CATEGORY 4

# MINIATURE

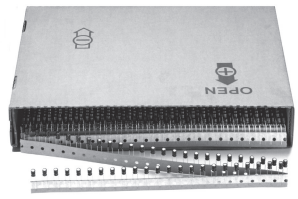
## ALUMINUM ELECTROLYTIC CAPACITORS

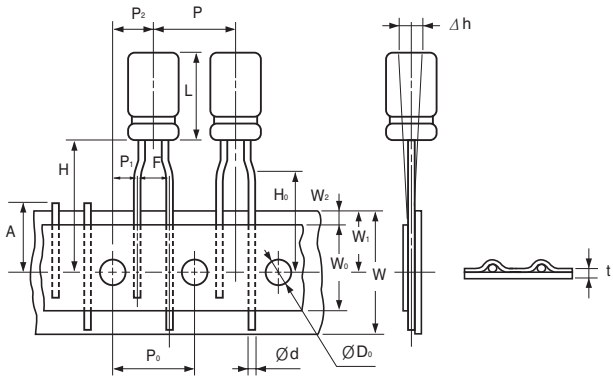
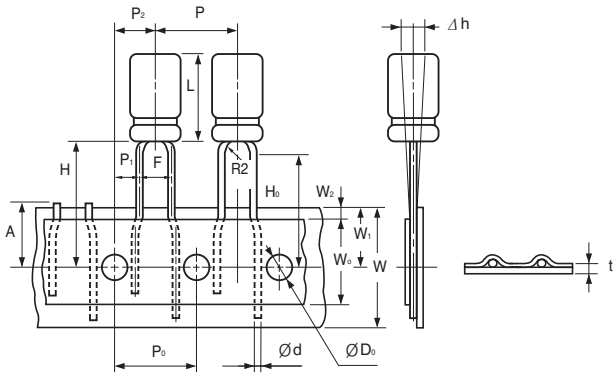


# TAPING

## ● Lead Taping Capacitors for Automatic Insertion

● Ammo



| DRAWING I | DRAWING II |
|---|---|
|  |  |



## ● DIMENSIONS

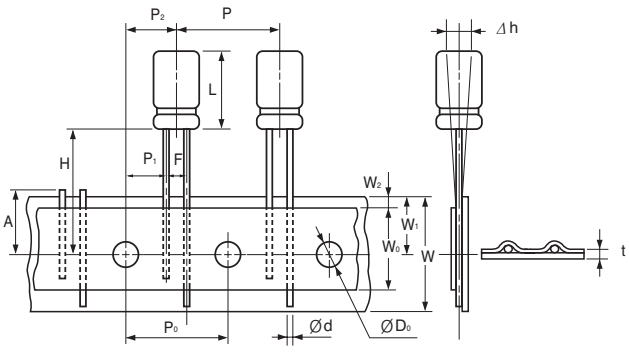
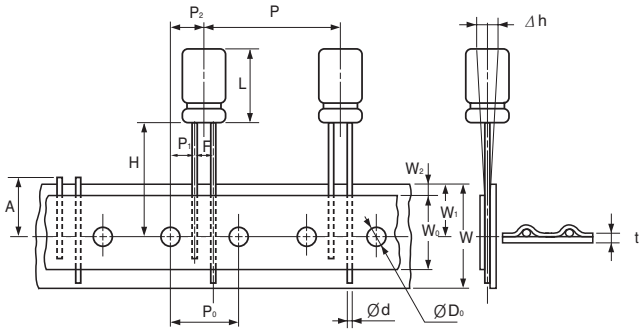
Unit : mm

| Applicable Drawing No. | | | II | | | III | | | I | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | Symbol | Tolerance | Ø4 | Ø5 | | Ø6.3 | | Ø8 | Ø4 | Ø5 | | Ø6.3 | | Ø8 | |
| Case Height | L | *Note | 5, 7 | 5 | 7~11 | 5 | 7~11 | 5 | 5, 7 | 5 | 7~11 | 5 | 7~11 | 5 | 9, 11.5 |
| Lead Dia. | Ød | ±0.05 | 0.45 | 0.45 | 0.5 | 0.45 | 0.5 | 0.45 | 0.45 | 0.45 | 0.5 | 0.45 | 0.5 | 0.45 | 0.6 |
| Body Pitch | P | ±1.0 | 12.7 | | | 12.7 | | 12.7 | 12.7 | | | | | 12.7 | 12.7 |
| Feeding Hole Pitch | $P_0$ | ±0.2 | 12.7 | | | 12.7 | | 12.7 | 12.7 | | | | | 12.7 | 12.7 |
| Feeding Hole Alignment | $P_1$ | ±0.7 | 5.1 | | | 5.1 | | 5.1 | 3.85 | | | | | 3.85 | 3.85 |
| Feeding Hole Alignment | $P_2$ | ±1.0 | 6.35 | | | 6.35 | | 6.35 | 6.35 | | | | | 6.35 | 6.35 |
| Lead Center Spacing | F | $^{+0.6}_{-0.2}$ | 2.5 | | | 2.5 | | 2.5 | 5.0 | | | | | 5.0 | 5.0 |
| Body Inclination | Δh | ±2.0 | 0 | | | 0 | | 0 | 0 | | | | | 0 | 0 |
| Tape Width | W | ±0.5 | 18.0 | | | 18.0 | | 18.0 | 18.0 | | | | | 18.0 | 18.0 |
| Adhesive Tape Width | $W_0$ | min. | 9.5 | | | 9.5 | | 9.5 | 9.5 | | | | | 9.5 | 12.5 |
| Feeding Hole Alignment | $W_1$ | ±0.5 | 9.0 | | | 9.0 | | 9.0 | 9.0 | | | | | 9.0 | 9.0 |
| Adhesive Tape Margin | $W_2$ | max. | 2.0 | | | 2.0 | | 2.0 | 2.0 | | | | | 2.0 | 2.0 |
| Length from Seating Plane | H | ±0.5 | 18.0 | | | 18.0 | | 18.5 | 18.5 (5, 7mmL = 17.5) | | | | | 17.5 | 20.0 |
| Lead Clinch Height | $H_0$ | ±0.5 | 17.0 | | | — | | — | 16.5 | | | | | 16.5 | 16.5 |
| Feeding Hole Dia. | Ø$D_0$ | ±0.2 | 4.0 | | | 4.0 | | 4.0 | 4.0 | | | | | 4.0 | 4.0 |
| Total Tape Thickness | t | ±0.2 | 0.6 | | | 0.6 | | 0.6 | 0.6 | | | | | 0.6 | 0.6 |
| Cut Lead Height | A | max. | 11.0 | | | 11.0 | | 11.0 | 11.0 | | | | | 11.0 | 11.0 |
| Taping Code / Ammo | ⊕ leader | | PC | | | PC | | PE | PA | | | | | PA | PG |

* Note : Refer to the drawing of each series for tolerance.

# TAPING

## Lead Taping Capacitors for Automatic Insertion

| DRAWING Ⅲ | DRAWING Ⅳ |
|---|---|
|  |  |



### DIMENSIONS

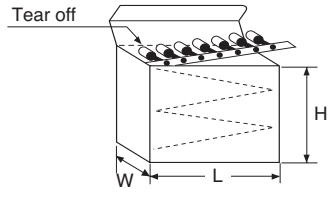
Unit : mm

| Applicable Drawing No. | | | Ⅲ | Ⅲ | Ⅳ | Ⅳ | Ⅳ |
|---|---|---|---|---|---|---|---|
| Description | Symbol | Tolerance | Ø10 | Ø12.5 | | Ø16 | Ø18 |
| Case Height | L | max. | 22 | 27.0 | | 37.5 | 37.5 |
| Lead Dia. | Ød | ±0.05 | 0.6 | 0.6 | | 0.8 | 0.8 |
| Body Pitch | P | ±1.0 | 12.7 | 15.0 | 25.4 | 30.0 | 30.0 |
| Feeding Hole Pitch | $P_0$ | ±0.2 | 12.7 | 15.0 | 12.7 | 15.0 | 15.0 |
| Feeding Hole Alignment | $P_1$ | ±0.7 | 3.85 | 5.0 | 3.85 | 3.75 | 3.75 |
| Feeding Hole Alignment | $P_2$ | ±1.0 | 6.35 | 7.5 | 6.35 | 7.5 | 7.5 |
| Lead Center Spacing | F | $^{+0.6}_{-0.2}$ | 5.0 | 5.0 | | 7.5 | 7.5 |
| Body Inclination | Δh | ±2.0 | 0 | 0 | | 0 | 0 |
| Tape Width | W | ±0.5 | 18.0 | 18.0 | | 18.0 | 18.0 |
| Adhesive Tape Width | $W_0$ | min. | 12.5 | 12.5 | | 12.5 | 12.5 |
| Feeding Hole Alignment | $W_1$ | ±0.5 | 9.0 | 9.0 | | 9.0 | 9.0 |
| Adhesive Tape Margin | $W_2$ | max. | 2.0 | 2.0 | | 2.0 | 2.0 |
| Length from Seating Plane | H | ±0.5 | 18.5 | 18.5 | | 18.5 | 18.5 |
| Feeding Hole Dia. | $ØD_0$ | ±0.2 | 4.0 | 4.0 | | 4.0 | 4.0 |
| Total Tape Thickness | t | ±0.2 | 0.6 | 0.7 | | 0.7 | 0.7 |
| Cut Lead Height | A | max. | 11.0 | 11.0 | | 11.0 | 11.0 |
| Taping Code / Ammo | ⊕ leader | | PA | PH | PL | PA | PA |

### PACKAGING Q'ty(pcs.)/Box

Unit : mm

**Ammo**





| Size | | Ammo | | | |
|---|---|---|---|---|---|
| ØD | Case Height | L | H | W | Q'ty |
| 4 | 5, 7 | 332 | 230 | 42 | 2500 |
| 5 | 5, 7 | 332 | 230 | 42 | 2000 |
| | 11 | 332 | 230 | 49 | |
| 6.3 | 5, 7 | 332 | 230 | 42 | 1500 |
| | 11 | 332 | 230 | 49 | |
| 8 | 5, 7 | 332 | 230 | 42 | 1000 |
| | 11.5 | 332 | 230 | 49 | |
| 10 | 12.5, 16 | 332 | 190 | 51 | 500 |
| | 20 | 332 | 190 | 59 | |
| 12.5 | 16, 20, 25 | 342 | 240 | 62 | 400 |
| 16 | 20, 25 | 342 | 240 | 62 | 250 |
| | 31.5, 35.5 | 342 | 240 | 74 | |
| 18 | 20, 25 | 342 | 240 | 62 | 200 |
| | 31.5, 35.5 | 342 | 240 | 74 | |

# PACKING

## ● BULK PACKING QUANTITY(pcs) / BOX

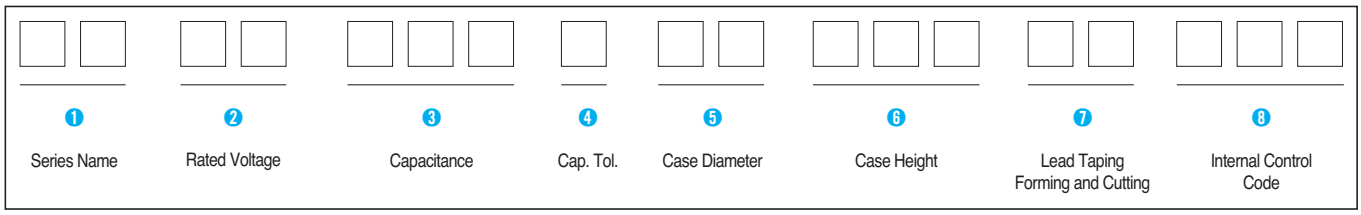
| SIZE | | BULK (QUANTITY) | | |
|---|---|---|---|---|
| ØD | L(mm) | V-Bag | INNER BOX | MIDDLE BOX |
| 4 | 5, 7 | 500 | 10000 | 40000 |
| 5 | 5, 7, 11 | 500 | 7000 | 28000 |
| 6.3 | 5, 7, 11 | 500 | 6000 | 24000 |
| 8 | 5, 7 | 500 | 5000 | 20000 |
| | 11.5 | 300 | 3600 | 14400 |
| 10 | 12.5 | 200 | 2400 | 9600 |
| | 16 | 200 | 2000 | 8000 |
| | 20 | 200 | 1600 | 6400 |
| 12.5 | 16 | 100 | 1200 | 4800 |
| | 20 | 100 | 1000 | 4000 |
| | 25 | 100 | 900 | 3600 |
| | 30 | 100 | 800 | 3200 |
| 16 | 20 | - | 600 | 2400 |
| | 25 | - | 500 | 2000 |
| | 31.5, 35.5, 40 | - | 400 | 1600 |
| | 45, 50 | - | 250 | 1000 |
| 18 | 20 | - | 500 | 2000 |
| | 25, 31.5 | - | 400 | 1600 |
| | 35.5, 40 | - | 300 | 1200 |
| | 45, 51 | - | 250 | 1000 |
| 20, 22 | 41 | - | 200 | 800 |

## ● CUTTING PACKING QUANTITY(pcs) / BOX

| SIZE | | CUTTING (QUANTITY) | | |
|---|---|---|---|---|
| ØD | L(mm) | V-Bag | INNER BOX | MIDDLE BOX |
| 4 | 5, 7 | 500 | 9000 | 36000 |
| 5 | 5, 7, 11 | 500 | 7000 | 28000 |
| 6.3 | 5, 7, 11 | 500 | 6000 | 24000 |
| 8 | 5, 7 | 500 | 5000 | 20000 |
| | 11.5 | 300 | 3600 | 14400 |
| 10 | 12.5 | - | 800 | 12800 |
| | 16 | - | 600 | 9600 |
| | 20 | - | 500 | 8000 |
| 12.5 | 16 | - | 400 | 6400 |
| | 20 | - | 300 | 4800 |
| | 25 | - | 250 | 4000 |
| 16 | 16, 20, 25 | - | 400 | 1200 |
| | 31.5, 35.5 | - | 400 | 1200 |
| | 40 ↑ | - | 400 | 1200 |
| 18 | 20, 25 | - | 300 | 900 |
| | 31.5, 35.5 | - | 300 | 900 |
| | 40 | - | 300 | 900 |
| | 45 ↑ | - | 300 | 600 |
| 20 | 41 | - | 240 | 720 |
| 22 | 45 ↓ | - | 190 | 570 |
| | 51 ↑ | - | 190 | 380 |

# PART NUMBER SYSTEM

## Part Number System




### 1 Series Name

See page 7

### 2 Rated Working Voltage

| WV | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 |
|---|---|---|---|---|---|---|---|
| Code | 0E | 0G | 0J | 1A | 1C | 1D | 1E |
| **WV** | **35** | **40** | **50** | **63** | **80** | **100** | **160** |
| **Code** | 1V | 1G | 1H | 1J | 1K | 2A | 2C |
| **WV** | **200** | **250** | **315** | **350** | **400** | **450** | **500** |
| **Code** | 2D | 2E | 2F | 2V | 2G | 2W | 2H |

### 3 Capacitance

ex) 4.7$\mu$F 475
47$\mu$F 476
470$\mu$F 477
4700$\mu$F 478
47000$\mu$F 479

### 4 Capacitance Tolerance

| Tolerance (%) | ±10 | ±20 | −10 +20 | −10 +30 | −10 +50 |
|---|---|---|---|---|---|
| Code | K | M | V | Q | T |

### 5 Case Diameter

ex) Ø4 04 Ø12.5 12
Ø5 05 Ø16 16
Ø6.3 6L Ø18 18
Ø8 08 Ø22 22
Ø10 10

### 6 Case Height

ex) 5mm 005
11mm 011
12.5mm 12M
20mm 020
31.5mm 31M
35.5mm 35M

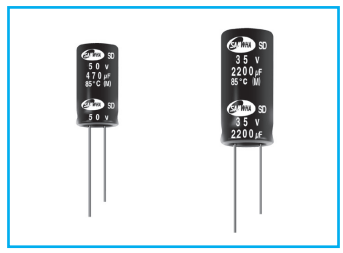
### 7 Lead Taping, Forming and Cutting

See pages 94 ~ 96

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## SD Standard, For General Purposes Series

Solvent Proof
WV≦100V



- Standard series for general purposes
- High voltage, high capacitance series
- Voltage range of 6.3~500V
- Complied to the RoHS directive

SD ⇨ RD
Wide temp.

| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV: 6.3 ~ 450 / 500<br>Temperature range: -40 ~ +85°C / -25 ~ +85°C |
| **Leakage current max.** | WV≦100: I = 0.01CV or 3μA whichever is greater (after 2 min); I = 0.03CV or 4μA whichever is greater (after 1 min)<br>WV>100: I = 0.02CV+15μA (after 5 min) |
| **Capacitance tolerance** | ±20% at 120Hz, 20°C |
| **Dissipation factor max. (at 120Hz, 20°C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 ~ 250 | 350 ~ 500 |
|---|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.28 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.15 | 0.20 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 | 25 | 35 | 50~100 | 160 | 200~350 | 400~450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|
| Z-25°C/Z+20°C | 5 | 4 | 3 | 2 | 2 | 2 | 4 | 6 | 10 | 12 |
| Z-40°C/Z+20°C | 12 | 10 | 8 | 5 | 4 | 3 | 6 | 8 | 12 | – |

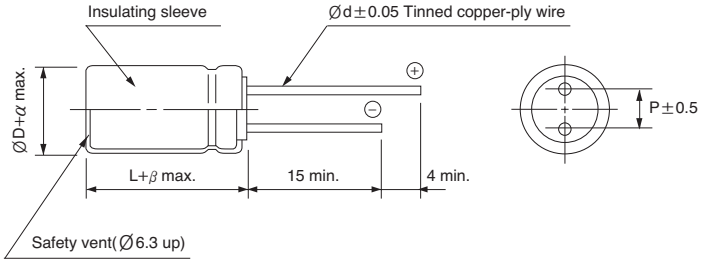
**Load life (after application of the rated voltage for 2000 hours at 85°C)**

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 200% of specified value |

| | |
|---|---|
| **Shelf life (at 85°C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 |
|---|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | | | | 1.0 |
| β | 1.5 | | | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV | Frequency / μF | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|---|
| 6.3~100 | ~ 47 | 0.75 | 1.00 | 1.55 | 2.00 | 2.00 | 2.00 |
| | 68 ~ 680 | 0.80 | 1.00 | 1.35 | 1.50 | 1.62 | 1.75 |
| | 1000 ~ | 0.85 | 1.00 | 1.15 | 1.15 | 1.32 | 1.50 |
| 160~500 | ~ 220 | 0.80 | 1.00 | 1.40 | 1.60 | 1.70 | 1.80 |
| | 330 ~ | 0.90 | 1.00 | 1.13 | 1.15 | 1.32 | 1.50 |

# SD series

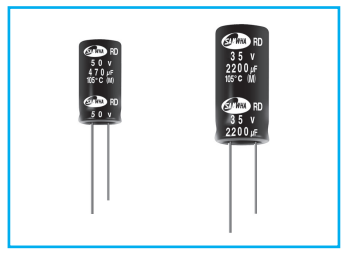
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / μF | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160 | 200 | 250 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | | | | | | 5×11<br>21 | 5×11<br>23 | 5×11<br>23 | | | | | | | |
| 1.5 | | | | | | 5×11<br>26 | 5×11<br>28 | 5×11<br>28 | | | | | | 8×11.5<br>32 | |
| 2.2 | | | | | | 5×11<br>32 | 5×11<br>34 | 5×11<br>34 | | | | | | 8×11.5<br>33 | |
| 3.3 | | | | | | 5×11<br>39 | 5×11<br>42 | 5×11<br>42 | 6.3×11<br>45 | 6.3×11<br>45 | 6.3×11<br>48 | 8×11.5<br>53 | 8×11.5<br>56 | 8×11.5<br>50 | |
| 4.7 | | | | | | 5×11<br>46 | 5×11<br>50 | 5×11<br>50 | 6.3×11<br>53 | 6.3×11<br>57 | 6.3×11<br>57 | 8×11.5<br>66 | 10×12.5<br>73 | 10×12.5<br>72 | 10×16<br>69 |
| 6.8 | | | | | | 5×11<br>56 | 5×11<br>60 | 5×11<br>60 | 8×11.5<br>76 | 8×11.5<br>76 | 8×11.5<br>76 | 10×12.5<br>88 | 10×12.5<br>87 | 10×16<br>86 | 10×16<br>76 |
| 10 | | | | | | 5×11<br>68 | 5×11<br>72 | 5×11<br>76 | 8×11.5<br>96 | 8×11.5<br>96 | 10×12.5<br>107 | 10×12.5<br>107 | 10×16<br>115 | 10×20<br>115 | 12.5×25<br>178 |
| 15 | | | | | | 5×11<br>83 | 5×11<br>89 | 6.3×11<br>89 | 10×12.5<br>131 | 10×16<br>143 | 10×16<br>143 | 10×20<br>156 | 12.5×20<br>165 | 12.5×20<br>164 | |
| 22 | | | | | | 5×11<br>101 | 5×11<br>108 | 6.3×11<br>124 | 10×12.5<br>156 | 10×16<br>173 | 10×16<br>170 | 12.5×20<br>222 | 12.5×20<br>218 | 12.5×25<br>217 | 16×25<br>265 |
| 33 | | | | | | 5×11<br>123 | 6.3×11<br>151 | 8×11.5<br>178 | 10×16<br>209 | 10×20<br>232 | 10×20<br>247 | 16×20<br>297 | 12.5×25<br>296 | 16×25<br>294 | 16×31.5<br>310 |
| 47 | | | | | 5×11<br>131 | ★6.3×11<br>169 | 6.3×11<br>181 | 8×11.5<br>222 | 10×20<br>293 | 10×20<br>293 | 12.5×20<br>319 | 16×20<br>353 | 16×25<br>387 | 16×31.5<br>384 | 18×31.5<br>412 |
| 68 | | | | 5×11<br>144 | ★6.3×11<br>182 | 6.3×11<br>203 | 8×11.5<br>256 | 10×12.5<br>293 | 12.5×20<br>391 | 12.5×25<br>426 | 16×20<br>425 | 16×25<br>465 | 16×31.5<br>488 | 16×35.5<br>503 | 18×35.5<br>457 |
| 100 | | | 5×11<br>162 | ★ 5×11<br>181 | 6.3×11<br>220 | 8×11.5<br>291 | 8×11.5<br>311 | 10×16<br>388 | 12.5×25<br>516 | 16×25<br>516 | 16×25<br>564 | 18×31.5<br>592 | 18×35.5<br>667 | 18×40<br>546 | |
| 150 | | | ★ 5×11<br>198 | 6.3×11<br>246 | 8×11.5<br>318 | 10×12.5<br>414 | 10×12.5<br>422 | 10×20<br>528 | 16×20<br>632 | 16×25<br>691 | 16×31.5<br>726 | 18×40<br>845 | 18×40<br>863 | 22×45<br>1283 | |
| 220 | 5×11<br>201 | ★ 5×11<br>218 | 6.3×11<br>276 | 6.3×11<br>327 | 8×11.5<br>386 | 10×12.5<br>501 | 10×16<br>586 | 12.5×20<br>737 | 16×25<br>873 | 18×31.5<br>962 | 18×35.5<br>988 | 22×41<br>1112 | 22×45<br>1183 | | |
| 330 | ★6.3×11<br>283 | 6.3×11<br>307 | 6.3×11<br>359 | 8×11.5<br>431 | 10×12.5<br>549 | 10×16<br>672 | 10×20<br>784 | 12.5×25<br>1002 | 16×35.5<br>1152 | 18×35.5<br>1206 | 22×41<br>1495 | | | | |
| 470 | 6.3×11<br>338 | 6.3×11<br>366 | 8×11.5<br>476 | 10×12.5<br>550 | 10×16<br>740 | 10×20<br>875 | 12.5×20<br>1098 | 16×25<br>1328 | 18×40<br>1434 | 22×41<br>1495 | | | | | |
| 680 | 8×11.5<br>480 | 8×11.5<br>520 | 8×11.5<br>600 | 10×16<br>754 | 10×20<br>947 | 12.5×20<br>1235 | 12.5×25<br>1440 | 16×31.5<br>1643 | 22×41<br>1831 | | | | | | |
| 1000 | 8×11.5<br>581 | 10×12.5<br>659 | 10×12.5<br>796 | 10×16<br>942 | 12.5×20<br>1306 | 12.5×25<br>1633 | 16×25<br>1937 | 18×31.5<br>1965 | | | | | | | |
| 2200 | 10×16<br>983 | 10×16<br>1051 | 10×20<br>1331 | 12.5×20<br>1542 | 16×25<br>2032 | 16×31.5<br>2220 | 18×31.5<br>2445 | | | | | | | | |
| 3300 | 10×20<br>1286 | 12.5×20<br>1545 | 12.5×20<br>1686 | 16×25<br>2194 | 16×31.5<br>2502 | 18×31.5<br>2765 | 18×40<br>2987 | | | | | | | | |
| 4700 | 12.5×20<br>1736 | 12.5×25<br>1903 | 12.5×25<br>2129 | 16×25<br>2448 | 16×35.5<br>2905 | 18×40<br>3272 | | | | | | | | | |
| 6800 | 12.5×25<br>2129 | 16×25<br>2332 | 16×25<br>2577 | 18×31.5<br>3114 | 18×40<br>3408 | ← Case size ØD×L (mm)<br>← Ripple current (mA rms) at 85°C, 120Hz | | | | | | | | | |
| 10000 | 16×25<br>2629 | 16×31.5<br>2830 | 16×31.5<br>3176 | 18×40<br>3544 | | | | | | | | | | | |
| 15000 | 16×35.5<br>2959 | 16×35.5<br>3284 | 18×35.5<br>3656 | | | | | | | | | | | | |
| 22000 | 18×40<br>3733 | 18×40<br>3843 | 22×41<br>4012 | | | | | | | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## RD Wide Temperature Range Series

