.5*50       | 0.18 | 1404   |
|                       | 330      | 16*30         | 0.18 | 1355   |
|                       |          | 18*25         | 0.18 | 1292   |
|                       |          | 16*35         | 0.18 | 1505   |
|                       | 390      | 16*40         | 0.18 | 1708   |
|                       |          | 16*45         | 0.18 | 1730   |
|                       |          | 18*30         | 0.18 | 1665   |
|                       | 470      | 18*35         | 0.18 | 1722   |
|                       |          | 16*50         | 0.18 | 1924   |
| 18*40                 |          | 0.18          | 1910 |  |
| 560                   | 18*45    | 0.18          | 2135 |  |
|                       | 18*50    | 0.18          | 2148 |  |
|                       | 33       | 10*20         | 0.18 | 255  |
| 39                    | 10*20    | 0.18          | 268  |  |
| 47                    | 10*20    | 0.18          | 302  |  |
| 56                    | 10*25    | 0.18          | 346  |  |
| 68                    | 10*30    | 0.18          | 406  |  |
| 82                    | 12.5*20  | 0.18          | 522  |  |
| 100                   | 10*35    | 0.18          | 520  |  |
|                       | 12.5*25  | 0.18          | 628  |  |
|                       | 10*40    | 0.18          | 595  |  |
| 120                   | 10*45    | 0.18          | 624  |  |
|                       | 12.5*30  | 0.18          | 728  |  |
|                       | 16*20    | 0.18          | 698  |  |
| 150                   | 10*50    | 0.18          | 720  |  |
|                       | 12.5*35  | 0.18          | 862  |  |
|                       | 16*25    | 0.18          | 928  |  |
| 180                   | 18*20    | 0.18          | 895  |  |
|                       | 12.5*40  | 0.18          | 1078 |  |
|                       | 12.5*45  | 0.18          | 1116 |  |
| 220                   | 18*25    | 0.18          | 1050 |  |
|                       | 12.5*50  | 0.18          | 1268 |  |
|                       | 16*30    | 0.18          | 1225 |  |
| 270                   | 16*35    | 0.18          | 1252 |  |
|                       | 16*40    | 0.18          | 1428 |  |
|                       | 18*30    | 0.18          | 1402 |  |
| 330                   | 16*45    | 0.18          | 1575 |  |
|                       | 18*35    | 0.18          | 1570 |  |
|                       | 16*50    | 0.18          | 1762 |  |
| 390                   | 18*35    | 0.18          | 1570 |  |
|                       | 16*50    | 0.18          | 1762 |  |
|                       | 18*40    | 0.18          | 1748 |  |
| 470                   | 18*45    | 0.18          | 1775 |  |
|                       | 18*50    | 0.18          | 1952 |  |