Solvent Proof
WV≦100V



- Standard series for general purpose
- High CV value
- Wide operating temperature range of -55 ~ +105˚C
- Complied to the RoHS directive

SD ⇨ RD
Wide temp.

| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV: 6.3 ~ 100 / 160 ~ 450 / 500<br>Temperature range: -55 ~ +105˚C / -40 ~ +105˚C / -25 ~ +105˚C |
| **Leakage current max.** | WV≦100: I = 0.01CV or 3μA whichever is greater (after 2 min); I = 0.03CV or 4μA whichever is greater (after 1 min)<br>WV>100: I = 0.02CV+15μA (after 5 min) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160~250 | 350~500 |
|---|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.28 | 0.24 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.15 | 0.20 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 | 25 | 35 | 50~100 | 160 | 200~350 | 400~450 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 5 | 4 | 3 | 2 | 2 | 2 | 4 | 6 | 10 | 12 |
| Z-40˚C/Z+20˚C | 12 | 10 | 8 | 5 | 4 | 3 | 6 | 8 | 12 | – |

**Load life (after application of the rated voltage for 2000 hours at 105˚C)**

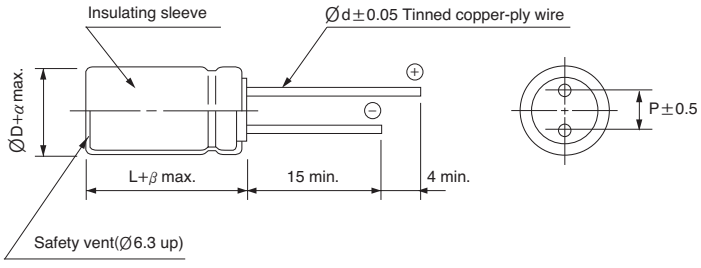
| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 200% of specified value |

| ØD | ØD ≦ 8 | ØD ≧ 10 |
|---|---|---|
| Life time | 1000 hours | 2000 hours |

| Item | Characteristics |
|---|---|
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 |
|---|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | | | | 1.0 |
| β | 1.5 | | | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV | Frequency / μF | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|---|
| 6.3~100 | ~ 47 | 0.75 | 1.00 | 1.55 | 2.00 | 2.00 | 2.00 |
| | 68 ~ 680 | 0.80 | 1.00 | 1.35 | 1.50 | 1.62 | 1.75 |
| | 820 ~ | 0.85 | 1.00 | 1.15 | 1.15 | 1.32 | 1.50 |
| 160~500 | ~ 220 | 0.80 | 1.00 | 1.40 | 1.60 | 1.70 | 1.80 |
| | 330 ~ | 0.90 | 1.00 | 1.13 | 1.15 | 1.32 | 1.50 |

# RD series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 6.3 | | 10 | | 16 | | 25 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz |
| 68 | | | | | | | 5×11 | 108 |
| 82 | | | | | | | 6.3×11 | 137 |
| 100 | | | | | 5×11 | 119 | 6.3×11 | 151 |
| 150 | | | 5×11 | 134 | 6.3×11 | 167 | 6.3×11 | 185 |
| 220 | 5×11 | 146 | 5×11 | 162 | 6.3×11 | 203 | 6.3×11 | 224 |
| 330 | 6.3×11 | 206 | 6.3×11 | 228 | 6.3×11 | 248 | 8×11.5 | 324 |
| 470 | 6.3×11 | 246 | 6.3×11 | 272 | 8×11.5 | 349 | 8×11.5 | 386 |
| 680 | 8×11.5 | 348 | 8×11.5 | 386 | 8×11.5 | 420 | 10×12.5 | 540 |
| 820 | 8×11.5 | 382 | 10×12.5 | 493 | 10×16 | 587 | 10×20 | 708 |
| 1000 | 8×11.5 | 422 | 10×12.5 | 544 | 10×16 | 648 | 10×20 | 820 |
| 1500 | 10×16 | 621 | 10×16 | 680 | 10×20 | 797 | 12.5×20 | 1017 |
| 2200 | 10×16 | 713 | 10×16 | 774 | 10×20 | 898 | 12.5×20 | 1100 |
| | 10×20 | 778 | 10×20 | 844 | 12.5×20 | 1055 | 12.5×25 | 1235 |
| 3300 | 12.5×16 | 983 | 12.5×20 | 1148 | 12.5×20 | 1184 | 16×25 | 1562 |
| 4700 | 12.5×20 | 1219 | 12.5×20 | 1272 | 12.5×25 | 1459 | 16×25 | 1752 |
| | | | 12.5×25 | 1421 | 16×25 | 1657 | 16×31.5 | 1916 |
| 6800 | 12.5×25 | 1480 | 16×25 | 1737 | 16×25 | 1811 | 16×35.5 | 2176 |
| | | | | | 16×31.5 | 1982 | 18×35.5 | 2335 |
| 10000 | 16×25 | 1807 | 16×31.5 | 2172 | 16×31.5 | 2140 | 18×35.5 | 2497 |
| 15000 | 16×31.5 | 2128 | 16×35.5 | 2323 | 18×35.5 | 2545 | | |
| | 16×35.5 | 2233 | 18×35.5 | 2482 | | | | |
| 22000 | 18×31.5 | 2411 | | | | | | |

| WV / Item / μF | 35 | | 50 | | 63 | | 100 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz | ØD×L (mm) | Ripple current (mA rms) 105℃ 120Hz |
| 2.2 | | | 5×11 | 24 | 5×11 | 26 | | |
| 3.3 | | | 5×11 | 29 | 5×11 | 32 | 5×11 | 32 |
| 4.7 | | | 5×11 | 35 | 5×11 | 38 | 5×11 | 38 |
| 6.8 | | | 5×11 | 42 | 5×11 | 46 | 5×11 | 46 |
| 10 | | | 5×11 | 51 | 5×11 | 56 | 5×11 | 56 |
| 15 | | | 5×11 | 62 | 5×11 | 68 | 6.3×11 | 78 |
| 22 | | | 5×11 | 75 | 5×11 | 83 | 6.3×11 | 95 |
| 33 | | | 5×11 | 92 | 6.3×11 | 116 | 8×11.5 | 139 |
| 47 | 5×11 | 96 | 6.3×11 | 127 | 6.3×11 | 139 | 10×12.5 | 190 |
| 68 | 6.3×11 | 132 | 8×11.5 | 180 | 8×11.5 | 197 | 10×16 | 251 |
| 82 | 6.3×11 | 145 | 8×11.5 | 198 | 8×11.5 | 216 | 10×16 | 290 |
| 100 | 6.3×11 | 160 | 8×11.5 | 218 | 8×11.5 | 239 | 10×16 | 304 |
| 150 | 8×11.5 | 231 | 8×11.5 | 267 | 10×12.5 | 340 | 10×20 | 406 |
| 220 | 8×11.5 | 280 | 10×12.5 | 376 | 10×16 | 451 | 12.5×20 | 564 |
| 330 | 10×12.5 | 400 | 10×16 | 504 | 10×20 | 603 | 16×25 | 856 |
| 470 | 10×16 | 521 | 10×20 | 657 | 12.5×20 | 844 | 16×25 | 1021 |
| 680 | 10×20 | 684 | 12.5×20 | 927 | 12.5×25 | 1107 | 16×31.5 | 1344 |
| 820 | 12.5×20 | 880 | 12.5×25 | 1050 | 16×25 | 1300 | 16×35.5 | 1627 |
| 1000 | 12.5×20 | 974 | 12.5×25 | 1226 | 16×25 | 1490 | 18×35.5 | 1835 |
| 1500 | 12.5×25 | 1136 | 16×25 | 1442 | 16×35.5 | 1770 | | |
| | 16×20 | 1188 | 16×31.5 | 1578 | 18×31.5 | 1812 | | |
| 2200 | 16×25 | 1426 | 16×31.5 | 1709 | 16×35.5 | 1891 | | |
| 3300 | 16×35.5 | 1857 | 16×35.5 | 1794 | 18×40 | 2689 | | |
| | 18×31.5 | 1900 | 18×35.5 | 2152 | | | | |
| 4700 | 16×35.5 | 2073 | | | | | | |
| | 18×35.5 | 2224 | | | | | | |
| 6800 | 18×40 | 2510 | | | | | | |

# RD series

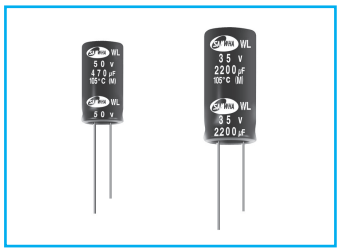
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz |
| 2.2 | 6.3×11 | 23 | 6.3×11 | 23 | 6.3×11 | 23 | 6.3×11 | 23 |
| 3.3 | 6.3×11 | 29 | 6.3×11 | 29 | 6.3×11 | 30 | 8×11.5 | 34 |
| 4.7 | 6.3×11 | 34 | 6.3×11 | 34 | 8×11.5 | 40 | 8×11.5 | 40 |
| | | | 8×11.5 | 40 | | | 10×12.5 | 47 |
| 6.8 | 6.3×11 | 41 | 8×11.5 | 49 | 10×12.5 | 56 | 10×12.5 | 56 |
| | | | 10×12.5 | 56 | | | 10×16 | 62 |
| 10 | 8×11.5 | 59 | 8×11.5 | 59 | 10×12.5 | 68 | 10×16 | 75 |
| | 10×12.5 | 68 | 10×12.5 | 68 | | | | |
| 15 | 10×12.5 | 84 | 10×12.5 | 84 | 10×16 | 92 | 10×16 | 92 |
| | 10×16 | 92 | 10×16 | 92 | | | 10×20 | 100 |
| 22 | 10×12.5 | 102 | 10×16 | 111 | 10×16 | 111 | 12.5×20 | 143 |
| | 10×16 | 111 | | | 10×20 | 121 | | |
| 33 | 10×16 | 136 | 10×20 | 149 | 10×20 | 149 | 12.5×25 | 190 |
| | 10×20 | 149 | | | 12.5×20 | 175 | | |
| 47 | 10×20 | 177 | 12.5×20 | 208 | 12.5×20 | 203 | 16×25 | 252 |
| | 12.5×20 | 208 | | | 12.5×25 | 227 | | |
| 68 | 12.5×25 | 273 | 16×20 | 279 | 12.5×25 | 267 | 16×31.5 | 332 |
| 82 | 12.5×25 | 302 | 16×25 | 333 | 16×25 | 333 | 18×31.5 | 391 |
| 100 | 12.5×25 | 331 | 16×25 | 368 | 16×25 | 368 | 18×31.5 | 432 |
| 150 | 16×25 | 450 | 16×25 | 450 | 16×31.5 | 450 | 18×35.5 | 554 |
| 220 | 16×31.5 | 596 | 18×31.5 | 641 | 18×35.5 | 671 | 22×41 | 721 |
| | | | 18×35.5 | 671 | 18×40 | 694 | | |
| 330 | 18×31.5 | 784 | 18×40 | 863 | 22×41 | 968 | | |
| 470 | 18×40 | 1030 | 22×41 | 1155 | | | | |
| 680 | 22×41 | 1390 | | | | | | |

| WV / Item / μF | 400 | | 450 | | 500 | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz | ØD×L (mm) | Ripple current (mA rms) 105°C 120Hz |
| 2.2 | 8×11.5 | 28 | 8×11.5 | 23 | | |
| 3.3 | 8×11.5 | 34 | 10×12.5 | 33 | | |
| | 10×12.5 | 39 | 10×16 | 36 | | |
| 4.7 | 10×12.5 | 47 | 10×12.5 | 39 | 10×16 | 59 |
| 6.8 | 10×16 | 62 | 10×16 | 52 | 10×16 | 72 |
| 10 | 10×16 | 75 | 10×20 | 68 | 12.5×25 | 88 |
| | 10×20 | 82 | 12.5×20 | 80 | | |
| 15 | 12.5×20 | 118 | 12.5×20 | 96 | 12.5×30 | 115 |
| 22 | 12.5×20 | 140 | 12.5×25 | 127 | 16×25 | 159 |
| | 12.5×25 | 155 | 16×25 | 144 | | |
| 33 | 16×25 | 211 | 16×25 | 177 | 16×31.5 | 207 |
| 47 | 16×25 | 252 | 16×31.5 | 231 | 18×31.5 | 261 |
| 68 | 16×31.5 | 332 | 16×35.5 | 291 | 18×35.5 | 335 |
| | 18×31.5 | 356 | | | | |
| 82 | 18×31.5 | 391 | 18×31.5 | 327 | 18×40 | 370 |
| 100 | 18×35.5 | 453 | 18×40 | 420 | | |
| 150 | 22×41 | 596 | | | | |

# WL Low Impedance Series

Long Life | Solvent Proof WV≦100V | Low Impedance



- Wide voltage compared with RZ series
- Operating temperature range of −40 ~ +105˚C
- Low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C
- For E-meter
- Complied to the RoHS directive

WL ⇨ WF
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV: 6.3 ~ 450 / 500; Temperature range: -40 ~ +105˚C / -25 ~ +105˚C |
| **Leakage current max.** | WV ≦ 100: I = 0.01CV or 3μA whichever is greater (after 2 min.) I = 0.03CV or 4μA whichever is greater (after 1 min.); WV > 100: I = 0.02CV + 15μA (after 5 min.) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 160~250 | 350~500 |
|---|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.15 | 0.20 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 | 25 ~ 100 | 160 ~ 250 | 350 ~ 450 | 500 |
|---|---|---|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 4 | 3 | 2 | 2 | 3 | 6 | 8 |
| Z-40˚C/Z+20˚C | 8 | 6 | 4 | 3 | 4 | 10 | – |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

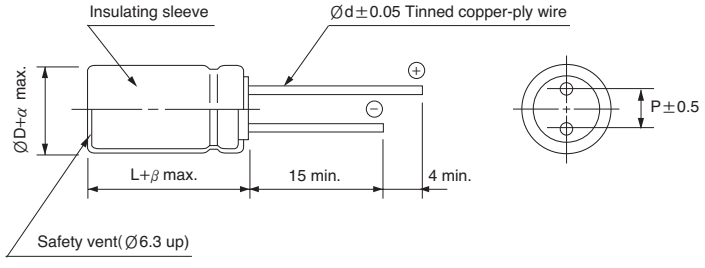
| Life time | ØD = 5, 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| WV≦ 100 | 2000 hours | 3000 hours | 5000 hours |
| WV > 100 | 2000 hours | | |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 20 | 22 |
|---|---|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 | 10.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | | | | 1.0 | |
| β | 1.5 | | | 2.0 | | | | 3.0 | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.40 | 0.65 | 0.82 | 0.91 | 1.00 |
| 47 ~ 220 | 0.50 | 0.70 | 0.84 | 0.92 | 1.00 |
| 330 ~ 680 | 0.55 | 0.75 | 0.86 | 0.93 | 1.00 |
| 820 ~ 1500 | 0.60 | 0.80 | 0.88 | 0.94 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.90 | 0.95 | 1.00 |

# WL series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 10 | | | | | | | 5×11 | 0.90 | 180 | 5×11 | 0.90 | 180 |
| 22 | 5×11 | 0.70 | 180 | 5×11 | 0.70 | 180 | 5×11 | 0.70 | 180 | 5×11 | 0.70 | 180 |
| 33 | 5×11 | 0.70 | 180 | 5×11 | 0.70 | 180 | 5×11 | 0.70 | 180 | 5×11 | 0.70 | 180 |
| 47 | 5×11 | 0.65 | 180 | 5×11 | 0.65 | 180 | 5×11 | 0.65 | 180 | 5×11 | 0.65 | 180 |
| 100 | 5×11 | 0.65 | 180 | 5×11 | 0.65 | 180 | 6.3×11 | 0.30 | 280 | 6.3×11 | 0.30 | 280 |
| 150 | 6.3×11 | 0.30 | 280 | 6.3×11 | 0.30 | 280 | 6.3×11 | 0.30 | 280 | 8×11.5 | 0.20 | 450 |
| 220 | 6.3×11 | 0.30 | 280 | 6.3×11 | 0.30 | 280 | 8×11.5 | 0.14 | 450 | 8×11.5 | 0.20 | 450 |
| 330 | 6.3×11 | 0.30 | 280 | 8×11.5 | 0.14 | 450 | 8×11.5 | 0.14 | 450 | 10×12.5 | 0.10 | 660 |
| 470 | 8×11.5 | 0.14 | 450 | 8×11.5 | 0.14 | 450 | 10×12.5 | 0.10 | 660 | 10×16 | 0.080 | 850 |
| 680 | 10×12.5 | 0.10 | 660 | 10×12.5 | 0.10 | 660 | 10×16 | 0.080 | 850 | 10×20 | 0.054 | 1100 |
| 1000 | 10×12.5 | 0.10 | 660 | 10×16 | 0.080 | 850 | 10×20 | 0.054 | 1100 | 12.5×20 | 0.050 | 1400 |
| 1500 | 10×20 | 0.054 | 1100 | 10×20 | 0.054 | 1100 | 12.5×20 | 0.050 | 1400 | 16×20 | 0.030 | 2100 |
| 2200 | 12.5×20 | 0.050 | 1400 | 12.5×20 | 0.050 | 1400 | 12.5×25 | 0.038 | 1700 | 16×25 | 0.030 | 2100 |
| 3300 | 12.5×20 | 0.050 | 1400 | 12.5×25 | 0.038 | 1700 | 16×25 | 0.030 | 2100 | 16×31.5 | 0.025 | 2600 |
| 4700 | 16×25 | 0.030 | 2100 | 16×25 | 0.030 | 2100 | 16×31.5 | 0.025 | 2600 | 18×35.5 | 0.022 | 3000 |
| 6800 | 16×25 | 0.030 | 2100 | 16×31.5 | 0.025 | 2600 | 18×35.5 | 0.022 | 3000 | | | |
| 10000 | 16×31.5 | 0.025 | 2600 | 18×35.5 | 0.022 | 3000 | | | | | | |
| 15000 | 18×35.5 | 0.022 | 3000 | | | | | | | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | | 100 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 1.0 | | | | 5×11 | 3.0 | 40 | | | | | | |
| 2.2 | | | | 5×11 | 3.0 | 55 | | | | 5×11 | 2.5 | 52 |
| 3.3 | | | | 5×11 | 2.6 | 65 | 5×11 | 2.0 | 64 | 5×11 | 2.5 | 64 |
| 4.7 | 5×11 | 0.90 | 180 | 5×11 | 2.3 | 90 | 5×11 | 2.0 | 76 | 5×11 | 2.5 | 76 |
| 10 | 5×11 | 0.90 | 180 | 5×11 | 1.4 | 120 | 5×11 | 2.0 | 111 | 6.3×11 | 1.0 | 128 |
| 22 | 5×11 | 0.70 | 180 | 5×11 | 1.2 | 150 | 6.3×11 | 0.60 | 190 | 8×11.5 | 0.60 | 224 |
| 33 | 5×11 | 0.65 | 180 | 6.3×11 | 0.60 | 200 | 6.3×11 | 0.60 | 233 | 10×12.5 | 0.40 | 319 |
| 47 | 6.3×11 | 0.30 | 280 | 6.3×11 | 0.43 | 250 | 8×11.5 | 0.50 | 328 | 10×16 | 0.30 | 417 |
| 100 | 8×11.5 | 0.20 | 450 | 8×11.5 | 0.24 | 340 | 10×16 | 0.12 | 456 | 12.5×20 | 0.15 | 570 |
| 150 | 8×11.5 | 0.14 | 450 | 10×12.5 | 0.17 | 490 | 10×20 | 0.10 | 610 | 12.5×25 | 0.12 | 762 |
| 220 | 10×12.5 | 0.10 | 660 | 10×16 | 0.12 | 650 | 12.5×20 | 0.090 | 809 | 16×25 | 0.070 | 1250 |
| 330 | 10×16 | 0.080 | 850 | 10×20 | 0.10 | 810 | 12.5×20 | 0.085 | 1036 | 16×31.5 | 0.050 | 1404 |
| 470 | 10×20 | 0.054 | 1100 | 12.5×20 | 0.085 | 1100 | 16×20 | 0.050 | 1411 | 18×40 | 0.030 | 1980 |
| 680 | 12.5×20 | 0.050 | 1400 | 12.5×25 | 0.065 | 1200 | 16×25 | 0.043 | 1843 | 18×40 | 0.030 | 2050 |
| 820 | 12.5×25 | 0.045 | 1500 | 16×25 | 0.055 | 1300 | 18×25 | 0.035 | 1900 | 18×40 | 0.030 | 2215 |
| 1000 | 12.5×25 | 0.038 | 1700 | 16×25 | 0.043 | 1600 | 16×35.5 | 0.025 | 1967 | | | |
| 1500 | 16×25 | 0.030 | 2100 | 16×31.5 | 0.038 | 2000 | | | | | | |
| 2200 | 16×31.5 | 0.025 | 2600 | 18×35.5 | 0.034 | 2300 | | | | | | |
| 3300 | 18×35.5 | 0.022 | 3000 | | | | | | | | | |

# WL series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

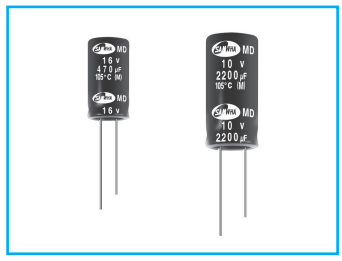
| WV / Item / μF | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz |
| 1 | 6.3×11 | 45 | | | | | | |
| 10 | 10×12.5 | 230 | | | 10×16 | 300 | 10×16 | 180 |
| 22 | 10×16 | 440 | 10×20 | 440 | 10×20 | 480 | 12.5×20 | 270 |
| 33 | 10×16 | 560 | 12.5×20 | 590 | 12.5×20 | 630 | 16×20 | 600 |
| 47 | 10×20 | 725 | 12.5×20 | 780 | 12.5×25 | 630 | 16×25 | 700 |
| 68 | 12.5×25 | 950 | 12.5×25 | 950 | 16×25 | 1000 | 16×31.5 | 1100 |
| 82 | | | | | 16×25 | 1100 | 16×35.5 | 1130 |
| 100 | 16×25 | 1280 | 16×25 | 1280 | 16×31.5 | 1400 | 18×31.5 | 1170 |
| 120 | | | | | | | 18×35.5 | 1200 |
| 150 | 16× 25 | 1300 | 16× 25 | 1500 | 18×25<br>18×31.5 | 1450 | 18×40 | 1250 |
| 220 | 16× 31.5 | 1500 | 18× 31.5 | 1700 | 18×35.5<br>18×40 | 1485 | | |
| 330 | 18×31.5 | 1700 | 18×35.5 | 1900 | | | | |

| WV / Item / μF | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Ripple current (mA rms) 105℃ 100kHz |
| 3.3 | | | | | 10×12.5 | 150 | | |
| 4.7 | | | | | 10×16 | 200 | | |
| 10 | 10×16 | 176 | | | 10×16 | 230 | 12.5×20 | 240 |
| 22 | 12.5×25 | 300 | | | 12.5×25 | 525 | 12.5×30 | 420 |
| 33 | 16×20 | 600 | | | 16×25 | 600 | 16×31.5 | 560 |
| 47 | 16×25 | 700 | 16×25 | 630 | 16×25<br>16×31.5<br>18×25 | 660<br>720<br>720 | 16×35.5<br>18×31.5<br>18×35.5 | 650<br>620<br>700 |
| 56 | | | 16×31.5<br>18×25 | 740 | 16×31.5<br>18×25 | 800<br>800 | 16×40 | 740 |
| 68 | 16×31.5 | 1100 | 16×35.5<br>18×25 | 810 | 16×35.5<br>18×31.5 | 900<br>900 | 16×45<br>18×40 | 820<br>900 |
| 82 | 16×35.5 | 1150 | 16×40<br>18×31.5 | 960<br>900 | 16×40<br>18×31.5<br>18×35.5 | 1115<br>1115<br>1200 | 16×50<br>18×40 | 1000<br>1000 |
| 100 | 18×35.5 | 1200 | 16×40<br>18×35.5 | 1100 | 16×40<br>18×35.5 | 1300 | 16×50<br>18×45<br>20×41 | 1250<br>1250<br>1250 |
| 120 | 18×40 | 1270 | 16×50<br>18×40 | 1250<br>1200 | 16×50<br>18×40 | 1500<br>1500 | 22×45 | 1370 |
| 150 | 20×41 | 1380 | | | 20×41 | 1600 | | |

# MD High Ripple Current, Ultra Low Impedance Series

Low Impedance  Solvent Proof

MZ ⇒ MD
High Ripple



- High ripple current compared with MZ series
- Enabled ripple current with extremely low impedance at high frequency range
- High reliability withstanding 2000 hours load life at 105˚C
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.<br>WV: 6.3 / 10 / 16<br>tanδ: 0.22 / 0.19 / 0.16 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 6.3 / 10 / 16<br>Z-40˚C / Z+20˚C: 3 / 3 / 3 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 2000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±25% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

● DRAWING (See page 98)

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

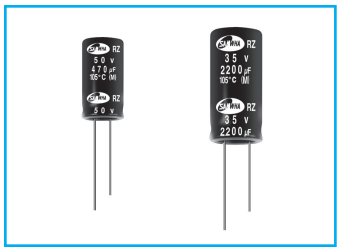
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| **470** | | | | | | | 8 × 11.5 | 0.021 | 1340 |
| **680** | | | | 8 × 11.5 | 0.021 | 1340 | 8 × 15 | 0.020 | 1850 |
| | | | | | | | 10 × 12.5 | 0.020 | 1960 |
| **820** | 8 × 11.5 | 0.021 | 1340 | | | | | | |
| **1000** | | | | 8 × 15 | 0.020 | 1850 | 8 × 20 | 0.016 | 2350 |
| | | | | 10 × 12.5 | 0.016 | 1960 | 10 × 16 | 0.016 | 2460 |
| **1500** | 10 × 12.5 | 0.016 | 1960 | 8 × 20 | 0.013 | 2350 | 10 × 20 | 0.014 | 2805 |
| | | | | 10 × 16 | 0.013 | 2460 | | | |
| **1800** | 10 × 16 | 0.013 | 2460 | 10 × 20 | 0.011 | 2805 | 12.5 × 20 | 0.013 | 3230 |
| **2200** | 10 × 20 | 0.011 | 2805 | 12.5 × 20 | 0.009 | 3230 | | | |
| **3300** | 12.5 × 20 | 0.009 | 3230 | | | | | | |

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF / Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| **~ 820** | 0.55 | 0.77 | 0.94 | 0.97 | 1.00 |
| **1000 ~ 1800** | 0.60 | 0.80 | 0.96 | 0.98 | 1.00 |
| **2200 ~** | 0.70 | 0.85 | 0.98 | 0.99 | 1.00 |

# RZ Low Impedance Series

Long Life | Solvent Proof | Low Impedance



- Low impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C (2000/3000 hours for smaller case sizes as specified below)
- Ideally suited for use in switching power supplies
- Complied to the RoHS directive

RZ ⇨ RP
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -55 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 |
|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3, 10 | 16 ~ 35 | 50, 63 |
|---|---|---|---|
| Z-55˚C/Z+20˚C | 4 | 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 200% of specified value |

| ØD | ØD ≦ 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 2000 hours | 3000 hours | 5000 hours |

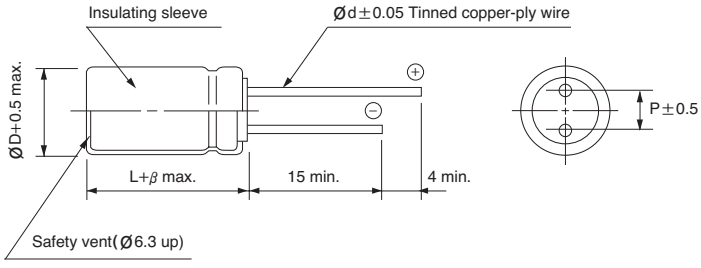
**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 150% of specified value |

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.40 | 0.65 | 0.82 | 0.91 | 1.00 |
| 47 ~ 220 | 0.50 | 0.70 | 0.84 | 0.92 | 1.00 |
| 330 ~ 680 | 0.55 | 0.75 | 0.86 | 0.93 | 1.00 |
| 1000 ~ 1500 | 0.60 | 0.80 | 0.88 | 0.94 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.90 | 0.95 | 1.00 |

# RZ series

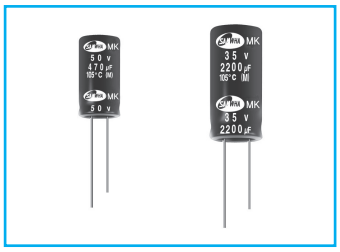
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 33 | | | | | | | | | | 5×11 | 0.80 | 155 |
| 47 | | | | | | | 5×11 | 0.80 | 155 | 6.3×11 | 0.55 | 210 |
| 68 | | | | 5×11 | 0.80 | 155 | 6.3×11 | 0.50 | 220 | 6.3×11 | 0.36 | 260 |
| 100 | 5×11 | 0.85 | 150 | 6.3×11 | 0.55 | 210 | 6.3×11 | 0.35 | 265 | 8×11.5 | 0.24 | 383 |
| 150 | 6.3×11 | 0.49 | 225 | 6.3×11 | 0.35 | 265 | 8×11.5 | 0.23 | 388 | 8×11.5 | 0.16 | 460 |
| 220 | 6.3×11 | 0.30 | 285 | 8×11.5 | 0.24 | 387 | 8×11.5 | 0.16 | 460 | 10×12.5 | 0.13 | 600 |
| 330 | 8×11.5 | 0.20 | 292 | 8×11.5 | 0.16 | 460 | 10×12.5 | 0.12 | 625 | 10×16 | 0.095 | 750 |
| 470 | 10×12.5 | 0.14 | 575 | 10×12.5 | 0.13 | 600 | 10×16 | 0.09 | 770 | 10×20 | 0.065 | 1020 |
| 680 | 10×16 | 0.11 | 700 | 10×16 | 0.09 | 770 | 10×20 | 0.065 | 1020 | 12.5×20 | 0.046 | 1392 |
| 1000 | 10×20 | 0.075 | 950 | 10×20 | 0.060 | 1060 | 12.5×20 | 0.047 | 1411 | 12.5×25 | 0.036 | 1660 |
| 1500 | 12.5×20 | 0.055 | 1220 | 12.5×20 | 0.045 | 1417 | 12.5×25 | 0.036 | 1660 | 16×20 | 0.034 | 1770 |
| 2200 | 12.5×20 | 0.043 | 1438 | 12.5×25 | 0.034 | 1710 | 16×20 | 0.033 | 1800 | 16×25 | 0.028 | 2051 |
| 3300 | 12.5×25 | 0.034 | 1710 | 16×20 | 0.031 | 1850 | 16×25 | 0.027 | 2095 | 16×35.5 | 0.020 | 2680 |
| 4700 | 16×25 | 0.032 | 1935 | 16×31.5 | 0.023 | 2420 | 16×35.5 | 0.020 | 2680 | 18×40 | 0.018 | 2960 |
| 6800 | 16×31.5 | 0.024 | 2370 | 16×35.5 | 0.020 | 2680 | 18×35.5 | 0.018 | 2900 | | | |
| 10000 | 16×40 | 0.020 | 2750 | 18×40 | 0.017 | 3040 | | | | | | |
| 15000 | 18×40 | 0.018 | 2960 | | | | | | | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 1.0 | | | | 5 × 11 | 4.00 | 36 | | | |
| 1.5 | | | | 5 × 11 | 3.80 | 45 | | | |
| 2.2 | | | | 5 × 11 | 3.50 | 54 | | | |
| 3.3 | | | | 5 × 11 | 3.00 | 66 | | | |
| 4.7 | | | | 5 × 11 | 2.20 | 81 | | | |
| 6.8 | | | | 5 × 11 | 1.80 | 91 | | | |
| 10 | | | | 5 × 11 | 1.80 | 115 | 5 × 11 | 1.80 | 135 |
| 15 | | | | 5 × 11 | 1.60 | 145 | 6.3 × 11 | 1.00 | 185 |
| 22 | 5 × 11 | 0.75 | 160 | 6.3 × 11 | 1.40 | 195 | 6.3 × 11 | 1.00 | 215 |
| 33 | 6.3 × 11 | 0.49 | 225 | 6.3 × 11 | 1.20 | 240 | 8 × 11.5 | 0.80 | 320 |
| 47 | 6.3 × 11 | 0.34 | 270 | 8 × 11.5 | 0.80 | 344 | 8 × 11.5 | 0.80 | 365 |
| 68 | 8 × 11.5 | 0.24 | 384 | 8 × 11.5 | 0.65 | 410 | 10 × 12.5 | 0.23 | 495 |
| 100 | 8 × 11.5 | 0.16 | 460 | 10 × 16 | 0.40 | 581 | 10 × 20 | 0.16 | 750 |
| 150 | 10 × 12.5 | 0.12 | 625 | 10 × 20 | 0.30 | 820 | 12.5 × 20 | 0.12 | 950 |
| 220 | 10 × 16 | 0.09 | 770 | 12.5 × 20 | 0.20 | 1040 | 12.5 × 20 | 0.085 | 1140 |
| 330 | 10 × 20 | 0.060 | 1060 | 12.5 × 20 | 0.12 | 1281 | 12.5 × 25 | 0.060 | 1420 |
| 470 | 12.5 × 20 | 0.046 | 1401 | 12.5 × 25 | 0.085 | 1500 | 16 × 25 | 0.055 | 1700 |
| 680 | 12.5 × 25 | 0.036 | 1660 | 16 × 20 | 0.060 | 1630 | 16 × 31.5 | 0.032 | 2050 |
| 1000 | 16 × 20 | 0.034 | 1770 | 16 × 31.5 | 0.040 | 2120 | 18 × 35.5 | 0.029 | 2280 |
| 1500 | 16 × 31.5 | 0.028 | 2385 | 16 × 40 | 0.035 | 2410 | | | |
| 2200 | 16 × 35.5 | 0.020 | 2680 | 18 × 40 | 0.030 | 2560 | | | |
| 3300 | 18 × 40 | 0.017 | 3040 | | | | | | |

# MK High Ripple Current Series

Low Impedance  Solvent Proof



- Ripple current compared with RZ series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C
  (2000 ~ 3000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive

RZ ⇨ MK
Miniature High Ripple

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.08 |

| **Low temperature characteristics (Impedance ratio at 120Hz)** | Z-40˚C / Z+20˚C | Z-25˚C / Z+20˚C |
|---|---|---|
| | 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

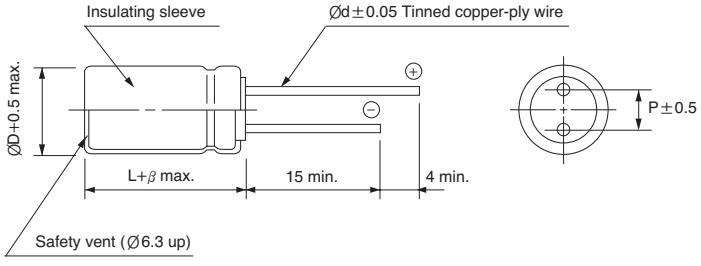
| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of the initial value |
| tanδ | Less than 200% of the specified value |

| ØD | ØD = 5, 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 2000 hours | 3000 hours | 5000 hours |

| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |
|---|---|

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.40 | 0.65 | 0.82 | 0.94 | 1.00 |
| 47 ~ 220 | 0.50 | 0.70 | 0.84 | 0.96 | 1.00 |
| 330 ~ 680 | 0.55 | 0.75 | 0.86 | 0.96 | 1.00 |
| 820 ~ 1800 | 0.60 | 0.80 | 0.88 | 0.97 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.90 | 0.97 | 1.00 |

# MK series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 10 | | | | | | | 5×11 | 0.525 | 250 | 5×11 | 0.85 | 250 |
| 22 | 5×11 | 0.525 | 250 | 5×11 | 0.525 | 250 | 5×11 | 0.525 | 270 | 5×11 | 0.525 | 270 |
| 33 | 5×11 | 0.525 | 270 | 5×11 | 0.525 | 270 | 5×11 | 0.525 | 290 | 5×11 | 0.525 | 290 |
| 47 | 5×11 | 0.450 | 290 | 5×11 | 0.450 | 290 | 5×11 | 0.450 | 310 | 5×11 | 0.500 | 310 |
| 100 | 5×11 | 0.450 | 310 | 5×11 | 0.450 | 310 | 5×11 | 0.450 | 310 | 6.3×11 | 0.225 | 460 |
| | | | | | | | 6.3×11 | 0.300 | 405 | | | |
| 150 | 6.3×11 | 0.300 | 405 | 6.3×11 | 0.300 | 405 | 6.3×11 | 0.225 | 460 | 8×11.5 | 0.160 | 760 |
| 220 | 6.3×11 | 0.225 | 460 | 6.3×11 | 0.225 | 460 | 8×11.5 | 0.108 | 760 | 8×11.5 | 0.160 | 950 |
| 330 | 6.3×11 | 0.225 | 505 | 8×11.5 | 0.150 | 760 | 8×11.5 | 0.108 | 950 | 10×12.5 | 0.088 | 1280 |
| 390 | 8×11.5 | 0.108 | 550 | 8×11.5 | 0.150 | 760 | 8×15 | 0.098 | 1000 | 8×15 | 0.098 | 1430 |
| | | | | | | | 10×12.5 | 0.098 | 1000 | 10×12.5 | 0.098 | 1430 |
| 470 | 8×11.5 | 0.108 | 950 | 8×11.5 | 0.150 | 950 | 8×11.5 | 0.108 | 950 | 10×12.5 | 0.098 | 1430 |
| | | | | | | | 8×15 | 0.098 | 1100 | 10×16 | 0.065 | 1785 |
| | | | | | | | 10×12.5 | 0.088 | 1280 | 10×20 | 0.060 | 1785 |
| 560 | 8×15 | 0.098 | 1000 | 8×15 | 0.098 | 1100 | 8×20 | 0.088 | 1280 | 8×20 | 0.088 | 1900 |
| | 10×12.5 | 0.098 | 1050 | 10×12.5 | 0.098 | 1100 | 10×16 | 0.088 | 1280 | 10×16 | 0.088 | 1900 |
| 680 | 10×12.5 | 0.088 | 1280 | 8×15 | 0.098 | 1280 | 10×16 | 0.065 | 1785 | 10×16 | 0.065 | 1900 |
| | | | | 10×12.5 | 0.088 | | | | | 10×20 | 0.050 | 2270 |
| 820 | 10×16 | 0.075 | 1300 | 10×12.5 | 0.088 | 1400 | 10×16 | 0.065 | 1785 | 10×20 | 0.050 | 2300 |
| 1000 | 10×16 | 0.065 | 1785 | 8×20 | 0.088 | 1600 | 8×20 | 0.088 | 2000 | 10×20 | 0.050 | 2400 |
| | | | | 10×12.5 | | | 10×16 | 0.065 | | | | |
| | | | | 10×16 | 0.065 | 1785 | 10×20 | 0.050 | 2270 | 12.5×20 | 0.043 | 2950 |
| 1200 | | | | 10×16 | 0.065 | 2200 | | | | 12.5×20 | 0.043 | 3100 |
| 1500 | 10×20 | 0.050 | 2270 | 10×20 | 0.050 | 2270 | 12.5×20 | 0.043 | 2450 | 12.5×25 | 0.029 | 3470 |
| | | | | | | | | | | 16×20 | 0.029 | 3600 |
| 1800 | 10×20 | 0.050 | 2300 | 12.5×20 | 0.043 | 2350 | 12.5×25 | 0.029 | 2950 | 12.5×25 | 0.029 | 3650 |
| 2200 | 12.5×20 | 0.043 | 2950 | 10×20 | 0.05 | 2650 | | | | | | |
| | | | | 12.5×20 | 0.043 | 2950 | 12.5×25 | 0.029 | 3460 | 12.5×25 | 0.029 | 3700 |
| | | | | | | | | | | 16×25 | 0.024 | 3890 |
| 3300 | 12.5×20 | 0.040 | 3000 | 12.5×25 | 0.029 | 3140 | 16×25 | 0.024 | 3500 | 16×31.5 | 0.024 | 3900 |
| | | | | 16×20 | | | | | | | | |
| 4700 | 16×25 | 0.024 | 3114 | 16×25 | 0.024 | 3200 | 16×31.5 | 0.024 | 3600 | 18×35.5 | 0.022 | 3950 |
| 6800 | 16×25 | 0.024 | 3114 | 16×31.5 | 0.024 | 3312 | 18×35.5 | 0.022 | 3700 | | | |
| 10000 | 16×31.5 | 0.024 | 3312 | 18×35.5 | 0.022 | 3420 | | | | | | |
| 15000 | 18×35.5 | 0.022 | 3420 | | | | | | | | | |

# MK series

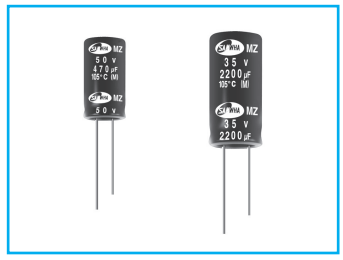
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 35 | | | 50 | | | 63 | | | 100 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 1.0 | | | | 5×11 | 3.00 | 250 | | | | | | |
| 2.2 | | | | 5×11 | 3.00 | 250 | | | | 5×11 | 3.000 | 125 |
| 3.3 | | | | 5×11 | 1.50 | 250 | 5×11 | 2.000 | 165 | 5×11 | 2.000 | 125 |
| 4.7 | 5×11 | 0.525 | 250 | 5×11 | 1.50 | 270 | 5×11 | 2.000 | 165 | 5×11 | 2.000 | 125 |
| 10 | 5×11 | 0.525 | 270 | 5×11 | 0.750 | 290 | 5×11 | 0.800 | 165 | 6.3×11 | 1.200 | 205 |
| 22 | 5×11 | 0.525 | 290 | 5×11 | 0.500 | 310 | 6.3×11 | 0.500 | 265 | 8×11.5 | 0.600 | 355 |
| 33 | 5×11 | 0.450 | 310 | 6.3×11 | 0.300 | 405 | 6.3×11 | 0.500 | 265 | 10×12.5 | 0.250 | 450 |
| 47 | 6.3×11 | 0.330 | 460 | 6.3×11 | 0.300 | 460 | 8×11.5 | 0.300 | 500 | 8×15 | 0.300 | 500 |
| | | | | | | | | | | 10×16 | 0.200 | 580 |
| 56 | 6.3×11 | 0.330 | 460 | 8×11.5 | 0.160 | 580 | 10×12.5 | 0.160 | 680 | 10×16 | 0.160 | 750 |
| 100 | 8×11.5 | 0.160 | 760 | 8×11.5 | 0.160 | 950 | 10×16 | 0.100 | 945 | 10×20 | 0.150 | 800 |
| | | | | 8×15 | 0.108 | 960 | | | | 12.5×20 | 0.100 | 1045 |
| 150 | 8×11.5 | 0.160 | 950 | 10×12.5 | 0.088 | 1280 | 10×20 | 0.080 | 1100 | 12.5×25 | 0.080 | 1195 |
| 220 | 8×15 | 0.098 | 1030 | 10×16 | 0.065 | 1785 | 12.5×20 | 0.070 | 1300 | 16×25 | 0.060 | 1600 |
| | 10×12.5 | 0.088 | 1280 | | | | | | | | | |
| 330 | 10×16 | 0.065 | 1785 | 10×20 | 0.050 | 2270 | 12.5×20 | 0.050 | 1495 | 16×31.5 | 0.040 | 1750 |
| 390 | 8×20 | 0.088 | 1830 | 10×20 | 0.050 | 2270 | 12.5×25 | 0.039 | 1600 | 16×31.5 | 0.040 | 1750 |
| 470 | 8×20 | 0.088 | 1930 | 12.5×20 | 0.043 | 2950 | 16×20 | 0.035 | 1990 | 18×40 | 0.030 | 2060 |
| | 10×16 | 0.065 | | | | | | | | | | |
| | 10×20 | 0.050 | 2270 | | | | | | | | | |
| 680 | 10×20 | 0.050 | 2400 | 12.5×25 | 0.029 | 3460 | 16×25 | 0.030 | 2780 | | | |
| | 12.5×20 | 0.043 | 2950 | | | | | | | | | |
| 1000 | 12.5×20 | 0.043 | 3100 | 16×25 | 0.027 | 3890 | 16×35.5 | 0.020 | 2835 | | | |
| | 12.5×25 | 0.032 | 3460 | | | | | | | | | |
| 1500 | 12.5×25 | 0.029 | 3500 | 16×31.5 | 0.024 | 3900 | | | | | | |
| | 16×20 | 0.027 | 3600 | | | | | | | | | |
| | 16×25 | 0.024 | 3890 | | | | | | | | | |
| 2200 | 16×31.5 | 0.024 | 3900 | 18×35.5 | 0.022 | 3950 | | | | | | |
| 3300 | 18×35.5 | 0.022 | 3950 | | | | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## MZ Ultra Low Impedance Series

Low Impedance | Miniaturized | Solvent Proof



- Low impedance compared with MK series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 5000 hours load life at 105˚C
  (2000~3000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive

MK ⇨ MZ
Low Imp.

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| Z-40˚C / Z+20˚C | Z-25˚C / Z+20˚C |
|---|---|
| 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

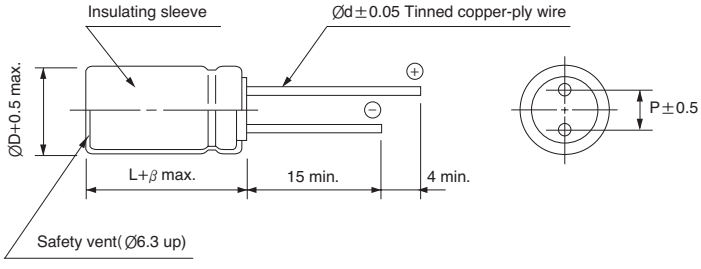
| ØD | ØD = 5, 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 2000 hours | 3000 hours | 5000 hours |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.42 | 0.70 | 0.90 | 0.95 | 1.00 |
| 47 ~ 220 | 0.50 | 0.73 | 0.92 | 0.96 | 1.00 |
| 330 ~ 680 | 0.55 | 0.77 | 0.94 | 0.97 | 1.00 |
| 1000 ~ 1500 | 0.60 | 0.80 | 0.96 | 0.98 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.98 | 0.99 | 1.00 |

# MZ series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

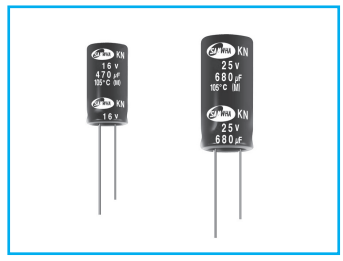
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 10 | | | | | | | 5×11 | 0.35 | 250 | 5×11 | 0.60 | 250 |
| 22 | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 | 5×11 | 0.40 | 250 |
| 33 | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 | 5×11 | 0.40 | 250 |
| 47 | 5×11 | 0.30 | 250 | 5×11 | 0.30 | 250 | 5×11 | 0.30 | 250 | 5×11 | 0.30 | 250 |
| 100 | 5×11 | 0.30 | 250 | 5×11 | 0.30 | 250 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.15 | 405 |
| 150 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.10 | 760 |
| 220 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.085 | 760 | 8×11.5 | 0.10 | 760 |
| 330 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.12 | 760 | 8×11.5 | 0.085 | 760 | 10×12.5 | 0.08 | 1030 |
| 470 | 8×11.5 | 0.072 | 760 | 8×11.5 | 0.10 | 760 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.045 | 1430 |
| 680 | 10×12.5 | 0.053 | 1030 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.038 | 1430 | 10×20 | 0.032 | 1820 |
| 1000 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.038 | 1430 | 10×20 | 0.027 | 1820 | 12.5×20 | 0.025 | 2360 |
| 1500 | 10×20 | 0.027 | 1820 | 10×20 | 0.032 | 1820 | 12.5×20 | 0.025 | 2360 | 16×20 | 0.020 | 3460 |
| 2200 | 12.5×20 | 0.025 | 2360 | 12.5×20 | 0.025 | 2360 | 12.5×25 | 0.018 | 2770 | 16×25 | 0.015 | 3460 |
| 3300 | 12.5×20 | 0.025 | 2360 | 12.5×25 | 0.024 | 2770 | 16×25 | 0.015 | 3460 | 16×31.5 | 0.015 | 3680 |
| 4700 | 16×25 | 0.015 | 3460 | 16×25 | 0.015 | 3460 | 16×31.5 | 0.015 | 3680 | 18×35.5 | 0.014 | 3800 |
| 6800 | 16×25 | 0.015 | 3460 | 16×31.5 | 0.015 | 3680 | 18×35.5 | 0.014 | 3800 | | | |
| 10000 | 16×31.5 | 0.015 | 3680 | 18×35.5 | 0.014 | 3800 | | | | | | |
| 15000 | 18×35.5 | 0.014 | 3800 | | | | | | | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | | 100 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 1.0 | | | | 5×11 | 2.0 | 250 | | | | | | |
| 2.2 | | | | 5×11 | 2.0 | 250 | | | | 5×11 | 2.0 | 125 |
| 3.3 | | | | 5×11 | 1.0 | 250 | 5×11 | 2.0 | 165 | 5×11 | 2.0 | 125 |
| 4.7 | 5×11 | 0.35 | 250 | 5×11 | 1.0 | 250 | 5×11 | 2.0 | 165 | 5×11 | 2.0 | 125 |
| 10 | 5×11 | 0.35 | 250 | 5×11 | 0.55 | 250 | 5×11 | 0.80 | 165 | 6.3×11 | 0.50 | 205 |
| 22 | 5×11 | 0.35 | 250 | 5×11 | 0.45 | 250 | 6.3×11 | 0.50 | 265 | 8×11.5 | 0.30 | 355 |
| 33 | 5×11 | 0.30 | 250 | 6.3×11 | 0.25 | 405 | 6.3×11 | 0.50 | 265 | 10×12.5 | 0.25 | 450 |
| 47 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.20 | 405 | 8×11.5 | 0.30 | 500 | 10×16 | 0.20 | 580 |
| 100 | 8×11.5 | 0.072 | 760 | 8×11.5 | 0.105 | 760 | 10×16 | 0.10 | 945 | 12.5×20 | 0.10 | 1045 |
| 150 | 8×11.5 | 0.072 | 760 | 10×12.5 | 0.061 | 1030 | 10×20 | 0.08 | 1100 | 12.5×25 | 0.070 | 1195 |
| 220 | 10×12.5 | 0.065 | 1030 | 10×20 | 0.038 | 1430 | 12.5×20 | 0.07 | 1300 | 16×25 | 0.060 | 1600 |
| 330 | 10×16 | 0.038 | 1430 | 10×20 | 0.032 | 1820 | 12.5×20 | 0.04 | 1495 | 16×31.5 | 0.040 | 1750 |
| 470 | 10×20 | 0.027 | 1820 | 12.5×20 | 0.027 | 2360 | 16×20 | 0.035 | 1990 | 18×40 | 0.030 | 2060 |
| 680 | 12.5×20 | 0.025 | 2360 | 12.5×25 | 0.022 | 2770 | 16×25 | 0.030 | 2780 | | | |
| 1000 | 12.5×25 | 0.022 | 2770 | 16×25 | 0.018 | 3460 | 16×35.5 | 0.020 | 2835 | | | |
| 1500 | 16×25 | 0.018 | 3460 | 16×31.5 | 0.015 | 3680 | | | | | | |
| 2200 | 16×31.5 | 0.015 | 3680 | 18×35.5 | 0.014 | 3800 | | | | | | |
| 3300 | 18×35.5 | 0.014 | 3800 | | | | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## KN Low Imp., High Ripple Current Series