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ | Rated ripple current (mA <sub>rms</sub> /105°C, 120Hz) |
|-----------------------|----------|---------------|------|--|
| 250(2E)               | 27       | 10*20         | 0.18 | 205  |
|                       | 33       | 10*20         | 0.18 | 242  |
|                       | 47       | 10*25         | 0.18 | 316  |
|                       |          | 10*30         | 0.18 | 342  |
|                       | 56       | 12.5*20       | 0.18 | 430  |
|                       | 68       | 10*35         | 0.18 | 432  |
|                       | 82       | 10*40         | 0.18 | 495  |
|                       |          | 10*45         | 0.18 | 518  |
|                       |          | 12.5*25       | 0.18 | 565  |
|                       |          | 12.5*30       | 0.18 | 575  |
|                       | 100      | 10*50         | 0.18 | 586  |
|                       |          | 12.5*30       | 0.18 | 662  |
|                       |          | 16*20         | 0.18 | 638  |
|                       | 120      | 12.5*35       | 0.18 | 770  |
|                       |          | 16*25         | 0.18 | 758  |
|                       |          | 18*20         | 0.18 | 732  |
|                       | 150      | 12.5*40       | 0.18 | 892  |
|                       |          | 12.5*45       | 0.18 | 922  |
|                       |          | 12.5*50       | 0.18 | 1040   |
|                       | 180      | 16*30         | 0.18 | 995  |
|                       |          | 18*25         | 0.18 | 955  |
|                       |          | 16*35         | 0.18 | 1130   |
|                       | 220      | 18*30         | 0.18 | 1138   |
|                       |          | 16*40         | 0.18 | 1290   |
|                       |          | 16*45         | 0.18 | 1315   |
|                       | 270      | 18*35         | 0.18 | 1300   |
|                       |          | 16*50         | 0.18 | 1480   |
|                       |          | 18*40         | 0.18 | 1466   |
| 330                   | 18*45    | 0.18          | 1488 |  |
|                       | 18*50    | 0.18          | 1630 |  |
|                       | 15       | 10*16         | 0.24 | 150  |
| 18                    | 10*20    | 0.24          | 165  |  |
| 22                    | 10*20    | 0.24          | 200  |  |
| 27                    | 10*25    | 0.24          | 242  |  |
|                       | 10*30    | 0.24          | 256  |  |
| 33                    | 12.5*20  | 0.24          | 332  |  |
| 39                    | 10*35    | 0.24          | 326  |  |
| 47                    | 10*40    | 0.24          | 376  |  |
|                       | 12.5*25  | 0.24          | 425  |  |
|                       | 10*45    | 0.24          | 426  |  |
| 56                    | 12.5*30  | 0.24          | 498  |  |
|                       | 16*20    | 0.24          | 476  |  |
|                       | 10*50    | 0.24          | 486  |  |
| 68                    | 12.5*35  | 0.24          | 583  |  |
|                       | 18*20    | 0.24          | 550  |  |
|                       | 12.5*40  | 0.24          | 658  |  |
| 82                    | 16*25    | 0.24          | 628  |  |
|                       | 12.5*45  | 0.24          | 752  |  |
|                       | 12.5*50  | 0.24          | 772  |  |
| 100                   | 16*30    | 0.24          | 744  |  |
|                       | 18*25    | 0.24          | 710  |  |
|                       | 16*35    | 0.24          | 832  |  |
| 120                   | 16*40    | 0.24          | 964  |  |
|                       | 16*45    | 0.24          | 978  |  |
|                       | 18*30    | 0.24          | 944  |  |
| 150                   | 16*50    | 0.24          | 1095 |  |
|                       | 18*35    | 0.24          | 1065 |  |
|                       | 18*40    | 0.24          | 1086 |  |
| 180                   | 18*45    | 0.24          | 1215 |  |
|                       | 18*50    | 0.24          | 1222 |  |



# HL series

■ STANDARD RATINGS

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ | Rated ripple current (mA <sub>rms</sub> /105°C,120Hz) |
|-----------------------|----------|---------------|------|---|
| 400(2G)               | 12       | 10*16         | 0.24 | 135   |
|                       | 15       | 10*20         | 0.24 | 155   |
|                       | 18       | 10*20         | 0.24 | 180   |
|                       | 22       | 10*25         | 0.24 | 216   |
|                       | 27       | 10*30         | 0.24 | 256   |
|                       |          | 12.5*20       | 0.24 | 300   |
|                       | 33       | 10*35         | 0.24 | 300   |
|                       |          | 10*40         | 0.24 | 342   |
|                       | 39       | 10*45         | 0.24 | 358   |
|                       |          | 12.5*25       | 0.24 | 390   |
|                       | 47       | 12.5*30       | 0.24 | 456   |
|                       |          | 16*20         | 0.24 | 438   |
|                       | 56       | 10*50         | 0.24 | 440   |
|                       |          | 12.5*35       | 0.24 | 528   |
|                       |          | 18*20         | 0.24 | 502   |
|                       | 68       | 12.5*40       | 0.24 | 600   |
|                       |          | 16*25         | 0.24 | 572   |
|                       | 82       | 12.5*45       | 0.24 | 684   |
|                       |          | 12.5*50       | 0.24 | 700   |
|                       |          | 16*30         | 0.24 | 672   |
|                       |          | 18*25         | 0.24 | 644   |
|                       | 100      | 16*35         | 0.24 | 760   |
|                       |          | 16*40         | 0.24 | 864   |
|                       | 120      | 16*45         | 0.24 | 880   |
|                       |          | 18*30         | 0.24 | 842   |
|                       |          | 18*35         | 0.24 | 875   |
|                       | 150      | 16*50         | 0.24 | 1000  |
|                       |          | 18*40         | 0.24 | 985   |
| 180                   | 18*45    | 0.24          | 1098 |   |
| 220                   | 18*50    | 0.24          | 1225 |   |