Low Impedance | Miniaturized | Solvent Proof



- High ripple current compared with MN series
- Enabled high ripple current by a reduction of impedance at high frequency range
- High reliability withstanding 5000 hours load life at 105˚C
- Complied to the RoHS directive

MK ⇒ KN (High Ripple)

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 10 | 16 | 25 | 35 | 50 |
|---|---|---|---|---|---|
| tanδ | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| Z-40˚C / Z+20˚C | Z-25˚C / Z+20˚C |
|---|---|
| 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

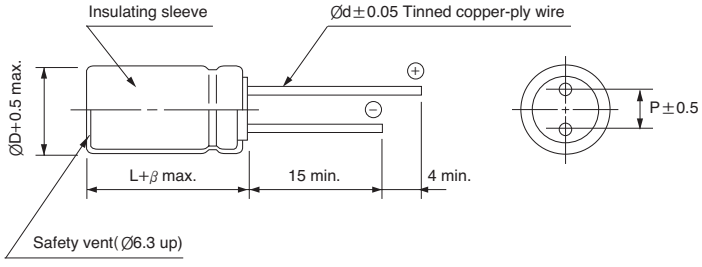
| Case Size | ØD ≦ 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 2000 hours | 3000 hours | 5000 hours |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 |
|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 |
| β | 1.5 | | | 2.0 | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 47 | 0.18 | 0.70 | 0.90 | 0.94 | 1.00 |
| 56 ~ 100 | 0.27 | 0.73 | 0.92 | 0.95 | 1.00 |
| 120 ~ 270 | 0.49 | 0.73 | 0.92 | 0.96 | 1.00 |
| 330 ~ 680 | 0.55 | 0.77 | 0.94 | 0.97 | 1.00 |
| 820 ~ 1500 | 0.60 | 0.80 | 0.96 | 0.98 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.98 | 0.99 | 1.00 |

# KN series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

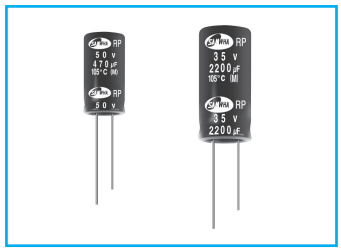
| WV / Item / μF | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz |
| 47 | | | | | | | 5 × 11 | 0.150 | 405 |
| 56 | | | | 5 × 11 | 0.150 | 405 | 6.3 × 11 | 0.065 | 760 |
| 100 | 5 × 11 | 0.150 | 405 | 6.3 × 11 | 0.065 | 760 | 8 × 11.5 | 0.060 | 850 |
| 220 | 6.3 × 11 | 0.065 | 760 | 8 × 11.5 | 0.060 | 850 | 8 × 11.5 | 0.036 | 1000 |
| 330 | 8 × 11.5 | 0.060 | 850 | 8 × 11.5 | 0.036 | 1000 | 8 × 15 | 0.028 | 1250 |
| | | | | | | | 10 × 12.5 | 0.027 | 1430 |
| 470 | 8 × 11.5 | 0.036 | 1000 | 8 × 15 | 0.028 | 1250 | 8 × 20 | 0.020 | 1600 |
| | | | | 10 × 12.5 | 0.027 | 1430 | 10 × 16 | 0.020 | 1820 |
| 680 | 8 × 15 | 0.028 | 1250 | 8 × 20 | 0.020 | 1600 | 10 × 20 | 0.014 | 2180 |
| | 10 × 12.5 | 0.027 | 1430 | 10 × 16 | 0.020 | 1820 | 12.5 × 16 | 0.018 | 2200 |
| 820 | 10 × 12.5 | 0.025 | 1500 | 10 × 16 | 0.018 | 2000 | 12.5 × 20 | 0.013 | 2360 |
| 1000 | 8 × 20 | 0.020 | 1600 | 10 × 20 | 0.014 | 2180 | 12.5 × 20 | 0.013 | 2480 |
| | 10 × 16 | 0.020 | 1820 | 12.5 × 16 | 0.018 | 2200 | | | |
| 1200 | 10 × 20 | 0.014 | 2180 | 12.5 × 20 | 0.013 | 2360 | 12.5 × 20 | 0.013 | 2600 |
| | 12.5 × 16 | 0.018 | 2200 | | | | | | |
| 1500 | 12.5 × 20 | 0.013 | 2360 | 12.5 × 20 | 0.013 | 2480 | 12.5 × 25 | 0.012 | 2900 |
| 2200 | 12.5 × 20 | 0.013 | 2480 | 12.5 × 25 | 0.012 | 2900 | | | |
| 3300 | 12.5 × 25 | 0.012 | 3200 | | | | | | |

| WV / Item / μF | 35 | | | 50 | | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz |
| 33 | 5 × 11 | 0.150 | 405 | | | |
| 47 | 6.3 × 11 | 0.100 | 550 | 6.3 × 11 | 0.140 | 405 |
| 56 | 6.3 × 11 | 0.065 | 760 | 6.3 × 11 | 0.140 | 580 |
| 100 | 8 × 11.5 | 0.050 | 850 | 8 × 11.5 | 0.072 | 760 |
| 150 | 8 × 11.5 | 0.040 | 1000 | 10 × 12.5 | 0.061 | 1030 |
| 220 | 8 × 15 | 0.028 | 1250 | 10 × 16 | 0.042 | 1430 |
| | 10 × 12.5 | 0.027 | 1430 | | | |
| 270 | 8 × 20 | 0.020 | 1600 | 12.5 × 16 | 0.042 | 1700 |
| 330 | 10 × 16 | 0.020 | 1820 | 10 × 20 | 0.030 | 1820 |
| 470 | 10 × 20 | 0.014 | 2180 | 12.5 × 20 | 0.027 | 2360 |
| | 12.5 × 16 | 0.018 | 2200 | | | |
| 560 | 12.5 × 20 | 0.015 | 2360 | 12.5 × 25 | 0.020 | 2500 |
| 680 | 12.5 × 20 | 0.015 | 2480 | | | |
| 1000 | 12.5 × 25 | 0.015 | 2900 | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## RP Low Impedance Series

Low Impedance | Long Life | Solvent Proof



- High reliability long life(10000 hours)
- Operating temperature −55 ~ +105˚C
- Enabled high ripple current by a reduction of impedance at high frequency
- Ideally suited for use in switching power supply, main board
- Complied to the RoHS directive

RZ ⇒ RP
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -55 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 |
|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 ~ 25 | 35 ~ 50 |
|---|---|---|---|---|
| Z-55˚C/Z+20˚C | 3 | 3 | 3 | 3 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 200% of specified value |

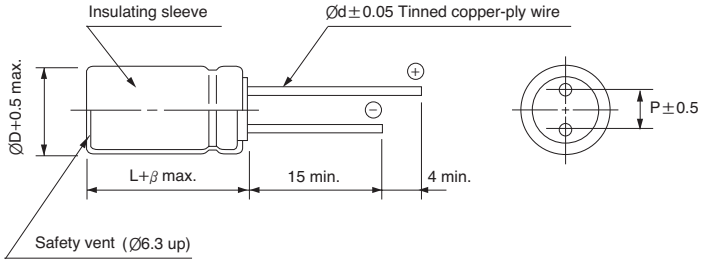
| ØD | ØD = 5, 6.3 | ØD = 8 | ØD = 10 | ØD ≧ 12.5 |
|---|---|---|---|---|
| Life time | 4000 hours | 6000 hours | 7000 hours | 10000 hours |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## ● DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.40 | 0.65 | 0.82 | 0.91 | 1.00 |
| 47 ~ 270 | 0.50 | 0.70 | 0.84 | 0.92 | 1.00 |
| 330 ~ 680 | 0.55 | 0.75 | 0.86 | 0.93 | 1.00 |
| 820 ~ 1800 | 0.60 | 0.80 | 0.88 | 0.94 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.90 | 0.95 | 1.00 |

# RP series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

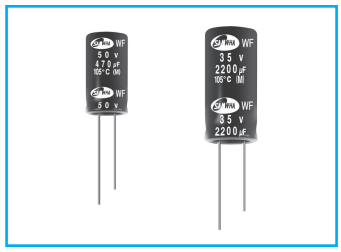
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 47 | | | | | | | 5 × 11 | 0.65 | 180 |
| 68 | | | | 5 × 11 | 0.65 | 180 | 6.3 × 11 | 0.30 | 280 |
| 100 | 5 × 11 | 0.65 | 180 | 5 × 11 | 0.65 | 180 | 6.3 × 11 | 0.30 | 280 |
| 150 | 5 × 11 | 0.65 | 280 | 6.3 × 11 | 0.30 | 280 | 6.3 × 11 | 0.30 | 280 |
| 220 | 6.3 × 11 | 0.30 | 280 | 6.3 × 11 | 0.30 | 280 | 8 × 11.5 | 0.14 | 450 |
| 330 | 6.3 × 11 | 0.30 | 280 | 8 × 11.5 | 0.14 | 450 | 8 × 11.5 | 0.14 | 450 |
| 470 | 8 × 11.5 | 0.14 | 450 | 8 × 11.5 | 0.14 | 450 | 10 × 12.5 | 0.10 | 660 |
| 680 | 10 × 12.5 | 0.10 | 660 | 10 × 12.5 | 0.10 | 660 | 10 × 16 | 0.08 | 850 |
| 1000 | 10 × 12.5 | 0.10 | 660 | 10 × 16 | 0.08 | 850 | 10 × 20 | 0.054 | 1100 |
| 1500 | 10 × 20 | 0.054 | 1100 | 10 × 20 | 0.054 | 1100 | 12.5 × 20 | 0.050 | 1400 |
| 2200 | 12.5 × 20 | 0.050 | 1400 | 12.5 × 20 | 0.050 | 1400 | 12.5 × 25 | 0.038 | 1700 |
| 3300 | 12.5 × 20 | 0.050 | 1400 | 12.5 × 25 | 0.038 | 1700 | 16 × 25 | 0.030 | 2100 |
| 4700 | 16 × 25 | 0.030 | 2100 | 16 × 25 | 0.030 | 2100 | 16 × 25 | 0.025 | 2600 |
| 6800 | 16 × 25 | 0.030 | 2100 | 16 × 31.5 | 0.025 | 2600 | 16 × 35.5 | 0.022 | 3000 |
| 10000 | 16 × 31.5 | 0.025 | 2600 | 18 × 35.5 | 0.022 | 3000 | | | |
| 15000 | 18 × 35.5 | 0.022 | 3000 | | | | | | |

| WV / Item / μF | 25 | | | 35 | | | 50 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 1.0 | | | | | | | 5 × 11 | 3.5 | 40 |
| 2.2 | | | | | | | 5 × 11 | 3.0 | 55 |
| 3.3 | | | | | | | 5 × 11 | 2.6 | 65 |
| 4.7 | | | | | | | 5 × 11 | 2.3 | 90 |
| 6.8 | | | | | | | 5 × 11 | 1.4 | 120 |
| 10 | | | | | | | 5 × 11 | 1.4 | 120 |
| 22 | | | | 5 × 11 | 0.70 | 180 | 5 × 11 | 1.2 | 150 |
| 33 | 5 × 11 | 0.70 | 180 | 5 × 11 | 0.65 | 180 | 6.3 × 11 | 0.85 | 200 |
| 47 | 5 × 11 | 0.65 | 180 | 6.3 × 11 | 0.30 | 280 | 6.3 × 11 | 0.70 | 250 |
| 68 | 6.3 × 11 | 0.30 | 280 | 8 × 11.5 | 0.14 | 450 | 8 × 11.5 | 0.24 | 340 |
| 100 | 6.3 × 11 | 0.30 | 280 | 8 × 11.5 | 0.14 | 450 | 8 × 11.5 | 0.24 | 340 |
| 150 | 8 × 11.5 | 0.14 | 450 | 8 × 11.5 | 0.14 | 450 | 10 × 12.5 | 0.17 | 490 |
| 220 | 8 × 11.5 | 0.14 | 450 | 10 × 12.5 | 0.10 | 660 | 10 × 16 | 0.12 | 650 |
| 330 | 10 × 12.5 | 0.10 | 660 | 10 × 16 | 0.080 | 850 | 10 × 20 | 0.10 | 810 |
| 470 | 10 × 16 | 0.080 | 850 | 10 × 20 | 0.054 | 1100 | 12.5 × 20 | 0.085 | 1100 |
| 680 | 10 × 20 | 0.054 | 1100 | 12.5 × 20 | 0.050 | 1400 | 12.5 × 25 | 0.065 | 1200 |
| 1000 | 12.5 × 20 | 0.050 | 1400 | 12.5 × 25 | 0.038 | 1700 | 16 × 31.5 | 0.043 | 1600 |
| 1500 | 16 × 25 | 0.030 | 1400 | 16 × 31.5 | 0.030 | 2100 | 16 × 31.5 | 0.038 | 2000 |
| 2200 | 16 × 25 | 0.030 | 2100 | 16 × 31.5 | 0.025 | 2600 | 18 × 35.5 | 0.034 | 2300 |
| 3300 | 16 × 31.5 | 0.025 | 2600 | 18 × 35.5 | 0.022 | 3000 | | | |
| 4700 | 18 × 35.5 | 0.022 | 3000 | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## WF High ripple current, Extremely Low Impedance Series

Low Impedance | Long Life | Solvent Proof



- Operating temperature range of −40 ~ +105˚C
- Extremely low impedance at high frequency
- High reliability withstanding 10000 hours load life at 105˚C
- For E-meter
- Complied to the RoHS directive

WL ⇨ WF
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.03CV or 3μA whichever is greater (after 2 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 |

| **Low temperature characteristics (Impedance ratio at 120Hz)** | | | | |
|---|---|---|---|---|
| WV | 6.3 | 10 | 16 | 25 ~ 100 |
| Z-40˚C/Z+20˚C | 8 | 6 | 4 | 3 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

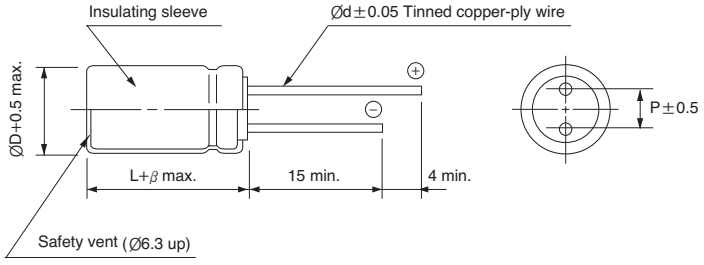
| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

| ØD | ØD = 5, 6.3 | ØD = 8, 10 | ØD ≧ 12.5 |
|---|---|---|---|
| Life time | 5000 hours | 7000 hours | 10000 hours |

| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |
|---|---|

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.40 | 0.65 | 0.82 | 0.91 | 1.00 |
| 47 ~ 220 | 0.50 | 0.70 | 0.84 | 0.92 | 1.00 |
| 330 ~ 470 | 0.55 | 0.75 | 0.86 | 0.93 | 1.00 |
| ~ 1000 | 0.60 | 0.80 | 0.88 | 0.94 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.90 | 0.95 | 1.00 |

# WF series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

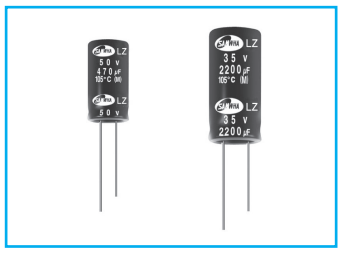
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 33 | | | | | | | | | | 5×11 | 0.90 | 150 |
| 47 | | | | | | | 5×11 | 0.90 | 150 | 5×11 | 0.90 | 150 |
| 100 | 5×11 | 0.90 | 150 | 5×11 | 0.90 | 150 | 6.3×11 | 0.40 | 250 | 6.3×11 | 0.40 | 250 |
| 220 | 6.3×11 | 0.40 | 250 | 6.3×11 | 0.40 | 250 | 8×11.5 | 0.25 | 400 | 8×11.5 | 0.25 | 400 |
| 330 | 6.3×11 | 0.40 | 250 | 8×11.5 | 0.25 | 400 | 8×11.5 | 0.25 | 400 | 10×12.5 | 0.16 | 580 |
| 470 | 8×11.5 | 0.25 | 400 | 8×11.5 | 0.25 | 400 | 10×12.5 | 0.16 | 580 | 10×16 | 0.120 | 770 |
| 1000 | 10×12.5 | 0.16 | 580 | 10×16 | 0.120 | 770 | 10×20 | 0.078 | 1050 | 12.5×20 | 0.062 | 1300 |
| 2200 | 12.5×20 | 0.062 | 1300 | 12.5×20 | 0.062 | 1300 | 12.5×25 | 0.048 | 1650 | 16×25 | 0.034 | 1850 |
| 3300 | 12.5×20 | 0.062 | 1300 | 12.5×25 | 0.048 | 1650 | 16×25 | 0.034 | 1850 | 16×31.5 | 0.029 | 2000 |
| 4700 | 16×25 | 0.034 | 1850 | 16×25 | 0.034 | 1850 | 16×31.5 | 0.029 | 2000 | 18×35.5 | 0.025 | 2200 |
| 6800 | 16×25 | 0.034 | 1850 | 16×31.5 | 0.029 | 2000 | 18×35.5 | 0.025 | 2200 | | | |
| 10000 | 16×31.5 | 0.029 | 2000 | 18×35.5 | 0.025 | 2200 | | | | | | |
| 15000 | 18×35.5 | 0.025 | 2200 | | | | | | | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | | 100 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 1.0 | | | | 5×11 | 4.0 | 50 | | | | 5×11 | 4.5 | 20 |
| 2.2 | | | | 5×11 | 2.5 | 55 | | | | 5×11 | 3.0 | 30 |
| 3.3 | | | | 5×11 | 2.2 | 65 | | | | 5×11 | 2.7 | 40 |
| 4.7 | | | | 5×11 | 1.9 | 88 | | | | 5×11 | 2.5 | 65 |
| 10 | | | | 5×11 | 1.5 | 100 | 5×11 | 2.3 | 87 | 6.3×11 | 1.2 | 140 |
| 22 | | | | 5×11 | 0.9 | 150 | 6.3×11 | 1.30 | 140 | 8×11.5 | 0.63 | 160 |
| 33 | 5×11 | 0.90 | 150 | 6.3×11 | 0.40 | 250 | 6.3×11 | 1.20 | 140 | 10×12.5 | 0.43 | 230 |
| 47 | 6.3×11 | 0.4 | 250 | 6.3×11 | 0.4 | 400 | 8×11.5 | 0.63 | 210 | 10×12.5 | 0.43 | 230 |
| | | | | | | | | | | 10×16 | 0.31 | 290 |
| 100 | 8×11.5 | 0.25 | 400 | 8×11.5 | 0.25 | 500 | 10×12.5 | 0.43 | 300 | 12.5×16 | 0.23 | 750 |
| | | | | | | | | | | 12.5×20 | 0.16 | |
| 220 | 10×12.5 | 0.16 | 580 | 10×16 | 0.12 | 770 | 12.5×20 | 0.210 | 520 | 16×25 | 0.073 | 900 |
| 330 | 10×16 | 0.120 | 770 | 10×20 | 0.08 | 1050 | 12.5×20 | 0.160 | 660 | 16×25 | 0.073 | 900 |
| 390 | 10×20 | 0.095 | 900 | 10×20 | 0.075 | 1170 | 12.5×25 | 0.140 | 700 | | | |
| 470 | 10×20 | 0.078 | 1050 | 12.5×20 | 0.062 | 1300 | 12.5×25 | 0.120 | 750 | | | |
| 1000 | 12.5×25 | 0.048 | 1650 | 16×25 | 0.034 | 1850 | 16×31.5 | 0.054 | 1390 | | | |
| 2200 | 16×31.5 | 0.029 | 2000 | 18×35.5 | 0.025 | 2200 | | | | | | |
| 3300 | 18×35.5 | 0.025 | 2200 | | | | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## LZ Low Impedance, Long Life Series

Low Impedance | Long Life | Solvent Proof



- Operating temperature range of -40 ~ +105˚C
- Enabled high ripple current by a reduction of impedance at high frequency range
- High reliability withstanding 10000 hours load life at 105˚C (6000 / 8000 hours for as specified below)
- Complied to the RoHS directive

MK ⇨ LZ
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 |
|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| Z-40˚C / Z+20˚C | Z-25˚C / Z+20˚C |
|---|---|
| 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

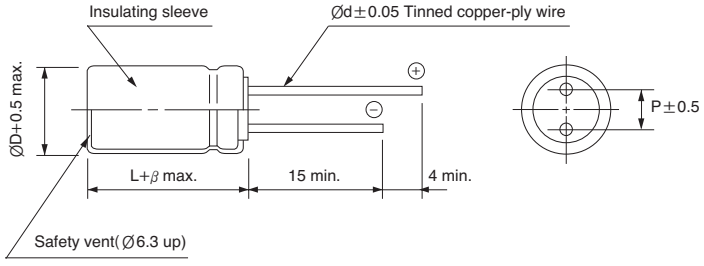
| ØD | ØD = 5, 6.3 | ØD = 8 | ØD ≥ 10 |
|---|---|---|---|
| Life time | 6000 hours | 8000 hours | 10000 hours |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz |
|---|---|---|---|---|---|
| ~ 33 | 0.32 | 0.60 | 0.80 | 0.90 | 1.00 |
| 47 ~ 270 | 0.40 | 0.63 | 0.82 | 0.91 | 1.00 |
| 330 ~ 680 | 0.45 | 0.67 | 0.84 | 0.92 | 1.00 |
| 820 ~ 1800 | 0.50 | 0.70 | 0.86 | 0.93 | 1.00 |
| 2200 ~ | 0.60 | 0.75 | 0.88 | 0.94 | 1.00 |

# LZ series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

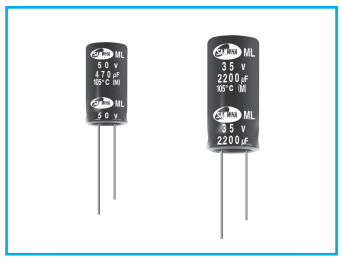
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 47 | 5 × 11 | 0.600 | 300 | 5 × 11 | 0.600 | 300 | 5 × 11 | 0.600 | 300 |
| 100 | 5 × 11 | 0.600 | 345 | 5 × 11 | 0.600 | 345 | 6.3 × 11 | 0.300 | 345 |
| 150 | 6.3 × 11 | 0.300 | 345 | 6.3 × 11 | 0.300 | 345 | 6.3 × 11 | 0.300 | 540 |
| 220 | 6.3 × 11 | 0.300 | 345 | 6.3 × 11 | 0.300 | 345 | 8 × 11.5 | 0.200 | 540 |
| 330 | 6.3 × 11 | 0.300 | 540 | 8 × 11.5 | 0.250 | 608 | 8 × 11.5 | 0.200 | 945 |
| 470 | 8 × 11.5 | 0.140 | 540 | 8 × 11.5 | 0.200 | 630 | 10 × 12.5 | 0.105 | 945 |
| 680 | 10 × 12.5 | 0.105 | 945 | 10 × 12.5 | 0.105 | 945 | 8 × 20 | 0.105 | 945 |
| | | | | | | | 10 × 16 | 0.075 | 1250 |
| 820 | 10 × 12.5 | 0.105 | 945 | 10 × 16 | 0.075 | 945 | 10 × 20 | 0.054 | 1760 |
| 1000 | 10 × 16 | 0.075 | 1250 | 8 × 20 | 0.105 | 945 | 8 × 20 | 0.075 | 1250 |
| | | | | 10 × 12.5 | 0.105 | 945 | 10 × 20 | 0.054 | 1760 |
| | | | | 10 × 16 | 0.075 | 1250 | | | |
| | | | | 10 × 20 | 0.054 | 1650 | | | |
| 1200 | 10 × 16 | 0.075 | 1500 | 10 × 16 | 0.075 | 1760 | 10 × 20 | 0.054 | 1960 |
| 1500 | 10 × 20 | 0.054 | 1760 | 10 × 20 | 0.054 | 1760 | 12.5 × 20 | 0.050 | 1960 |
| 1800 | 10 × 20 | 0.054 | 1760 | 10 × 20 | 0.054 | 1760 | 12.5 × 20 | 0.050 | 2250 |
| 2200 | 12.5 × 20 | 0.050 | 1960 | 12.5 × 20 | 0.050 | 1960 | 12.5 × 25 | 0.040 | 2480 |
| 2700 | 12.5 × 20 | 0.050 | 2250 | 12.5 × 25 | 0.040 | 2250 | 12.5 × 25 | 0.040 | 2900 |
| 3300 | 12.5 × 20 | 0.050 | 2480 | 12.5 × 25 | 0.040 | 2480 | 16 × 25 | 0.030 | 3250 |
| 3900 | 12.5 × 25 | 0.040 | 2480 | 16 × 25 | 0.030 | 2480 | 16 × 25 | 0.030 | 3570 |
| 4700 | 16 × 25 | 0.030 | 3250 | 16 × 25 | 0.030 | 3250 | 16 × 31.5 | 0.027 | 3630 |
| 5600 | 16 × 25 | 0.030 | 3570 | 16 × 25 | 0.030 | 3570 | | | |
| 6800 | 16 × 25 | 0.030 | 3630 | 16 × 31.5 | 0.027 | 3630 | | | |
| 8200 | 16 × 31.5 | 0.027 | 3700 | 18 × 35.5 | 0.025 | 3700 | | | |

| WV / Item / μF | 25 | | | 35 | | | 50 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 10 | | | | | | | 5×11 | 3.000 | 160 |
| 22 | | | | | | | 5×11 | 1.800 | 240 |
| 33 | | | | | | | 5×11 | 1.800 | 292 |
| 47 | | | | 6.3×11 | 0.450 | 345 | 6.3×11 | 1.000 | 450 |
| 56 | | | | 6.3×11 | 0.450 | 345 | 6.3×11 | 0.700 | 450 |
| 68 | 6.3×11 | 0.400 | 345 | 6.3×11 | 0.450 | 345 | 8×11.5 | 0.500 | 490 |
| 100 | 6.3×11 | 0.400 | 345 | 6.3×11 | 0.350 | 500 | 8×11.5 | 0.300 | 724 |
| | | | | 8×11.5 | 0.300 | 540 | | | |
| 120 | 6.3×11 | 0.400 | 345 | 8×11.5 | 0.250 | 540 | 8×11.5 | 0.200 | 950 |
| 150 | 8×11.5 | 0.250 | 740 | 8×11.5 | 0.250 | 945 | 10×12.5 | 0.120 | 979 |
| 180 | 8×11.5 | 0.200 | 740 | 8×11.5 | 0.190 | 945 | 8×20 | 0.120 | 1200 |
| | | | | | | | 10×12.5 | 0.120 | 1190 |
| 220 | 8×11.5 | 0.180 | 740 | 8×11.5 | 0.190 | 945 | 8×20 | 0.120 | 1370 |
| | | | | 10×12.5 | 0.105 | 945 | 10×16 | 0.075 | 1370 |
| 270 | 10×12.5 | 0.105 | 945 | 8×15 | 0.120 | 945 | 10×20 | 0.064 | 1580 |
| | | | | 10×16 | 0.085 | 1250 | | | |
| 330 | 10×12.5 | 0.105 | 945 | 10×16 | 0.085 | 1330 | 10×20 | 0.064 | 1870 |
| 390 | 8×15 | 0.135 | 1250 | 10×20 | 0.054 | 1500 | 10×20 | 0.064 | 2050 |
| | 10×12.5 | 0.105 | 1250 | | | | | | |
| 470 | 10×16 | 0.075 | 1330 | 8×20 | 0.095 | 1430 | 12.5×20 | 0.050 | 2050 |
| | | | | 10×16 | 0.085 | 1600 | | | |
| | | | | 10×20 | 0.054 | 1760 | | | |
| 560 | 8×20 | 0.075 | 1700 | 12.5×20 | 0.050 | 1960 | 12.5×25 | 0.040 | 2410 |
| | 10×20 | 0.054 | | | | | | | |
| 680 | 10×16 | 0.075 | 1760 | 10×20 | 0.054 | 1850 | 12.5×25 | 0.040 | 2410 |
| | 10×20 | 0.054 | | 12.5×20 | 0.050 | 2250 | | | |
| 820 | 10×20 | 0.054 | 2300 | 12.5×25 | 0.040 | 2350 | 16×20 | 0.040 | 2730 |
| | 12.5×20 | 0.050 | | | | | | | |
| 1000 | 12.5×20 | 0.050 | 2350 | 12.5×25 | 0.040 | 2480 | 16×25 | 0.036 | 3010 |
| 1200 | 12.5×20 | 0.050 | 2480 | 16×20 | 0.040 | 2900 | | | |
| 1500 | 16×20 | 0.040 | 2480 | 16×25 | 0.030 | 3250 | | | |
| 1800 | 16×20 | 0.040 | 2900 | 16×25 | 0.030 | 3570 | | | |
| 2200 | 12.5×30 | 0.040 | 2900 | 16×31.5 | 0.027 | 3630 | | | |
| | 16×25 | 0.030 | 3250 | | | | | | |
| 2700 | 16×25 | 0.030 | 3570 | | | | | | |
| 3300 | 16×31.5 | 0.027 | 3630 | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## ML Ultra Low Impedance, Long Life Series

Low Impedance | Miniaturized | Solvent Proof



- Long Life compared with MZ series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 10000 hours load life at 105˚C (6000/8000 hours for as specified below)
- Complied to the RoHS directive

MZ ⇒ ML
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| Z-40˚C / Z+20˚C | Z-25˚C / Z+20˚C |
|---|---|
| 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

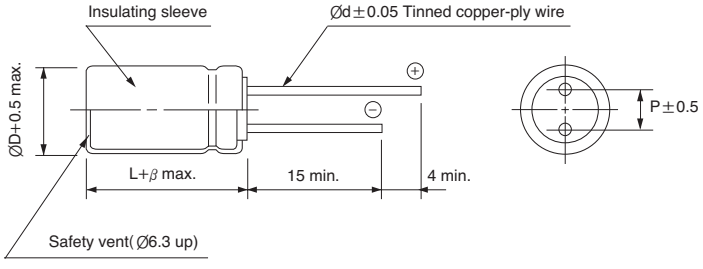
| ØD | ØD = 5, 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 6000 hours | 8000 hours | 10000 hours |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.42 | 0.70 | 0.90 | 0.95 | 1.00 |
| 47 ~ 220 | 0.50 | 0.73 | 0.92 | 0.96 | 1.00 |
| 330 ~ 680 | 0.55 | 0.77 | 0.94 | 0.97 | 1.00 |
| 1000 ~ 1500 | 0.60 | 0.80 | 0.96 | 0.98 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.98 | 0.99 | 1.00 |

# ML series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

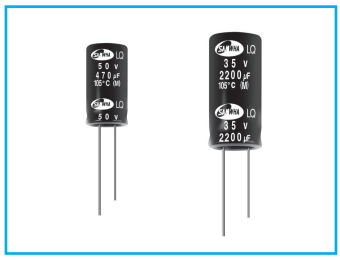
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz |
| 10 | | | | | | | 5×11 | 0.45 | 250 | 5×11 | 0.65 | 250 |
| 22 | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 | 5×11 | 0.45 | 250 | 5×11 | 0.50 | 250 |
| 33 | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 | 5×11 | 0.45 | 250 | 5×11 | 0.45 | 250 |
| 47 | 5×11 | 0.30 | 250 | 5×11 | 0.30 | 250 | 5×11 | 0.45 | 250 | 5×11 | 0.40 | 250 |
| 100 | 5×11 | 0.30 | 250 | 5×11 | 0.30 | 250 | 6.3×11 | 0.25 | 405 | 6.3×11 | 0.20 | 405 |
| 150 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.20 | 405 | 8×11.5 | 0.14 | 760 |
| 220 | 6.3×11 | 0.15 | 405 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.15 | 760 | 8×11.5 | 0.12 | 760 |
| 330 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.13 | 760 | 8×11.5 | 0.10 | 760 | 10×12.5 | 0.055 | 1030 |
| 390 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.11 | 760 | 8×11.5 | 0.10 | 760 | 8×15 | 0.072 | 1250 |
| 470 | 8×11.5 | 0.11 | 630 | 8×11.5 | 0.11 | 760 | 10×12.5 | 0.053 | 1030 | 10×12.5 | 0.055 | 1330 |
| 560 | 8×11.5 | 0.11 | 760 | 10×12.5 | 0.053 | 900 | 10×12.5 | 0.053 | 1100 | 8×20 | 0.072 | 1800 |
| 680 | 10×12.5 | 0.053 | 1030 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.038 | 1430 | 10×16 | 0.040 | 1760 |
| 1000 | 10×12.5 | 0.053 | 1030 | 10×12.5 | 0.053 | 1330 | 10×16 | 0.038 | 1760 | 10×20 | 0.033 | 1960 |
| 1500 | 10×20 | 0.027 | 1820 | 10×20 | 0.030 | 1820 | 10×20 | 0.030 | 1960 | 12.5×20 | 0.029 | 2550 |
| 2200 | 12.5×20 | 0.025 | 2360 | 12.5×20 | 0.027 | 2360 | 12.5×25 | 0.023 | 2770 | 16×20 | 0.022 | 3250 |
| 3300 | 12.5×20 | 0.025 | 2360 | 12.5×20 | 0.027 | 2480 | 16×20 | 0.020 | 3250 | 16×25 | 0.018 | 3630 |
| 4700 | 16×25 | 0.015 | 3460 | 16×20 | 0.022 | 3250 | 16×25 | 0.018 | 3630 | | | |
| 6800 | 16×25 | 0.015 | 3460 | 16×25 | 0.018 | 3630 | | | | | | |
| 10000 | 16×31.5 | 0.015 | 3680 | 18×31.5 | 0.015 | 3700 | | | | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | | 100 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | Impedance (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz |
| 10 | 5×11 | 0.55 | 250 | 5×11 | 0.60 | 250 | 5×11 | 1.00 | 165 | 6.3×11 | 0.80 | 205 |
| 22 | 5×11 | 0.50 | 250 | 5×11 | 0.45 | 250 | 6.3×11 | 0.53 | 265 | 8×11.5 | 0.45 | 355 |
| 33 | 5×11 | 0.45 | 250 | 6.3×11 | 0.25 | 405 | 6.3×11 | 0.45 | 265 | 10×12.5 | 0.25 | 450 |
| 47 | 6.3×11 | 0.30 | 405 | 6.3×11 | 0.20 | 405 | 8×11.5 | 0.20 | 500 | 10×12.5 | 0.20 | 580 |
| 56 | 6.3×11 | 0.20 | 405 | 6.3×11 | 0.20 | 405 | 8×11.5 | 0.17 | 540 | 10×16 | 0.20 | 630 |
| 68 | 8×11.5 | 0.10 | 540 | 8×11.5 | 0.15 | 540 | 10×12.5 | 0.15 | 760 | 10×16 | 0.20 | 700 |
| 100 | 8×11.5 | 0.10 | 760 | 8×11.5 | 0.12 | 760 | 10×12.5 | 0.160 | 825 | 10×20 | 0.18 | 800 |
| | | | | | | | | | | 12.5×16 | 0.110 | 975 |
| 150 | 8×11.5 | 0.10 | 760 | 10×12.5 | 0.061 | 1030 | 8×20 | 0.120 | 1200 | 12.5×20 | 0.090 | 1195 |
| | | | | | | | 10×20 | 0.080 | | | | |
| 220 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.038 | 1430 | 12.5×20 | 0.070 | 1300 | 16×25 | 0.060 | 1600 |
| 330 | 10×12.5 | 0.053 | 1330 | 10×20 | 0.032 | 1820 | 12.5×20 | 0.050 | 1495 | 16×25 | 0.040 | 1750 |
| 470 | 8×20 | 0.038 | 1600 | 12.5×20 | 0.030 | 2360 | 12.5×25 | 0.040 | 1990 | 18×31.5 | 0.035 | 2060 |
| | 10×16 | 0.041 | 1760 | | | | | | | | | |
| 680 | 12.5×20 | 0.026 | 2360 | 12.5×25 | 0.022 | 2770 | 16×25 | 0.030 | 2780 | | | |
| 1000 | 12.5×20 | 0.026 | 2480 | 16×25 | 0.018 | 3460 | 16×35.5 | 0.020 | 2835 | | | |
| 1500 | 16×20 | 0.022 | 3250 | 16×31.5 | 0.015 | 3680 | | | | | | |
| 2200 | 16×25 | 0.018 | 3630 | | | | 18×40 | 0.02 | 3500 | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## LQ Low Imp., High Ripple Current Series

Low Impedance | Miniaturized | Solvent Proof



- For LED Lighting
- High reliability withstanding 10000 hours load life at 105˚C (6000 ~ 9000 hours for smaller case sizes as specified below)
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 120 |
|---|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.08 | 0.08 | 0.08 |

| **Low temperature characteristics (Impedance ratio at 120Hz)** | |
|---|---|
| Z-25˚C / Z+20˚C | 2 |
| Z-40˚C / Z+20˚C | 3 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

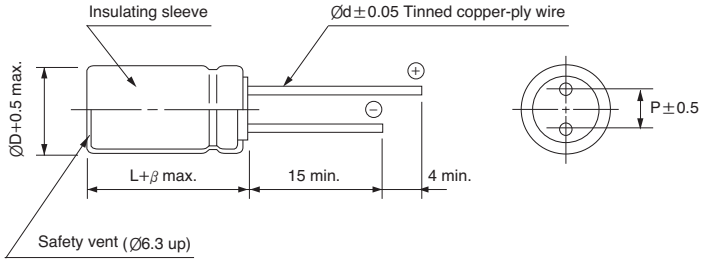
| Rated voltage (Vdc) | 6.3~10 | 16~120 |
|---|---|---|
| Capacitance change | Within ±30% of initial value | Within ±25% of initial value |
| tanδ | Less than 200% of specified value | |
| Leakage current | Less than specified value | |

| ØD | Life time (hrs) | | |
|---|---|---|---|
| | 6.3Vdc | 10~50Vdc | 63~120Vdc |
| Ø5 ~ Ø6.3 | 6000 | 7000 | 6000 |
| Ø8×11.5L | 8000 | 9000 | 8000 |
| Ø8×15L ~ 20L | 9000 | 10000 | 9000 |
| Ø10×12.5L | 9000 | | |
| Ø10×16L ~ 25L<br>Ø12.5 ~ | 10000 | | |

| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |
|---|---|

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.42 | 0.70 | 0.90 | 0.95 | 1.00 |
| 47 ~ 270 | 0.50 | 0.73 | 0.92 | 0.96 | 1.00 |
| 330 ~ 680 | 0.55 | 0.77 | 0.94 | 0.97 | 1.00 |
| 820 ~ 1800 | 0.60 | 0.80 | 0.96 | 0.98 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.98 | 0.99 | 1.00 |

# LQ series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

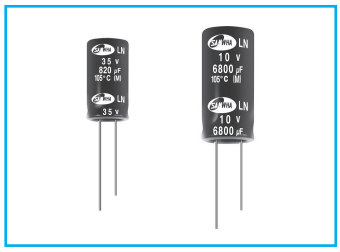
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | | 35 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz |
| 100 | | | | | | | | | | 5×11 | 0.400 | 450 | 6.3×11 | 0.170 | 700 |
| 120 | | | | | | | 5×11 | 0.400 | 450 | | | | | | |
| 150 | | | | 5×11 | 0.400 | 450 | | | | 6.3×11 | 0.170 | 700 | | | |
| 180 | | | | | | | | | | | | | 8×11.5 | 0.075 | 1200 |
| 220 | 5×11 | 0.400 | 345 | | | | | | | | | | 8×15 | 0.065 | 1600 |
| 270 | | | | | | | | | | | | | 10×12.5 | 0.053 | 1700 |
| 330 | | | | 6.3×11 | 0.170 | 700 | | | | 8×11.5 | 0.090 | 1200 | 8×20 | 0.041 | 1960 |
| 390 | | | | | | | | | | 8×15 | 0.065 | 1600 | 10×16 | 0.038 | 2000 |
| 470 | 6.3×11 | 0.170 | 540 | | | | | | | 10×12.5 | 0.053 | 1700 | 10×16 | 0.038 | 2100 |
| 560 | | | | 8×11.5 | 0.110 | 1200 | 8×15 | 0.059 | 1600 | 8×20 | 0.041 | 1960 | 10×20 | 0.030 | 2500 |
| 680 | | | | 8×15 | 0.059 | 1600 | 10×12.5 | 0.053 | 1700 | 10×16 | 0.039 | 2000 | 12.5×20 | 0.027 | 2600 |
| 820 | 8×11.5 | 0.075 | 945 | 10×12.5 | 0.053 | 1700 | 8×20 | 0.041 | 1960 | | | | 12.5×20 | 0.025 | 2900 |
| 1000 | 8×15 | 0.059 | 1250 | 10×16 | 0.041 | 1960 | 10×16 | 0.036 | 2000 | 10×20 | 0.030 | 2500 | 12.5×20 | 0.025 | 2900 |
| 1200 | 10×12.5 | 0.053 | 1500 | 10×16 | 0.036 | 2000 | | | | 12.5×20 | 0.028 | 2900 | 12.5×25 | 0.022 | 3200 |
| 1500 | 8×20 | 0.041 | 1500 | | | | 10×20 | 0.027 | 2500 | 12.5×20 | 0.026 | 2900 | 12.5×30 | 0.018 | 3660 |
| | | | | | | | | | | | | | 16×20 | 0.021 | 3330 |
| 1800 | 10×16 | 0.036 | 1760 | 10×20 | 0.027 | 2500 | 12.5×20 | 0.024 | 2600 | 12.5×25 | 0.024 | 3200 | 16×25 | 0.017 | 3810 |
| 2200 | | | | 12.5×20 | 0.027 | 2900 | 12.5×20 | 0.023 | 2900 | 12.5×30 | 0.017 | 3660 | | | |
| | | | | | | | | | | 16×20 | 0.020 | 3330 | | | |
| 2700 | 10×20 | 0.027 | 1960 | 12.5×20 | 0.024 | 3000 | 12.5×25 | 0.018 | 3200 | | | | | | |
| 3300 | 12.5×20 | 0.023 | 2250 | 12.5×25 | 0.022 | 3200 | 12.5×30 | 0.017 | 3660 | 16×25 | 0.016 | 3810 | | | |
| | | | | | | | 16×20 | 0.020 | 3300 | | | | | | |
| 3900 | 12.5×20 | 0.024 | 2480 | | | | | | | | | | | | |
| 4700 | 12.5×25 | 0.018 | 2900 | 12.5×30 | 0.018 | 3660 | 16×25 | 0.016 | 3810 | | | | | | |
| | | | | 16×25 | 0.016 | 3300 | | | | | | | | | |
| 5600 | 12.5×30 | 0.017 | 3450 | 16×25 | 0.016 | 3810 | | | | | | | | | |
| 6800 | 16×20 | 0.020 | 3250 | | | | | | | | | | | | |
| 8200 | 16×25 | 0.016 | 3630 | | | | | | | | | | | | |

| WV / Item / μF | 50 | | | 63 | | | 80 | | | 100 | | | 120 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz | ØD×L (mm) | IMP. (Ω)max. 20℃ 100kHz | Ripple current (mA rms) 105℃ 100kHz |
| 27 | 5×11 | 0.480 | 310 | | | | 6.3×11 | 0.460 | 370 | | | | | | |
| 33 | | | | | | | | | | 8×11.5 | 0.450 | 620 | 8×15 | 0.200 | 780 |
| 47 | 6.3×11 | 0.380 | 400 | 6.3×11 | 0.350 | 420 | 8×11.5 | 0.290 | 620 | 8×15 | 0.350 | 780 | 8×20 | 0.160 | 1040 |
| | | | | | | | | | | 10×12.5 | 0.250 | 780 | 10×16 | 0.110 | 1040 |
| 56 | 6.3×11 | 0.220 | 500 | | | | 8×15 | 0.200 | 780 | 10×12.5 | 0.250 | 780 | | | |
| 68 | | | | | | | 10×12.5 | 0.170 | 780 | 8×20 | 0.250 | 1040 | 10×20 | 0.084 | 1430 |
| | | | | | | | | | | 10×16 | 0.130 | 1040 | 12.5×16 | 0.110 | 1430 |
| 82 | | | | 8×11.5 | 0.240 | 720 | 8×20 | 0.160 | 1040 | 10×16 | 0.130 | 1140 | | | |
| 100 | 8×11.5 | 0.120 | 950 | 8×15 | 0.180 | 990 | 10×16 | 0.140 | 1040 | 10×20 | 0.105 | 1430 | | | |
| | | | | | | | | | | 12.5×16 | 0.105 | 1430 | 12.5×20 | 0.062 | 1750 |
| 120 | 8×15 | 0.082 | 1230 | 10×12.5 | 0.110 | 990 | | | | 12.5×20 | 0.075 | 1620 | 12.5×25 | 0.047 | 2210 |
| 150 | 10×12.5 | 0.073 | 1280 | 8×20 | 0.096 | 1200 | 10×20 | 0.084 | 1430 | 12.5×20 | 0.070 | 1750 | 12.5×30 | 0.042 | 2400 |
| | | | | | | | 12.5×16 | 0.110 | 1430 | | | | 16×20 | 0.048 | 1950 |
| 180 | 8×20 | 0.065 | 1580 | 10×16 | 0.076 | 1200 | 12.5×20 | 0.069 | 1620 | | | | | | |
| 220 | 10×16 | 0.050 | 1650 | | | | 12.5×20 | 0.062 | 1750 | 12.5×25 | 0.060 | 2210 | 16×25 | 0.038 | 2430 |
| 270 | | | | 10×20 | 0.070 | 1570 | 12.5×25 | 0.047 | 2210 | 12.5×30 | 0.040 | 2400 | 16×31.5 | 0.032 | 2640 |
| | | | | | | | | | | 16×20 | 0.046 | 1950 | 18×25 | 0.036 | 2500 |
| 330 | 10×20 | 0.036 | 2060 | 12.5×20 | 0.060 | 1990 | 12.5×30 | 0.042 | 2400 | | | | 16×35.5 | 0.029 | 2860 |
| | | | | | | | 16×20 | 0.048 | 1950 | | | | | | |
| 390 | 12.5×20 | 0.030 | 2240 | 12.5×20 | 0.050 | 1990 | | | | | | | 16×40 | 0.027 | 3510 |
| | | | | | | | | | | 16×25 | 0.036 | 2430 | 18×31.5 | 0.030 | 2860 |
| | | | | | | | | | | 18×20 | 0.045 | 2270 | | | |
| 470 | 12.5×20 | 0.030 | 2300 | 12.5×25 | 0.039 | 2460 | | | | 16×31.5 | 0.030 | 2640 | | | |
| | | | | | | | 16×25 | 0.038 | 2430 | 18×25 | 0.034 | 2500 | 18×35.5 | 0.027 | 3510 |
| | | | | | | | 18×20 | 0.045 | 2270 | | | | | | |
| 560 | | | | 12.5×30 | 0.035 | 2760 | 16×31.5 | 0.032 | 2640 | 16×35.5 | 0.028 | 2860 | 18×40 | 0.026 | 3860 |
| | | | | 16×20 | 0.032 | 2380 | | | | 18×31.5 | 0.029 | 2860 | | | |
| 680 | 12.5×25 | 0.024 | 2800 | | | | 16×35.5 | 0.029 | 2860 | 16×40 | 0.026 | 3510 | | | |
| | | | | | | | 18×25 | 0.036 | 2500 | 18×35.5 | 0.026 | 3510 | | | |
| 820 | 12.5×30 | 0.022 | 3370 | 16×25 | 0.025 | 2890 | 16×40 | 0.027 | 3510 | 18×40 | 0.025 | 3860 | | | |
| | 16×20 | 0.025 | 3070 | | | | 18×31.5 | 0.030 | 2860 | | | | | | |
| 1000 | 16×25 | 0.021 | 3510 | 16×31.5 | 0.023 | 2950 | 18×35.5 | 0.027 | 3510 | | | | | | |
| 1200 | | | | | | | 18×40 | 0.026 | 3860 | | | | | | |
| 2200 | | | | 18×40 | 0.020 | 3200 | | | | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## LN Low Imp., High Ripple Current Series

Low Impedance | Long Life | Solvent Proof



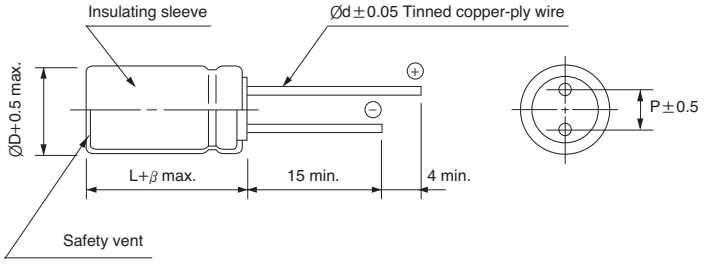
- Higher ripple current compared with LQ series
- Enabled high ripple current by a reduction of impedance at high frequency range
- High reliability withstanding 10000 hours load life at 105˚C
- Complied to the RoHS directive

LQ ⇨ LN (Low Imp.)