| WV (V <sub>dc</sub> ) | Cap (μF) | Size ΦDxL(mm) | tanδ | Rated ripple current (mA <sub>rms</sub> /105°C,120Hz) |
|-----------------------|----------|---------------|------|---|
| 450(2W)               | 10       | 10*16         | 0.24 | 120   |
|                       | 12       | 10*20         | 0.24 | 150   |
|                       | 15       | 10*25         | 0.24 | 186   |
|                       | 18       | 10*30         | 0.24 | 216   |
|                       |          | 12.5*20       | 0.24 | 256   |
|                       | 22       | 10*35         | 0.24 | 252   |
|                       |          | 10*40         | 0.24 | 292   |
|                       | 27       | 10*45         | 0.24 | 306   |
|                       |          | 12.5*25       | 0.24 | 342   |
|                       | 33       | 12.5*30       | 0.24 | 400   |
|                       |          | 16*20         | 0.24 | 386   |
|                       | 39       | 10*50         | 0.24 | 378   |
|                       |          | 12.5*35       | 0.24 | 462   |
|                       |          | 18*20         | 0.24 | 440   |
|                       | 47       | 12.5*40       | 0.24 | 528   |
|                       |          | 16*25         | 0.24 | 500   |
|                       | 56       | 12.5*45       | 0.24 | 592   |
|                       |          | 16*30         | 0.24 | 588   |
|                       |          | 18*25         | 0.24 | 562   |
|                       |          | 12.5*50       | 0.24 | 672   |
|                       | 68       | 16*35         | 0.24 | 664   |
|                       |          | 16*40         | 0.24 | 750   |
|                       | 82       | 16*45         | 0.24 | 762   |
|                       |          | 18*30         | 0.24 | 734   |
|                       | 100      | 16*50         | 0.24 | 858   |
|                       |          | 18*35         | 0.24 | 836   |
|                       | 120      | 18*40         | 0.24 | 935   |
|                       |          | 18*45         | 0.24 | 948   |
| 150                   | 18*50    | 0.24          | 1065 |   |
| 500(2H)               | 6.8      | 10*20         | 0.24 | 90  |
|                       | 10       | 10*30         | 0.24 | 130   |
|                       |          | 12.5*20       | 0.24 | 125   |
|                       | 12       | 12.5*20       | 0.24 | 135   |
|                       |          | 10*35         | 0.24 | 170   |
|                       | 15       | 12.5*25       | 0.24 | 170   |
|                       |          | 16*20         | 0.24 | 165   |
|                       | 18       | 10*45         | 0.24 | 190   |
|                       |          | 12.5*30       | 0.24 | 190   |
|                       | 22       | 10*50         | 0.24 | 230   |
|                       |          | 12.5*35       | 0.24 | 225   |
|                       | 33       | 16*20         | 0.24 | 220   |
| 18*25                 |          | 0.24          | 285  |   |
| 47                    | 18*30    | 0.24          | 400  |   |

Radial Type

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