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.<br>WV: 10 / 16 / 25 / 35<br>tanδ: 0.18 / 0.15 / 0.13 / 0.11 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | Z-40˚C / Z+20˚C: 3<br>Z-25˚C / Z+20˚C: 2 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±25% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 |
|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 |
| β | 2.0 | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 560 | 0.50 | 0.85 | 0.95 | 0.98 | 1.00 |
| 680 ~ 1800 | 0.60 | 0.87 | 0.95 | 0.98 | 1.00 |
| 2200 ~ 3900 | 0.75 | 0.90 | 0.95 | 0.98 | 1.00 |
| 4700 ~ 12000 | 0.85 | 0.95 | 0.98 | 0.99 | 1.00 |

# LN series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

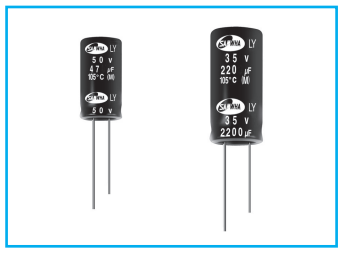
| WV / Item / μF | 10 | | | 16 | | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 820 | | | | 10 × 16 | 0.032 | 2000 |
| 1000 | | | | 10 × 16 | 0.032 | 2000 |
| 1200 | 10 × 16 | 0.032 | 2000 | 10 × 20 | 0.024 | 2500 |
| 1500 | 10 × 16 | 0.032 | 2000 | 10 × 20 | 0.024 | 2500 |
| 1800 | 10 × 20 | 0.024 | 2500 | 12.5 × 20 | 0.020 | 2600 |
| 2200 | 12.5 × 20 | 0.020 | 2600 | 12.5 × 20 | 0.020 | 2900 |
| 3300 | 12.5 × 20 | 0.020 | 2900 | 12.5 × 25 | 0.017 | 3200 |
| 3900 | 12.5 × 25 | 0.017 | 3200 | 16 × 20 | 0.017 | 3575 |
| 4700 | 16 × 20 | 0.017 | 3575 | 16 × 25 | 0.015 | 3810 |
| 5600 | 16 × 25 | 0.015 | 3810 | 16 × 25 | 0.015 | 3810 |
| 6800 | 16 × 25 | 0.015 | 3810 | 16 × 31.5 | 0.012 | 4000 |
| 8200 | 16 × 31.5 | 0.012 | 4000 | 16 × 35.5 | 0.011 | 4200 |
| 10000 | 16 × 31.5 | 0.012 | 4000 | | | |
| 12000 | 16 × 35.5 | 0.011 | 4200 | | | |

| WV / Item / μF | 25 | | | 35 | | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 390 | | | | 10 × 16 | 0.032 | 2000 |
| 470 | | | | 10 × 16 | 0.032 | 2000 |
| 560 | | | | 10 × 20 | 0.024 | 2500 |
| 680 | 10 × 16 | 0.032 | 2000 | 12.5 × 20 | 0.020 | 2600 |
| 820 | 10 × 20 | 0.024 | 2500 | 12.5 × 20 | 0.020 | 2600 |
| | 10 × 16 | 0.032 | 2000 | 12.5 × 20 | 0.020 | 2900 |
| 1000 | 10 × 20 | 0.024 | 2500 | 12.5 × 20 | 0.020 | 2600 |
| 1200 | 12.5 × 20 | 0.020 | 2600 | 12.5 × 25 | 0.017 | 3200 |
| 1500 | 12.5 × 20 | 0.020 | 2900 | 16 × 20 | 0.017 | 3575 |
| 1800 | 12.5 × 25 | 0.017 | 3200 | 16 × 25 | 0.015 | 3600 |
| 2200 | 12.5 × 25 | 0.017 | 3200 | 16 × 25 | 0.015 | 3700 |
| 2200 | 16 × 20 | 0.017 | 3575 | | | |
| 3300 | 16 × 25 | 0.015 | 3810 | 16 × 31.5 | 0.013 | 3800 |
| 3900 | 16 × 25 | 0.014 | 3810 | 16 × 35.5 | 0.012 | 4000 |
| 4700 | 16 × 31.5 | 0.014 | 4000 | | | |
| 5600 | 16 × 35.5 | 0.013 | 4200 | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## LY Miniature, Long Life, For LED Lighting Series

Long Life  Solvent Proof



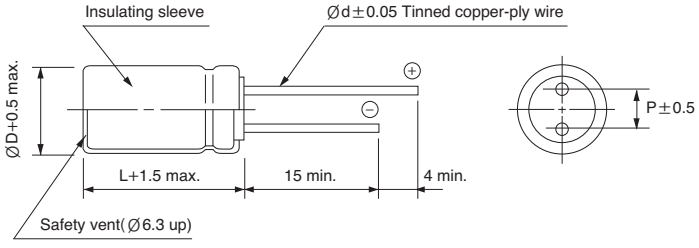
- Miniature, long life
- For LED Lighting
- High reliability withstanding 10000 hours load life at 105˚C
- Complied to the RoHS directive

WF ⇒ LY
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA wichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA wichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 10 / 16 / 25 / 35 / 50 / 63<br>tanδ: 0.45 / 0.35 / 0.30 / 0.22 / 0.19 / 0.17 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 10 / 16 / 25 / 35 / 50 / 63<br>Z-25˚C/Z+20˚C: 3 / 2 / 2 / 2 / 2 / 2<br>Z-40˚C/Z+20˚C: 8 / 6 / 3 / 3 / 4 / 4 |
| **Load life (after application of the rated voltage for 10000 hours at 105˚C)** | Leakage current: Less than specified value<br>Capacitance change: Within ±25% of the initial value<br>tanδ: Less than 200% of the specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## ● DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 |
|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 |
| Ød | 0.5 | 0.5 | 0.6 |

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.42 | 0.70 | 0.90 | 0.95 | 1.00 |
| 47 ~ | 0.55 | 0.73 | 0.92 | 0.96 | 1.00 |

# LY series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 33 | | | | | | | 5×11 | 1.50 | 172 |
| 47 | | | | 5×11 | 1.20 | 193 | 5×11 | 0.60 | 193 |
| 100 | 5×11 | 0.60 | 193 | 6.3×11 | 0.60 | 277 | 6.3×11 | 0.45 | 277 |
| 220 | 6.3×11 | 0.50 | 277 | 8×11.5 | 0.45 | 436 | 8×11.5 | 0.20 | 436 |
| 330 | 8×11.5 | 0.40 | 436 | 8×11.5 | 0.40 | 436 | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 1.0 | | | | 5×11 | 3.50 | 35 | | | |
| 2.2 | | | | 5×11 | 2.50 | 46 | | | |
| 3.3 | | | | 5×11 | 2.00 | 92 | | | |
| 4.7 | | | | 5×11 | 2.00 | 106 | | | |
| 10 | | | | 5×11 | 1.60 | 119 | | | |
| 22 | | | | 5×11 | 1.60 | 145 | 6.3×11 | 1.20 | 265 |
| 33 | 5×11 | 0.60 | 193 | 6.3×11 | 1.50 | 251 | 6.3×11 | 1.20 | 265 |
| 47 | 6.3×11 | 0.50 | 277 | 6.3×11 | 0.70 | 251 | 8×11.5 | 0.30 | 270 |
| 100 | 8×11.5 | 0.35 | 436 | 8×11.5 | 0.45 | 356 | | | |
| 220 | 8×15 | 0.30 | 473 | | | | | | |

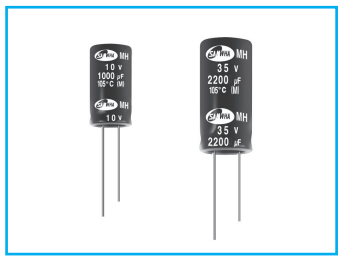
# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## MH Low Imp., Long Life Series

Low Impedance | Miniaturized | Solvent Proof

- Long Life compared with ML series
- High reliability withstanding 12000 hours load life at 105˚C (7000/9000 hours for as specified below)
- Complied to the RoHS directive

ML ⟹ MH (Long life)



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 |
|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| Z-40˚C / Z+20˚C | Z-25˚C / Z+20˚C |
|---|---|
| 3 | 2 |

**Load life**

After an application of DC bias voltage plus the rated AC ripple current for 12000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±25% of initial value |
| tanδ | Less than 200% of specified value |

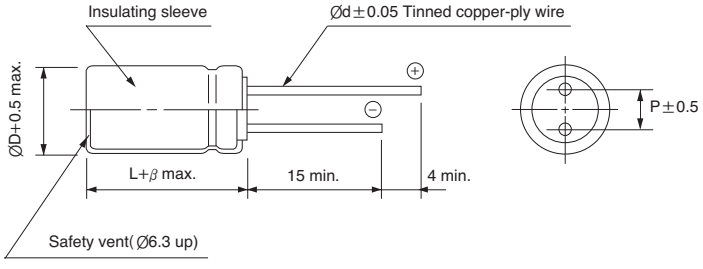
| ØD | ØD = 5, 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 7000 hours | 9000 hours | 12000 hours |

**Shelf life (at 105˚C)**

After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.42 | 0.70 | 0.90 | 0.95 | 1.00 |
| 47 ~ 220 | 0.50 | 0.73 | 0.92 | 0.96 | 1.00 |
| 330 ~ 680 | 0.55 | 0.77 | 0.94 | 0.97 | 1.00 |
| 1000 ~ 1500 | 0.60 | 0.80 | 0.96 | 0.98 | 1.00 |
| 2200 ~ | 0.70 | 0.85 | 0.98 | 0.99 | 1.00 |

# MH series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

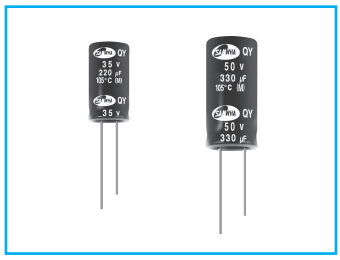
| WV / Item / μF | 6.3 | | | 10 | | | 16 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 10 | | | | | | | 5 × 11 | 0.35 | 250 |
| 22 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.35 | 250 |
| 33 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.35 | 250 |
| 47 | 5 × 11 | 0.30 | 250 | 5 × 11 | 0.30 | 250 | 5 × 11 | 0.30 | 250 |
| 100 | 5 × 11 | 0.30 | 250 | 5 × 11 | 0.30 | 250 | 6.3 × 11 | 0.25 | 405 |
| 150 | 6.3 × 11 | 0.15 | 405 | 6.3 × 11 | 0.15 | 405 | 6.3 × 11 | 0.20 | 405 |
| 220 | 6.3 × 11 | 0.15 | 405 | 6.3 × 11 | 0.15 | 405 | 8 × 11.5 | 0.15 | 760 |
| 330 | 6.3 × 11 | 0.15 | 405 | 8 × 11.5 | 0.13 | 760 | 8 × 11.5 | 0.10 | 760 |
| 390 | 6.3 × 11 | 0.15 | 405 | 8 × 11.5 | 0.11 | 760 | 8 × 11.5 | 0.10 | 760 |
| 470 | 8 × 11.5 | 0.11 | 630 | 8 × 11.5 | 0.11 | 760 | 10 × 12.5 | 0.053 | 1030 |
| 560 | 8 × 11.5 | 0.11 | 760 | 10 × 12.5 | 0.053 | 760 | 10 × 12.5 | 0.053 | 1100 |
| 680 | 10 × 12.5 | 0.053 | 1030 | 10 × 12.5 | 0.053 | 1030 | 10 × 16 | 0.038 | 1430 |
| 1000 | 10 × 12.5 | 0.053 | 1030 | 10 × 12.5 | 0.053 | 1330 | 10 × 16 | 0.038 | 1760 |
| 1500 | 10 × 20 | 0.027 | 1820 | 10 × 20 | 0.030 | 1820 | 10 × 20 | 0.030 | 1960 |
| 2200 | 12.5 × 20 | 0.025 | 2360 | 12.5 × 20 | 0.027 | 2360 | 12.5 × 25 | 0.023 | 2770 |
| 3300 | 12.5 × 20 | 0.025 | 2360 | 12.5 × 20 | 0.027 | 2480 | 16 × 20 | 0.020 | 3250 |
| 4700 | 16 × 25 | 0.015 | 3460 | 16 × 25 | 0.022 | 3250 | 16 × 25 | 0.018 | 3630 |
| 6800 | 16 × 25 | 0.015 | 3460 | 16 × 25 | 0.018 | 3630 | | | |
| 10000 | 16 × 31.5 | 0.015 | 3680 | 18 × 31.5 | 0.015 | 3700 | | | |

| WV / Item / μF | 25 | | | 35 | | | 50 | | |
|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20˚C 100kHz | Ripple current (mA rms) 105˚C 100kHz |
| 10 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.55 | 250 | 5 × 11 | 0.60 | 250 |
| 22 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.50 | 250 | 5 × 11 | 0.45 | 250 |
| 33 | 5 × 11 | 0.35 | 250 | 5 × 11 | 0.45 | 250 | 6.3 × 11 | 0.25 | 405 |
| 47 | 5 × 11 | 0.30 | 250 | 6.3 × 11 | 0.30 | 405 | 6.3 × 11 | 0.20 | 405 |
| 56 | 6.3 × 11 | 0.27 | 405 | 6.3 × 11 | 0.20 | 405 | 6.3 × 11 | 0.20 | 405 |
| 68 | 6.3 × 11 | 0.27 | 405 | 8 × 11.5 | 0.10 | 540 | 8 × 11.5 | 0.15 | 540 |
| 100 | 6.3 × 11 | 0.20 | 405 | 8 × 11.5 | 0.10 | 760 | 8 × 11.5 | 0.12 | 760 |
| 150 | 8 × 11.5 | 0.14 | 760 | 8 × 11.5 | 0.10 | 760 | 10 × 12.5 | 0.061 | 1030 |
| 220 | 8 × 11.5 | 0.12 | 760 | 10 × 12.5 | 0.053 | 1030 | 10 × 16 | 0.038 | 1430 |
| 330 | 10 × 12.5 | 0.053 | 1030 | 10 × 12.5 | 0.053 | 1330 | 10 × 20 | 0.032 | 1820 |
| 390 | 10 × 12.5 | 0.053 | 1250 | 10 × 16 | 0.048 | 1550 | 12.5 × 20 | 0.031 | 2000 |
| 470 | 10 × 12.5 | 0.050 | 1330 | 10 × 16 | 0.041 | 1760 | 12.5 × 20 | 0.030 | 2360 |
| 560 | 10 × 16 | 0.050 | 1800 | 10 × 20 | 0.037 | 2100 | 12.5 × 25 | 0.027 | 2450 |
| 680 | 10 × 16 | 0.040 | 1760 | 12.5 × 20 | 0.026 | 2360 | 12.5 × 25 | 0.022 | 2770 |
| 1000 | 10 × 20 | 0.033 | 1960 | 12.5 × 20 | 0.026 | 2480 | 16 × 25 | 0.018 | 3460 |
| 1500 | 12.5 × 20 | 0.029 | 2550 | 16 × 20 | 0.022 | 3250 | 16 × 31.5 | 0.015 | 3680 |
| 2200 | 16 × 20 | 0.022 | 3250 | 16 × 25 | 0.018 | 3630 | | | |
| 3300 | 16 × 25 | 0.018 | 3630 | | | | | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## QY Long Life Series

Solvent Proof

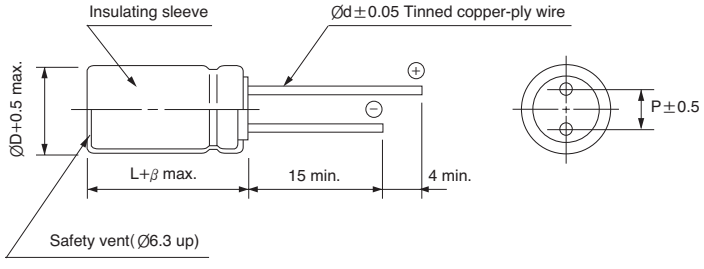


· High reliability withstanding 13000 hours load life at 105˚C
· Complied to the RoHS directive, Halogen-Free

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -25 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA (after 2 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 35 / 50 ; tanδ: 0.22 / 0.19 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 35 / 50 ; Z-25˚C/Z+20˚C: 3 / 3 |
| **Load life (after application of the rated voltage for 13000 hours at 105˚C)** | Leakage current: Less than specified value ; Capacitance change: Within ±30% of initial value ; tanδ: Less than 300% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 6.3 | 8 | | 10 | 12.5 |
|---|---|---|---|---|---|
| L | - | 7 | 11.5 | - | - |
| P | 2.5 | 3.5 | 3.5 | 5.0 | 5.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 |
| β | 1.5 | | | 2.0 | |

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 35 | | 50 | |
|---|---|---|---|---|
| 22 | | | 6.3 × 11 | 228 |
| 47 | 6.3 × 11 | 205 | 6.3 × 11 | 228 |
| | | | 8 × 7 | 228 |
| | | | 8 × 11.5 | 450 |
| 100 | 8 × 11.5 | 550 | 10 × 16 | 700 |
| 220 | 10 × 16 | 800 | 12.5 × 20 | 990 |
| 330 | 10 × 20 | 1030 | 12.5 × 25 | 1250 |
| 470 | 12.5 × 20 | 1320 | 12.5 × 30 | 1585 |
| 560 | 12.5 × 25 | 1500 | | |

Ripple current (mA rms) at 105˚C, 100kHz
Case size ØD×L (mm)

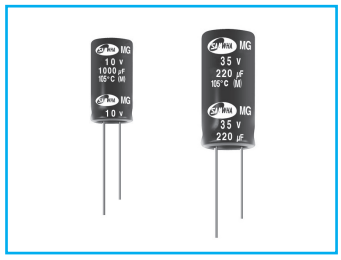
## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 22 | 0.25 | 0.50 | 0.75 | 0.90 | 1.00 |
| 47 ~ | 0.30 | 0.55 | 0.80 | 0.90 | 1.00 |

# MG Long Life Series

- Long Life
- For LED Lighting
- High reliability withstanding 20000 hours load life at 105˚C
- Complied to the RoHS directive

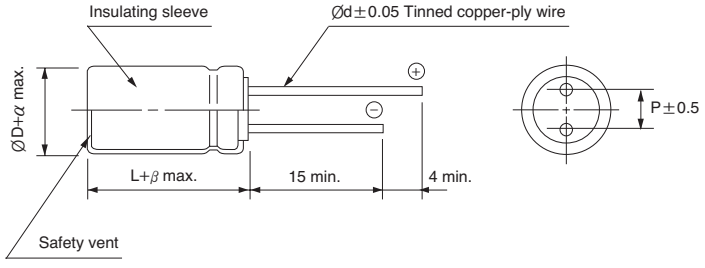
MH ⇨ **MG**
Long life



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.03CV or 4μA whichever is greater (after 1 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 10 / 16 / 25 / 35<br>tanδ: 0.20 / 0.16 / 0.14 / 0.12 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 10 / 16 / 25 / 35<br>Z-25˚C/Z+20˚C: 3 / 2 / 2 / 2<br>Z-40˚C/Z+20˚C: 3 / 3 / 3 / 3 |
| **Load life (after application of the rated voltage for 20000 hours at 105˚C)** | Leakage current: Less than specified value<br>Capacitance change: Within ±30% of initial value<br>tanδ: Less than 300% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 0.5 | | | |
| β | 2.0 | | | |

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 10 | | 16 | | 25 | | 35 | |
|---|---|---|---|---|---|---|---|---|
| **100** | | | | | 10 × 12.5 | 420 | 10 × 16 | 672 |
| **220** | | | 10 × 12.5 | 504 | 10 × 12.5 | 840 | 10 × 20 | 1008 |
| **330** | 10 × 12.5 | 504 | 10 × 16 | 672 | 10 × 16 | 1008 | 12.5 × 20 | 1344 |
| **470** | 10 × 12.5 | 672 | 10 × 20 | 806 | 10 × 20 | 1344 | 12.5 × 20 | 1680 |
| **680** | 10 × 16 | 806 | 12.5 × 20 | 1008 | 12.5 × 20 | 1008 | 12.5 × 25 | 1879 |
| **1000** | 10 × 20 | 1008 | 12.5 × 25 | 1680 | 12.5 × 25 | 1680 | 16 × 25 | 2184 |
| **2200** | 12.5 × 25 | 1680 | 16 × 25 | 2016 | | | | |
| **3300** | 16 × 25 | 2016 | 16 × 31.5 | 2184 | | | | |
| **4700** | 16 × 31.5 | 2184 | | | | | | |

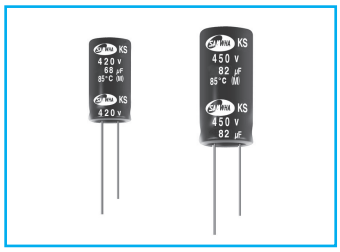
Ripple current (mA rms) at 105˚C, 100kHz
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| **Coefficient** | 0.75 | 0.8 | 0.9 | 0.95 | 1.00 |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## KS For PSU, Long Life Series

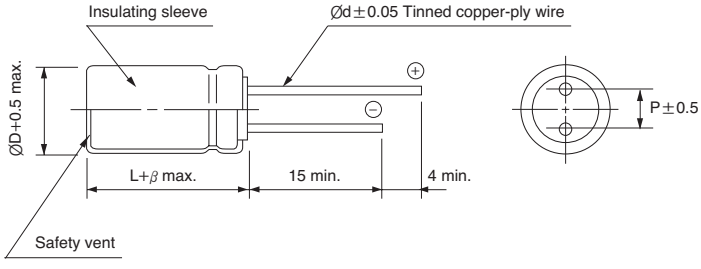


- High reliability withstanding 8000 hours load life at 85˚C
- Suitable for CFL, adapter and power supply
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -25 ~ +85˚C |
| **Leakage current max.** | I = 0.02CV+25$\mu$A (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 420 / 450 / 500<br>tan$\delta$: 0.2 / 0.2 / 0.2 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 420 / 450 / 500<br>Z(-25˚C) / Z(+20˚C): 6 / 6 / 6 |
| **Load life (after application of the rated voltage for 8000 hours at 85˚C)** | Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tan$\delta$: Less than 200% of specified value |
| **Shelf life (at 85˚C)** | After 1000 hours no load test, leakage current, capacitance and tan$\delta$ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | | 16 | 18 | 20 |
|---|---|---|---|---|
| P | | 7.5 | 7.5 | 10.0 |
| Ød | | 0.8 | 0.8 | 0.8 |
| β | L≤40mm | 2.0 | | - |
| | L>40mm | 3.0 | | |

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| $\mu$F \ WV | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|
| **47** | | | | | 16 × 35.5 | 474 |
| **56** | | | | | 16 × 40 | 552 |
| **68** | 16 × 31.5 | 726 | 16 × 35.5 | 738 | 16 × 40 | 648 |
| | | | | | 16 × 45 | |
| | | | 18 × 31.5 | 738 | 18 × 40 | |
| **82** | 16 × 40 | 768 | 16 × 40 | 834 | 16 × 40 | 684 |
| | | | 18 × 31.5 | 834 | | |
| **100** | 16 × 40 | 960 | 16 × 45 | 990 | 16 × 50 | 924 |
| | | | 18 × 35.5 | 990 | | |
| **120** | 16 × 45 | 1122 | 16 × 50 | 1056 | 20 × 41 | 1035 |
| **150** | | | 18 × 45 | 1146 | | |

Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

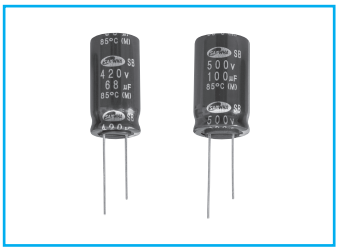
## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz, 100kHz |
|---|---|---|---|---|
| **420 ~ 500V** | 1.00 | 1.40 | 1.50 | 2.00 |

# SB

## High Ripple Current, Long Life Series

Long Life

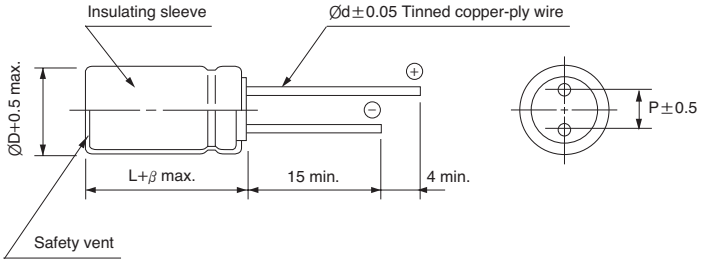


- High reliability withstanding 10000 hours load life at 85˚C
- Suitable for CFL, adapter and power supply
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| Operating temperature range | -25 ~ +85˚C |
| Leakage current max. | I = 0.02CV+25㎂ (after 5 minutes) |
| Capacitance tolerance | ±20% at 120Hz, 20˚C |
| Dissipation factor max. (at 120Hz, 20˚C) | WV: 420 / 450 / 500<br>tanδ: 0.20 / 0.20 / 0.20 |
| Low temperature characteristics (Impedance ratio at 120Hz) | WV: 420 / 450 / 500<br>Z(-25˚C) / Z(+20˚C): 6 / 6 / 6 |
| Load life (after application of the rated voltage for 10000 hours at 85˚C) | Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| Shelf life (at 85˚C) | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 16 | 18 |
|---|---|---|
| P | 7.5 | 7.5 |
| Ød | 0.8 | 0.8 |
| β L≤40mm | 2.0 | |
| β L>40mm | 3.0 | |

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| ㎌ \ WV | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|
| 47 | | | | | 16 × 35.5 | 430 |
| 56 | | | | | 16 × 40 | 500 |
| 68 | 16 × 31.5 | 660 | 16 × 35.5 | 760 | 16 × 45 | 590 |
| | | | 18 × 31.5 | | 18 × 40 | |
| 82 | 16 × 31.5 | 700 | 16 × 40 | 900 | 16 × 50 | 620 |
| | | | 18 × 31.5 | | | |
| 100 | 16 × 40 | 870 | 16 × 40 | 920 | 16 × 50 | 900 |
| | | | 18 × 35.5 | | | |
| 120 | 16 × 45 | 1020 | 16 × 50 | 960 | | |
| 150 | | | 16 × 50 | 1040 | | |

Ripple current (mA rms) at 85˚C, 120Hz
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz, 100kHz |
|---|---|---|---|---|
| 420 ~ 500V | 1.00 | 1.40 | 1.50 | 2.00 |

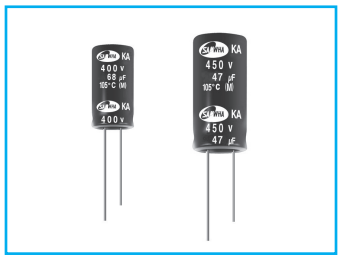
# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## KA

For PSU, High Ripple Current Series

- High ripple current
- Operating tempersture range of -40 ~ +105˚C
- Complied to the RoHS directive

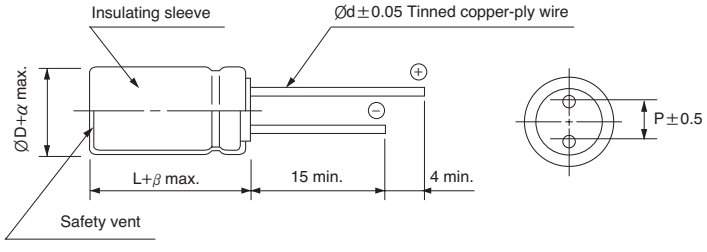
WL ⇨ KA
Long Life



| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV: 400 ~ 450 / 500; Temperature range: -40 ~ +105˚C / -25 ~ +105˚C |
| **Leakage current max.** | I = 0.02CV + 15μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max.** | 0.2max. at 120Hz, 20˚C |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 400 ~450 / 500; Z-25˚C/Z+20˚C: 6 / 8; Z-40˚C/Z+20˚C: 10 / - |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 3000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage. Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## ● DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 | 20 |
|---|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 |
| α | 0.5 | | | | 1.0 |
| β | 2.0 | | | | 3.0 |

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.40 | 0.65 | 0.82 | 0.91 | 1.00 |
| 47 ~ 150 | 0.50 | 0.70 | 0.84 | 0.92 | 1.00 |

# KA series

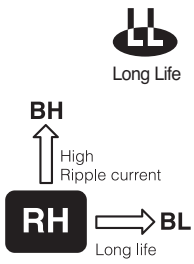
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

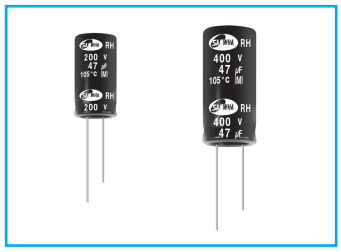
| WV / Item / μF | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz |
| 3.3 | | | | | 10×20 | 150 | | |
| 4.7 | | | | | 10×20 | 200 | | |
| 10 | 10×16 | 176 | | | 10×20 | 230 | 12.5×20 | 240 |
| | 10×20 | 180 | | | | | | |
| 22 | 12.5×25 | 300 | | | 12.5×25 | 525 | 12.5×30 | 420 |
| | | | | | | | 16×25 | 470 |
| 33 | 16×20 | 600 | | | 16×25 | 600 | 18×25 | 580 |
| 47 | 16×25 | 700 | 16×25 | 630 | 16×25 | 660 | 16×35.5 | 650 |
| | | | | | 16×31.5 | 720 | 18×31.5 | 650 |
| | | | | | 18×25 | 720 | 18×35.5 | 700 |
| 56 | | | 16×31.5 | 740 | 16×31.5 | 800 | 16×40 | 740 |
| | | | 18×25 | | 18×25 | 800 | | |
| 68 | 16×31.5 | 1100 | 16×31.5 | 810 | 16×31.5 | 900 | 16×45 | 820 |
| | | | | | | | 18×40 | 900 |
| 82 | 16×35.5 | 1150 | 16×40 | 960 | 16×40 | 1115 | 16×50 | 1000 |
| | | | 18×31.5 | 960 | 18×31.5 | 1115 | 18×40 | 1000 |
| 100 | 18×35.5 | 1200 | 16×40 | 1100 | | | 16×50 | 1250 |
| | | | 18×35.5 | 1100 | 16×40 | 1500 | 18×45 | 1250 |
| | | | | | 18×35.5 | 1500 | 20×41 | 1250 |
| 120 | 18×40 | 1270 | 16×50 | 1250 | 16×50 | 1500 | 20×41 | 1370 |
| | | | 18×40 | 1250 | 18×40 | 1500 | | |
| 150 | 20×41 | 1380 | | | 20×41 | 1600 | | |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## RH For PSU High Ripple Current, Long Life Series

- High ripple current
- High reliability withstanding 5000 hours load life at 105˚C
- Suited for ballast application
- Complied to the RoHS directive

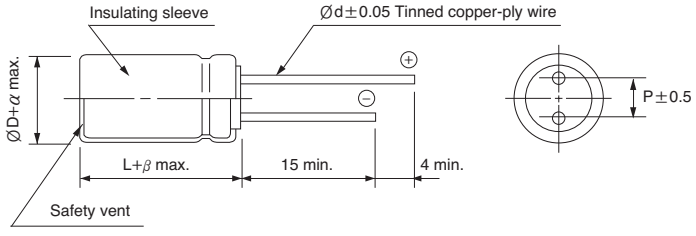


| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV: 160 ~ 450 / 500; Temperature range: -40 ~ +105˚C / -25 ~ +105˚C |
| **Leakage current max.** | I = 0.02CV + 15μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500; tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.24 / 0.24 / 0.24 / 0.24 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 160 / 200 / 250 / 350 / 400 / 450 / 500; Z-25˚C/Z+20˚C: 3 / 3 / 3 / 4 / 6 / 6 / 6; Z-40˚C/Z+20˚C: 4 / 4 / 4 / 8 / 10 / 10 / - |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage. Leakage current: Less than specified value; Capacitance change: Within ±20% of initial value; tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 | 20 | 22 |
|---|---|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 | 10.0 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | 1.0 | |
| β | 2.0 | | | | 3.0 | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|
| **~ 4.7** | 0.25 | 0.30 | 0.60 | 0.80 | 0.90 | 1.00 |
| **6.8 ~ 15** | 0.30 | 0.40 | 0.70 | 0.90 | 0.95 | 1.00 |
| **22 ~** | 0.40 | 0.50 | 0.80 | 0.90 | 0.95 | 1.00 |

# RH series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| 4.7 | | | | | | | 10 × 16 | 200 |
| 6.8 | | | 10 × 12.5 | 120 | 10 × 12.5 | 120 | 10 × 16 | 200 |
| 10 | 10 × 16 | 250 | 10 × 16 | 300 | 10 × 12.5 | 260 | 10 × 20 | 280 |
| 15 | | | | | 10 × 12.5 | 260 | | |
| 22 | 10 × 16 | 360 | 10 × 16 | 360 | 12.5 × 20 | 600 | 12.5 × 20 | 350 |
| | 10 × 20 | 500 | 10 × 20 | 500 | | | | |
| 33 | 10 × 20 | 500 | 10 × 20 | 500 | 12.5 × 20 | 600 | 16 × 20 | 500 |
| | | | 12.5 × 20 | 600 | | | | |
| 47 | 12.5 × 20 | 600 | 12.5 × 20 | 660 | 12.5 × 25 | 720 | 16 × 25 | 660 |
| 68 | 12.5 × 25 | 600 | 12.5 × 25 | 760 | 16 × 25 | 920 | 16 × 31.5 | 800 |
| 82 | 16 × 20 | 760 | 16 × 20 | 880 | 16 × 25 | 1120 | 18 × 31.5 | 920 |
| 100 | 16 × 25 | 1100 | 16 × 25 | 1120 | 16 × 31.5 | 1200 | 18 × 31.5 | 1020 |
| 120 | 16 × 25 | 1180 | 16 × 31.5 | 1200 | 18 × 25 | 1200 | 18 × 31.5 | 1150 |
| 150 | 16 × 31.5 | 1300 | 16 × 31.5 | 1300 | 18 × 25 | 1250 | 18 × 40 | 1250 |
| | | | | | 18 × 31.5 | 1250 | | |
| 220 | | | | | 18 × 35.5 | 1600 | | |

| μF \ WV | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| 1.0 | 10 × 12.5 | 90 | | | | | | |
| 2.2 | 10 × 12.5 | 100 | 10 × 12.5 | 100 | 10 × 12.5 | 100 | | |
| 3.3 | 10 × 12.5 | 128 | 10 × 12.5 | 128 | 10 × 12.5 | 128 | | |
| 4.7 | 10 × 12.5 | 180 | 10 × 12.5 | 180 | 10 × 16 | 180 | | |
| 6.8 | 10 × 16 | 200 | 10 × 16 | 200 | 10 × 16 | 200 | | |
| 10 | 10 × 20 | 280 | 10 × 20 | 280 | 10 × 20 | 300 | 12.5 × 20 | 300 |
| | | | | | | | 12.5 × 25 | 360 |
| 15 | 12.5 × 16 | 280 | | | | | 12.5 × 25 | 360 |
| 22 | 12.5 × 25 | 430 | 12.5 × 25 | 430 | 12.5 × 20 | 430 | 16 × 25 | 420 |
| | | | | | 16 × 25 | 550 | | |
| 33 | 16 × 25 | 640 | 16 × 25 | 660 | 16 × 31.5 | 700 | 16 × 31.5 | 560 |
| 47 | 16 × 31.5 | 750 | 16 × 31.5 | 750 | 16 × 31.5 | 700 | 18 × 35.5 | 700 |
| 56 | | | 18 × 25 | 750 | 18 × 25 | 750 | 18 × 35.5 | 740 |
| 68 | 16 × 31.5 | 880 | 16 × 31.5 | 900 | 18 × 25 | 900 | 18 × 35.5 | 900 |
| | | | | | 18 × 31.5 | 1000 | | |
| 82 | 16 × 35.5 | 1000 | 16 × 35.5 | 1000 | 18 × 31.5 | 1035 | 18 × 40 | 1030 |
| | | | | | 18 × 35.5 | 1100 | | |
| 100 | 18 × 35.5 | 1120 | 18 × 35.5 | 1170 | 18 × 35.5 | 1500 | 18 × 45 | 1100 |
| | | | | | | | 20 × 41 | 1200 |
| 120 | 18 × 40 | 1250 | 18 × 40 | 1280 | 18 × 40 | 1500 | | |
| 150 | 20 × 41 | 1380 | 20 × 41 | 1500 | 20 × 41 | 1796 | | |
| 180 | 20 × 41 | 1450 | 20 × 41 | 1600 | 22 × 45 | 1800 | | |

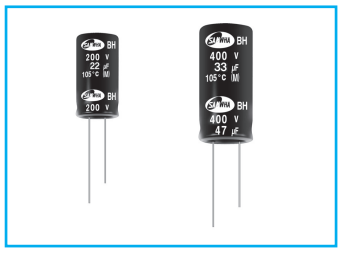
Ripple current (mA rms) at 105°C, 100kHz
Case size ØD×L (mm)

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## BH For PSU, High Ripple Current Series

Long Life

RH ⇨ BH
High Ripple



- Higher ripple current compared with RH series
- Operating tempersture range of -40 ~ +105˚C
- High reliability withstanding 5000 hours load life at 105˚C
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.04CV + 100μA (after 1 minute)<br>I = 0.02CV + 25μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 200 / 250 / 350 / 400 / 450 / 500<br>tanδ: 0.15 / 0.15 / 0.20 / 0.24 / 0.24 / 0.24 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 200 / 250 / 350 / 400 / 450 / 500<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 3 / 3 / 3<br>Z-40˚C/Z+20˚C: 11 / 11 / 11 / 11 / 11 / 11 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

● DRAWING (See page 98)

Unit : mm

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 200 | | 250 | | 350 | | 400 | |
|---|---|---|---|---|---|---|---|---|
| 2.2 | | | | | | | 10 × 12.5 | 130 |
| 3.3 | | | | | 10 × 12.5 | 140 | 10 × 12.5 | 140 |
| 4.7 | | | | | 10 × 16 | 220 | 10 × 16 | 220 |
| 6.8 | | | | | 10 × 16 | 280 | 10 × 16 | 280 |
| 8.2 | | | | | 8 × 20 | 300 | 8 × 20 | 400 |
| | | | | | 10 × 16 | 300 | 10 × 20 | 400 |
| 10 | 10 × 16 | 320 | 10 × 16 | 320 | 8 × 20 | 300 | 8 × 23 | 400 |
| | | | | | 10 × 20 | 400 | 10 × 20 | 400 |
| 22 | 8 × 20 | 300 | 8 × 23 | 350 | 10 × 30 | 500 | 12.5 × 20 | 700 |
| | 10 × 20 | 550 | 10 × 20 | 550 | 12.5 × 20 | 650 | 12.5 × 25 | 780 |
| | | | | | 12.5 × 25 | 680 | | |
| 33 | 12.5 × 20 | 700 | 12.5 × 20 | 800 | 16 × 25 | 910 | 16 × 25 | 920 |
| 47 | 12.5 × 20 | 980 | 12.5 × 25 | 1040 | 12.5 × 30 | 1050 | | |
| | | | | | 18 × 20 | 1150 | | |
| 68 | 12.5 × 20 | 1100 | 12.5 × 30 | 1300 | 16 × 31.5 | 1300 | | |
| | 12.5 × 25 | 1300 | 16 × 25 | 1350 | | | | |
| 82 | 16 × 20 | 1450 | 12.5 × 30 | 1450 | ← Ripple current (mA rms) at 105˚C, 100kHz | | | |
| 100 | 12.5 × 30 | 1550 | ↑ Case size ØD×L (mm) | | | | | |
| | 16 × 25 | 1630 | | | | | | |

| WV | Cap.(μF) | ØD×L(mm) | Rated ripple current (mA rms)105˚C | | | | |
|---|---|---|---|---|---|---|---|
| | | | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
| 450 | 8.2 | 8×20 | 160 | 280 | 360 | 380 | 400 |
| 500 | 4.7 | 8×20 | 70 | 120 | 160 | 216 | 240 |
| | 5.6 | 8×20 | 120 | 210 | 270 | 285 | 300 |

● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

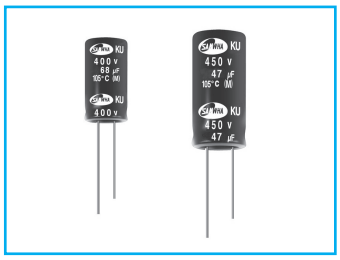
| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 4.7 | 0.40 | 0.60 | 0.80 | 0.90 | 1.00 |
| 6.8 ~ 10 | 0.40 | 0.70 | 0.90 | 0.95 | 1.00 |
| 22 ~ | 0.50 | 0.80 | 0.90 | 0.95 | 1.00 |

# KU

## For PSU, High Ripple Current, Long Life Series

- High ripple current
- High reliability withstanding 5000 hours load life at 105˚C
- Suited for ballast application
- Complied to the RoHS directive

RH ⇨ KU
High Ripple



| Item | Characteristics | | |
|---|---|---|---|
| **Operating temperature range** | WV | 400 ~ 450 | 500 |
| | Temperature range | -40 ~ +105˚C | -25 ~ +105˚C |
| **Leakage current max.** | I = 0.02CV + 15μA (after 5 minutes) | | |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C | | |
| **Dissipation factor max.** | 0.24max. at 120Hz, 20˚C | | |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV | 400 ~450 | 500 |
| | Z-25˚C/Z+20˚C | 6 | 6 |
| | Z-40˚C/Z+20˚C | 10 | - |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage. | | |
| | Leakage current | Less than specified value | |
| | Capacitance change | Within ±20% of initial value | |
| | tanδ | Less than 200% of specified value | |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 | | |

● DRAWING (See page 98)

Unit : mm



● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|
| ~ 4.7 | 0.25 | 0.30 | 0.60 | 0.80 | 0.90 | 1.00 |
| 6.8 ~ 15 | 0.30 | 0.40 | 0.70 | 0.90 | 0.95 | 1.00 |
| 22 ~ | 0.40 | 0.50 | 0.80 | 0.90 | 0.95 | 1.00 |

# KU series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

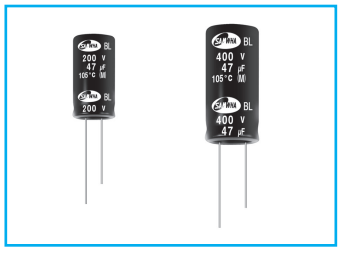
| WV / Item / μF | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 105°C, 100kHz |
| 2.2 | 10×12.5 | 120 | 10×12.5 | 120 | 10×12.5 | 120 | | |
| 3.3 | 10×12.5 | 154 | 10×12.5 | 154 | 10×12.5 | 154 | | |
| 4.7 | 10×16 | 216 | 10×16 | 216 | 10×20 | 216 | | |
| 6.8 | 10×16 | 240 | 10×16 | 240 | 10×20 | 240 | | |
| 10 | 10×20 | 336 | 10×20 | 336 | 12.5×20 | 360 | 12.5×20 | 360 |
| 15 | 12.5×16 | 336 | | | | | 12.5×25 | 432 |
| 22 | 12.5×25 | 516 | 12.5×25 | 516 | 12.5×25 | 516 | 16×25 | 504 |
| 33 | 16×25 | 768 | 16×25 | 792 | 16×25 | 768 | 16×31.5 | 672 |
| 47 | 16×31.5 | 900 | 16×31.5 | 900 | 16×31.5 | 840 | 18×35.5 | 840 |
| 56 | | | 18×25 | 900 | 18×25 | 900 | 18×35.5 | 888 |
| 68 | 16×31.5 | 1056 | 16×31.5 | 1080 | 16×35.5 | 1200 | 16×45 | 1080 |
| 82 | 16×35.5 | 1200 | 16×40 | 1260 | 16×35.5 | 1242 | 16×45 | 1236 |
| 100 | 18×35.5 | 1344 | 16×45 | 1440 | 16×45 | 1450 | 16×50 | 1320 |
| 120 | 18×40 | 1500 | 18×40 | 1536 | 16×50 | 1620 | 20×41 | 1570 |
| 150 | 20×41 | 1656 | 20×41 | 1800 | | | | |

# BL For PSU, High Ripple Current, Long Life Series

Long Life

RH ⇨ BL
Long life

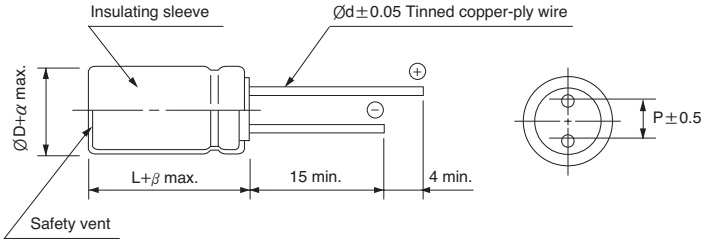
- High ripple current
- Operating temperature range of -40 ~ +105˚C
- For power supply and adapter
- Complied to the RoHS directive



| Item | Characteristics |
|---|---|
| Operating temperature range | -40 ~ +105˚C (160 ~ 450WV), -25 ~ +105˚C (500WV) |
| Leakage current max. | I = 0.02CV + 25μA (after 5 minutes) |
| Capacitance tolerance | ±20% at 120Hz, 20˚C |
| Dissipation factor max. (at 120Hz, 20˚C) | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.20 / 0.20 / 0.20 / 0.24 |
| Low temperature characteristics (Impedance ratio at 120Hz) | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 4 / 6 / 6 / 6 / 6<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 6 / 6 / 6 / 6 / - |
| Load life | After an application of DC bias voltage plus the rated AC ripple current for 10000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| Shelf life (at 105˚C) | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 8 | 10 | 12.5 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|
| P | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 |
| α | 0.5 | | | | | 1.0 |
| β | 1.5 | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| Frequency | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|
| Coefficient | 0.35 | 0.50 | 0.80 | 0.90 | 0.95 | 1.00 |

# BL series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| 4.7 | | | | | 8 × 11.5 | 193 | | |
| 6.8 | | | | | 8 × 11.5 | 220 | 10 × 16 | 264 |
| | | | | | 10 × 12.5 | 230 | | |
| 10 | 10 × 16 | 320 | 10 × 16 | 320 | 10 × 16 | 320 | 8 × 20 | 315 |
| | | | | | | | 10 × 20 | 340 |
| 22 | 10 × 16 | 500 | 10 × 16 | 500 | 10 × 20 | 500 | 12.5 × 20 | 424 |
| 33 | 10 × 20 | 650 | 10 × 20 | 650 | 12.5 × 20 | 770 | 16 × 20 | 605 |
| 47 | 10 × 20 | 750 | 12.5 × 20 | 840 | 12.5 × 20 | 980 | 16 × 25 | 800 |
| 68 | 12.5 × 20 | 970 | 12.5 × 25 | 970 | 16 × 20 | 1080 | 18 × 25 | 1020 |
| 82 | 12.5 × 25 | 1250 | 16 × 20 | 1125 | | | 18 × 31.5 | 1090 |
| | | | | | 16 × 20 | 1190 | | |
| 100 | 12.5 × 25 | 1250 | 16 × 20 | 1230 | 18 × 25 | 1425 | | |
| 150 | 16 × 25 | 1610 | 18 × 25 | 1740 | 18 × 25 | 2000 | | |

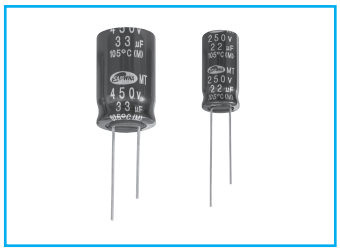
| μF \ WV | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| 1 | 8 × 11.5 | 72 | | | 8 × 11.5 | 100 | | |
| 2.2 | 8 × 11.5 | 99 | | | 8 × 11.5 | 110 | | |
| 3.3 | 8 × 11.5 | 160 | | | 8 × 11.5 | 160 | | |
| 3.9 | 8 × 11.5 | 170 | | | 8 × 15 | 180 | | |
| 4.7 | 8 × 15 | 175 | | | 8 × 20 | 240 | | |
| | 10 × 12.5 | 230 | | | 10 × 12.5 | 240 | | |
| 6.8 | 8 × 20 | 230 | | | 10 × 16 | 265 | | |
| | 10 × 16 | 265 | | | | | | |
| 10 | 10 × 20 | 340 | 10 × 20 | 360 | 10 × 20 | 385 | 12.5 × 25 | 385 |
| 15 | | | | | 10 × 20 | 385 | | |
| 22 | 12.5 × 25 | 520 | 12.5 × 25 | 520 | 12.5 × 20 | 485 | 16 × 25 | 675 |
| | | | | | 12.5 × 25 | 485 | 16 × 31.5 | 820 |
| | | | 16 × 20 | 520 | 16 × 25 | 675 | | |
| 33 | 16 × 25 | 775 | 16 × 25 | 825 | 18 × 25 | 845 | 18 × 35.5 | 870 |
| 47 | 18 × 25 | 1020 | 18 × 31.5 | 1015 | 18 × 31.5 | 1060 | 18 × 35.5 | 1000 |
| 68 | 18 × 31.5 | 1050 | 18 × 25 | 1090 | 18 × 25 | 1200 | 18 × 35.5 | 1200 |
| | | | 18 × 31.5 | 1125 | 18 × 31.5 | 1200 | 18 × 40 | 1300 |
| 82 | 18 × 35.5 | 1150 | 18 × 31.5 | 1210 | 18 × 35.5 | 1270 | 16 × 50 | 1350 |
| 100 | 18 × 40 | 1210 | 18 × 35.5 | 1270 | 18 × 35.5 | 1330 | | |
| | | | 18 × 40 | 1330 | 18 × 40 | 1400 | | |
| 120 | | | | | 18 × 40 | 1450 | | |
| 150 | | | | | 20 × 41 | 1550 | | |



Ripple current (mA rms) at 105˚C, 100kHz
Case size ØD×L (mm)

# MT For Display, 12000 hours at 105˚C Series

Long Life

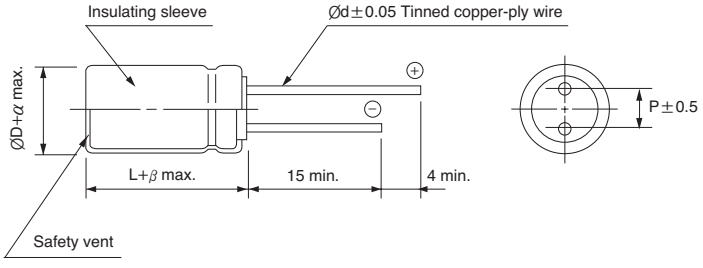


· High reliability withstanding 12000 Hours load life at 105˚C
· For power supply and adapter
· Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.04CV+100$\mu$A (after 1 minutes)<br>I = 0.02CV+25$\mu$A (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>tan$\delta$: 0.20 (160~250) / 0.24 (350~500) |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 3 / 6 / 6 / 6 / 6<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 6 / 6 / 6 / 6 / 6 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 12000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tan$\delta$: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tan$\delta$ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 | 20 |
|---|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 |
| $\alpha$ | 0.5 | | | | 1.0 |
| $\beta$ | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| $\mu$F \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| **10 ~ 82** | 1.00 | 1.75 | 2.25 | 2.45 | 2.50 |
| **100 ~ 470** | 1.00 | 1.67 | 2.05 | 2.20 | 2.25 |

# MT series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

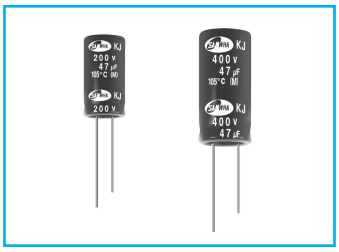
| μF \ WV | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| 10 | 10 × 16 | 102 | 10 × 16 | 110 | 10 × 12.5 | 110 | 10 × 16 | 135 |
| 22 | 10 × 16 | 195 | 10 × 16 | 200 | 10 × 16 | 195 | 12.5 × 20 | 270 |
| 27 | 10 × 16 | 222 | 10 × 16 | 222 | 10 × 20 | 240 | 12.5 × 20 | 285 |
| 33 | 10 × 16 | 245 | 10 × 20 | 280 | 12.5 × 20 | 294 | 12.5 × 25 | 290 |
| 39 | 10 × 16 | 265 | 10 × 20 | 305 | 12.5 × 20 | 322 | 12.5 × 25 | 320 |
| 47 | 10 × 20 | 335 | 10 × 20 | 335 | 12.5 × 20 | 400 | 16 × 25 | 410 |
| | | | 12.5 × 20 | 400 | | | | |
| 68 | 12.5 × 20 | 400 | 12.5 × 20 | 447 | 12.5 × 25 | 540 | 16 × 25 | 550 |
| | | | 12.5 × 25 | 540 | 16 × 20 | 540 | | |
| 82 | 12.5 × 20 | 450 | 12.5 × 25 | 560 | 16 × 20 | 600 | 18 × 25 | 625 |
| | | | 16 × 20 | 560 | | | | |
| 100 | 12.5 × 25 | 525 | 16 × 25 | 652 | 16 × 25 | 652 | 18 × 31.5 | 743 |
| | 16 × 20 | 525 | | | 18 × 20 | 652 | | |
| 120 | 12.5 × 25 | 580 | 16 × 25 | 714 | 16 × 25 | 714 | 18 × 35.5 | 840 |
| | 16 × 25 | 580 | | | | | | |
| 150 | 16 × 25 | 750 | 16 × 25 | 760 | 18 × 25 | 820 | 18 × 35.5 | 942 |
| 180 | 16 × 25 | 810 | 16 × 31.5 | 850 | 18 × 31.5 | 920 | | |
| 220 | 16 × 31.5 | 880 | 18 × 31.5 | 1000 | 18 × 31.5 | 1000 | | |
| | 18 × 25 | 880 | | | | | | |
| 270 | 16 × 35.5 | 1000 | 18 × 35.5 | 1150 | | | | |
| 330 | 16 × 40 | 1142 | 18 × 40 | 1250 | | | | |
| | 18 × 31.5 | 1119 | | | | | | |
| 470 | 18 × 40 | 1401 | | | | | | |

| μF \ WV | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| 10 | 10 × 16 | 135 | 10 × 20 | 135 | 10 × 20 | 135 | 12.5 × 20 | 165 |
| 22 | 12.5 × 20 | 270 | 12.5 × 20 | 225 | 12.5 × 25 | 296 | 16 × 20 | 260 |
| 27 | 12.5 × 25 | 285 | 12.5 × 20 | 254 | 12.5 × 25 | 305 | 16 × 25 | 329 |
| 33 | 12.5 × 25 | 320 | 16 × 20 | 345 | 16 × 20 | 364 | 16 × 25 | 350 |
| 39 | 12.5 × 30 | 320 | 16 × 25 | 345 | 16 × 25 | 400 | 16 × 31.5 | 413 |
| 47 | 16 × 25 | 420 | 16 × 25 | 450 | 16 × 25 | 450 | 16 × 35.5 | 462 |
| | 18 × 20 | 436 | 18 × 20 | 450 | 18 × 20 | 450 | 18 × 31.5 | 468 |
| 68 | 16 × 31.5 | 540 | 18 × 25 | 520 | 18 × 25 | 560 | 16 × 45 | 630 |
| | 18 × 25 | 540 | 18 × 31.5 | 580 | 18 × 31.5 | 590 | 18 × 35.5 | 600 |
| 82 | 18 × 31.5 | 700 | 18 × 31.5 | 650 | 16 × 40 | 650 | 16 × 50 | 685 |
| | | | | | 18 × 31.5 | 670 | 18 × 40 | 670 |
| 100 | 18 × 31.5 | 743 | 16 × 45 | 770 | 16 × 45 | 770 | 18 × 45 | 800 |
| | 18 × 35.5 | 820 | 18 × 35.5 | 770 | 18 × 35.5 | 790 | 20 × 41 | 800 |
| 120 | 18 × 35.5 | 840 | 16 × 50 | 850 | 16 × 50 | 850 | 18 × 50 | 920 |
| | 18 × 40 | 912 | 18 × 40 | 850 | 18 × 40 | 850 | | |
| 150 | 18 × 40 | 1020 | 18 × 45 | 1000 | | | | |
| | | | 20 × 41 | 1000 | | | | |
| 180 | 20 × 41 | 1080 | | | | | | |

Ripple current (mA rms) at 105°C, 120Hz
Case size ØD×L (mm)

# KJ

## For PSU, High Ripple, Long Life Series

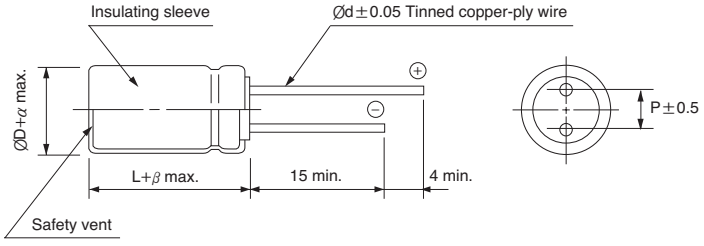


- High reliability withstanding 12000 hours load life at 105˚C
- Suitable for CFL, adapter and power supply
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C (160 ~ 450WV), -25 ~ +105˚C (500WV) |
| **Leakage current max.** | I = 0.04CV + 100μA (after 1 minute)<br>I = 0.02CV + 25μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.20 / 0.20 / 0.20 / 0.24 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 6 / 6 / 6 / 6 / 6<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 10 / 10 / 10 / 10 / - |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 12000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 8 | 10 | 12.5 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|
| P | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 0.8 |
| α | 0.5 | | | | | 1.0 |
| β | 1.5 | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV | Frequency / μF | 120Hz | 300Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|---|
| 160~450 | ~ 15 | 0.30 | 0.50 | 0.60 | 0.90 | 0.95 | 1.00 |
| | 22 ~ 47 | 0.40 | 0.50 | 0.70 | 0.90 | 0.95 | 1.00 |
| | 68 ~ | 0.50 | 0.60 | 0.80 | 0.90 | 0.95 | 1.00 |
| 500 | ~ 39 | 0.40 | 0.50 | 0.70 | 0.90 | 0.95 | 1.00 |
| | 47 ~ | 0.50 | 0.60 | 0.80 | 0.90 | 0.95 | 1.00 |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## KJ series

### ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| 4.7 | | | | | 8 × 11.5 | 193 | 10 × 12.5 | 198 |
| 6.8 | | | | | 8 × 11.5 | 220 | 10 × 16 | 308 |
| | | | | | 10 × 12.5 | 319 | | |
| 10 | 10 × 16 | 358 | 10 × 16 | 407 | 8 × 15 | 292 | 8 × 20 | 424 |
| | | | | | 10 × 16 | 407 | 10 × 20 | 462 |
| 22 | 10 × 16 | 572 | 10 × 20 | 638 | 10 × 20 | 580 | 12.5 × 20 | 743 |
| 27 | 10 × 16 | 611 | 10 × 20 | 638 | 10 × 20 | 660 | 12.5 × 20 | 784 |
| 33 | 10 × 16 | 690 | 10 × 20 | 825 | 12.5 × 20 | 853 | 16 × 20 | 858 |
| 39 | 10 × 20 | 759 | 12.5 × 20 | 839 | 12.5 × 20 | 886 | 16 × 20 | 880 |
| 47 | 10 × 20 | 924 | 12.5 × 20 | 1100 | 12.5 × 20 | 1100 | 16 × 25 | 1130 |
| 68 | 12.5 × 20 | 924 | 12.5 × 25 | 1188 | 16 × 20 | 1210 | 18 × 25 | 1220 |
| | | | 16 × 20 | 1210 | | | | |
| 82 | 12.5 × 25 | 1040 | 16 × 25 | 1232 | 16 × 20 | 1340 | 18 × 25 | 1380 |
| 100 | 12.5 × 25 | 1210 | 16 × 25 | 1434 | 16 × 25 | 1540 | 18 × 31.5 | 1617 |
| | 16 × 20 | | | | 18 × 20 | | | |
| 120 | 16 × 25 | 1325 | 16 × 25 | 1571 | 18 × 25 | 1645 | 18 × 35.5 | 1848 |
| 150 | 16 × 25 | 1645 | 18 × 25 | 1727 | 18 × 25 | 1914 | 18 × 40 | 2072 |
| 180 | 16 × 25 | 1782 | 18 × 25 | 1760 | 18 × 31.5 | 2024 | 20 × 41 | 2310 |
| 220 | 18 × 25 | 2090 | 18 × 31.5 | 2222 | 18 × 35.5 | 2200 | | |
| 270 | 16 × 35.5 | 2200 | 18 × 35.5 | 2530 | | | | |
| 330 | 16 × 40 | 2508 | 18 × 40 | 2750 | | | | |
| 470 | 18 × 45 | 3084 | | | | | | |

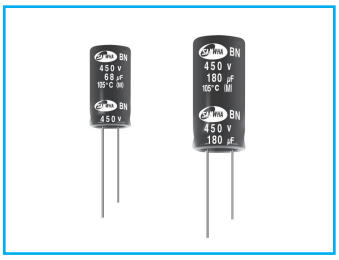
| μF \ WV | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| 1 | 8 × 11.5 | 72 | | | 8 × 11.5 | 90 | | |
| 2.2 | 8 × 11.5 | 99 | | | 8 × 11.5 | 105 | | |
| 3.3 | 8 × 11.5 | 160 | | | 8 × 11.5 | 145 | | |
| 3.9 | 8 × 11.5 | 171 | | | 8 × 15 | 165 | | |
| 4.7 | 8 × 15 | 176 | | | 8 × 20 | 242 | | |
| | 10 × 12.5 | 242 | | | 10 × 12.5 | 242 | | |
| 6.8 | 8 × 20 | 231 | | | 10 × 16 | 363 | | |
| | 10 × 16 | 308 | | | 10 × 20 | 440 | | |
| 10 | 10 × 20 | 462 | 10 × 20 | 462 | 10 × 20 | 440 | 12.5 × 20 | 413 |
| | | | | | 12.5 × 20 | 528 | | |
| 15 | 12.5 × 20 | 528 | 12.5 × 20 | 528 | 12.5 × 20 | 528 | 12.5 × 25 | 440 |
| | | | | | 12.5 × 25 | 660 | | |
| 22 | 12.5 × 25 | 792 | 12.5 × 25 | 745 | 12.5 × 25 | 890 | 16 × 20 | 500 |
| | | | 16 × 20 | 780 | 16 × 20 | 900 | 16 × 25 | 675 |
| 27 | 16 × 20 | 803 | 16 × 20 | 875 | 16 × 20 | 950 | 16 × 25 | 823 |
| 33 | 16 × 20 | 960 | 12.5 × 30 | 980 | 16 × 25 | 1095 | 16 × 31.5 | 880 |
| | | | 16 × 25 | 1035 | 18 × 20 | | 18 × 25 | |
| 39 | 16 × 20 | 1000 | 16 × 25 | 1050 | 16 × 25 | 1100 | 16 × 31.5 | 1033 |
| 47 | 16 × 25 | 1188 | 16 × 25 | 1125 | 18 × 25 | 1150 | 18 × 25 | 1000 |
| | 18 × 20 | | | | | | 18 × 31.5 | 1033 |
| 68 | 16 × 31.5 | 1309 | 18 × 25 | 1265 | 18 × 31.5 | 1180 | 18 × 35.5 | 1100 |
| | | | | | | | 18 × 40 | 1200 |
| 82 | 18 × 31.5 | 1639 | 18 × 31.5 | 1450 | 18 × 35.5 | 1430 | 18 × 35.5 | 1250 |
| | | | | | | | 18 × 40 | 1340 |
| 100 | 18 × 35.5 | 1810 | 18 × 35.5 | 1700 | 18 × 35.5 | 1740 | 18 × 45 | 1400 |
| | | | | | 18 × 40 | 1740 | 20 × 41 | 1600 |
| 120 | 18 × 40 | 2006 | 18 × 40 | 1700 | 18 × 45 | 1740 | | |
| 150 | 20 × 41 | 2244 | 20 × 41 | 2000 | | | | |

Ripple current (mA rms) at 105°C, 100kHz
Case size ØD×L (mm)

# BN

## For Network, High Ripple, 12000 hours at 105°C Series

Long Life

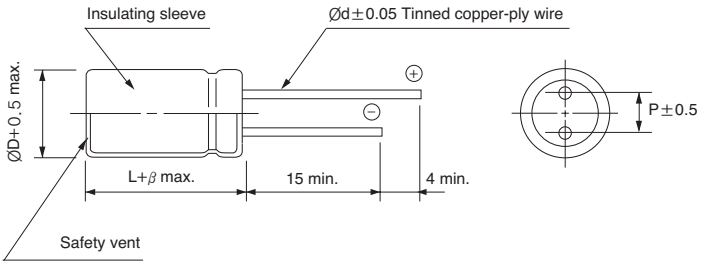


- High reliability withstanding 12000 hours load life at 105°C
- For DC-DC convertor
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105°C |
| **Leakage current max.** | I = 0.04CV + 100μA (after 1 minute)<br>I = 0.02CV + 25μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20°C |
| **Dissipation factor max. (at 120Hz, 20°C)** | WV: 400 ~ 500<br>tanδ: 0.24 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 400, 450 / 500<br>Z-25°C/Z+20°C: 6 / 6<br>Z-40°C/Z+20°C: 6 / 11 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 12000 hours at 105°C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±30% of initial value<br>tanδ: Less than 300% of specified value |
| **Shelf life (at 105°C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| | | |
|---|---|---|
| **ØD** | | **18** |
| **P** | | 7.5 |
| **Ød** | | 0.8 |
| β | L≤40mm | 2.0 |
| | L≥40mm | 3.0 |

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 400 | | 450 | | 500 | |
|---|---|---|---|---|---|---|
| **47** | 18 × 25 | 1150 | 18 × 25 | 1200 | 18 × 25 | 1350 |
| **68** | 18 × 25 | 1300 | 18 × 25 | 1500 | 18 × 25 | 1550 |
| **82** | 18 × 31.5 | 1400 | 18 × 25 | 1600 | 18 × 31.5 | 1650 |
| **100** | 18 × 31.5 | 1500 | 18 × 31.5 | 1700 | 18 × 40 | 1750 |
| **120** | 18 × 40 | 1700 | 18 × 40 | 1900 | 18 × 40 | 1950 |
| **150** | 18 × 40 | 1850 | 18 × 40 | 2000 | 18 × 45 | 2050 |
| **180** | 18 × 45 | 2050 | 18 × 45 | 2220 | 18 × 51 | 2150 |
| **220** | | | 18 × 51 | 2460 | | |

Ripple current (mA rms) at 105°C, 100kHz
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

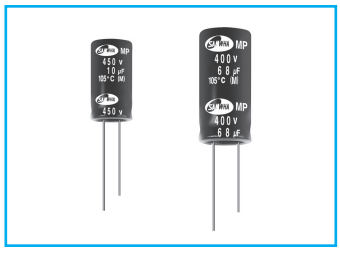
| Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| **Coefficient** | 0.50 | 0.80 | 0.90 | 0.95 | 1.00 |

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## MP For Display, 15000 hours at 105˚C Series

Long Life

MT ⇨ MP
Long life

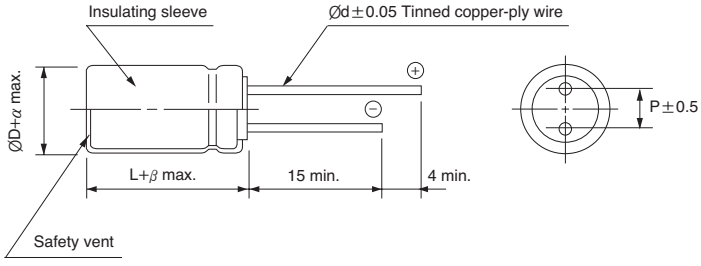


· High reliability withstanding 15000 hours load life at 105˚C
· For power supply and adapter
· Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.04CV+100μA (after 1 minute)<br>I = 0.02CV+25μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>tanδ: 0.20 (160–250) / 0.24 (350–500) |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 3 / 6 / 6 / 6 / 6<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 6 / 6 / 6 / 6 / 6 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 15000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage. (where 12000 hours for Ø10)<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## ● DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 0.5 | | | |
| β | 2.0 | | | |

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| 10 ~ 82 | 1.00 | 1.75 | 2.25 | 2.35 | 2.50 |
| 100 ~ 470 | 1.00 | 1.67 | 2.05 | 2.15 | 2.25 |

# MP series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| 10 | 10 × 12.5 | 110 | 10 × 12.5 | 110 | 10 × 12.5 | 160 | 10 × 16 | 149 |
| 15 | 10 × 12.5 | 150 | 10 × 12.5 | 150 | 10 × 16 | 220 | 10 × 20 | 197 |
| 22 | 10 × 12.5 | 243 | 10 × 16 | 243 | 10 × 20 | 240 | 12.5 × 20 | 297 |
| 27 | 10 × 16 | 264 | 10 × 20 | 280 | 10 × 20 | 270 | 12.5 × 20 | 314 |
| 33 | 10 × 16 | 270 | 10 × 20 | 308 | 12.5 × 20 | 323 | 12.5 × 25 | 325 |
| 39 | 10 × 20 | 320 | 12.5 × 20 | 350 | 12.5 × 20 | 354 | 12.5 × 30 | 352 |
| 47 | 10 × 20 | 369 | 12.5 × 20 | 440 | 12.5 × 25 | 460 | 16 × 20 | 451 |
| 68 | 12.5 × 20 | 480 | 12.5 × 25 | 594 | 12.5 × 30 | 610 | 16 × 31.5 | 623 |
| 82 | 12.5 × 25 | 525 | 16 × 20 | 616 | 16 × 25 | 680 | 18 × 25 | 688 |
| 100 | 12.5 × 25 | 575 | 16 × 25 | 717 | 16 × 31.5 | 717 | 18 × 31.5 | 817 |
| 120 | 12.5 × 30 | 670 | 16 × 25 | 785 | 16 × 31.5 | 804 | 18 × 35.5 | 924 |
| | 16 × 25 | 670 | | | | | | |
| 150 | 16 × 25 | 825 | 16 × 31.5 | 813 | 16 × 35.5 | 902 | 18 × 40 | 1083 |
| 180 | 16 × 25 | 591 | 16 × 35.5 | 951 | 18 × 35.5 | 1012 | 18 × 45 | 1230 |
| 220 | 16 × 31.5 | 968 | 18 × 31.5 | 1100 | 18 × 40 | 1121 | | |
| | 18 × 25 | 968 | | | | | | |
| 270 | 16 × 35.5 | 1100 | 18 × 40 | 1290 | | | | |
| 330 | 16 × 40 | 1231 | 18 × 45 | 1390 | | | | |
| | 18 × 31.5 | 1231 | | | | | | |
| 470 | 18 × 45 | 1626 | | | | | | |

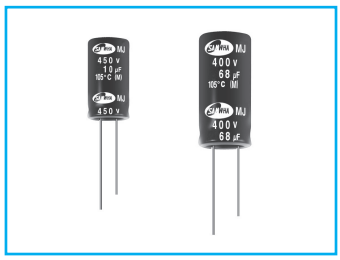
| μF \ WV | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| 10 | 10 × 16 | 145 | 10 × 20 | 135 | 10 × 20 | 135 | 12.5 × 20 | 165 |
| 22 | 12.5 × 20 | 297 | 12.5 × 25 | 250 | 12.5 × 25 | 296 | 16 × 20 | 260 |
| 27 | 12.5 × 25 | 330 | 12.5 × 25 | 265 | 12.5 × 25 | 305 | 16 × 25 | 329 |
| 33 | 12.5 × 30 | 355 | 16 × 20 | 345 | 16 × 20 | 364 | 16 × 31.5 | 380 |
| 39 | 16 × 25 | 400 | 16 × 25 | 400 | 16 × 31.5 | 423 | 16 × 35.5 | 434 |
| 47 | 16 × 25 | 480 | 16 × 25 | 450 | 16 × 31.5 | 478 | 18 × 31.5 | 468 |
| 68 | 16 × 35.5 | 627 | 18 × 31.5 | 580 | 18 × 31.5 | 590 | 18 × 40 | 630 |
| 82 | 16 × 40 | 770 | 18 × 31.5 | 650 | 18 × 31.5 | 670 | 18 × 40 | 670 |
| 100 | 18 × 35.5 | 875 | 18 × 35.5 | 770 | 18 × 40 | 794 | 18 × 45 | 800 |
| 120 | 18 × 40 | 1000 | 18 × 45 | 900 | 18 × 45 | 940 | 18 × 50 | 920 |
| 150 | 18 × 45 | 1150 | | | | | | |

Ripple current (mA rms) at 105°C, 120Hz
Case size ØD×L (mm)

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## MJ For PSU, High Ripple, 20000 hours at 105˚C Series

Long Life



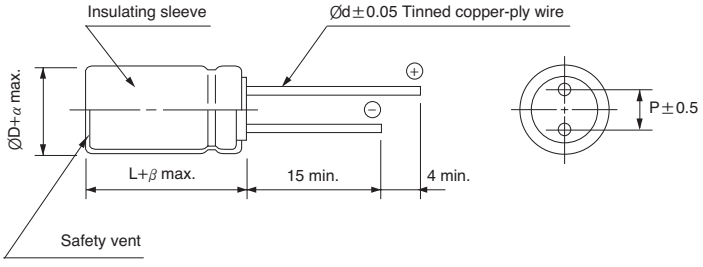
- High reliability withstanding 20000 hours load life at 105˚C
- For power supply and adapter
- Complied to the RoHS directive

MP ⇨ MJ
Long life

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C (160 ~ 450WV), -25 ~ +105˚C (500WV) |
| **Leakage current max.** | I = 0.04CV + 100μA (after 1 minute)<br>I = 0.02CV + 25μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>tanδ: 0.20 (160 ~ 250WV), 0.24 (350 ~ 450WV) |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 160 / 200 / 250 / 350 / 400 / 420 / 450 / 500<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 3 / 6 / 6 / 6 / 6<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 6 / 6 / 6 / 6 / - |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 20000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage. (where 15000 hours for Ø10)<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 | 22 |
|---|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | 1.0 |
| β | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| 3.3 ~ 82 | 1.00 | 1.75 | 2.25 | 2.35 | 2.50 |
| 100 ~ 470 | 1.00 | 1.67 | 2.05 | 2.15 | 2.25 |

# MJ series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 160 | | 200 | | 250 | | 350 | |
|---|---|---|---|---|---|---|---|---|
| 6.8 | | | | | 10 × 12.5 | 119 | 10 × 12.5 | 105 |
| 10 | | | | | 10 × 12.5 | 160 | 10 × 16 | 149 |
| 15 | | | 10 × 12.5 | 150 | 10 × 16 | 220 | 10 × 20 | 197 |
| 22 | 10 × 12.5 | 221 | 10 × 16 | 243 | 10 × 20 | 240 | 12.5 × 20 | 297 |
| | 10 × 16 | 243 | | | | | | |
| 27 | 10 × 16 | 264 | 10 × 20 | 280 | 10 × 20 | 270 | 12.5 × 20 | 314 |
| 33 | 10 × 16 | 270 | 10 × 20 | 308 | 12.5 × 20 | 323 | 12.5 × 25 | 325 |
| 39 | 10 × 20 | 320 | 12.5 × 20 | 350 | 12.5 × 20 | 354 | 12.5 × 25 | 352 |
| 47 | 10 × 20 | 369 | 12.5 × 20 | 440 | 12.5 × 25 | 460 | 12.5 × 30 | 451 |
| 68 | 12.5 × 25 | 480 | 12.5 × 25 | 594 | 12.5 × 30 | 610 | 16 × 31.5 | 623 |
| 82 | 12.5 × 25 | 525 | 12.5 × 30 | 640 | 16 × 25 | 680 | 18 × 25 | 688 |
| | | | 16 × 20 | 616 | | | | |
| 100 | 12.5 × 25 | 575 | 16 × 25 | 717 | 16 × 25 | 717 | 18 × 31.5 | 817 |
| 120 | 12.5 × 30 | 670 | 16 × 25 | 785 | 16 × 31.5 | 804 | 18 × 35.5 | 924 |
| 150 | 16 × 25 | 825 | 16 × 31.5 | 813 | 16 × 35.5 | 902 | 18 × 40 | 1083 |
| 180 | 16 × 25 | 891 | 16 × 35.5 | 951 | 18 × 31.5 | 1012 | 18 × 45 | 1230 |
| 220 | 16 × 31.5 | 968 | 18 × 31.5 | 1100 | 18 × 35.5 | 1121 | | |
| | 18 × 25 | 968 | | | | | | |
| 270 | 16 × 35.5 | 1100 | 18 × 40 | 1290 | | | | |
| 330 | 18 × 31.5 | 1231 | 18 × 45 | 1390 | | | | |
| 470 | 18 × 45 | 1626 | | | | | | |

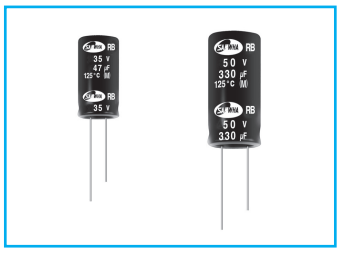
| μF \ WV | 400 | | 420 | | 450 | | 500 | |
|---|---|---|---|---|---|---|---|---|
| 3.3 | | | | | | | 10 × 12.5 | 63 |
| 4.7 | | | | | 10 × 12.5 | 76 | 10 × 16 | 83 |
| 6.8 | 10 × 16 | 85 | | | 10 × 16 | 110 | 10 × 20 | 119 |
| 8.2 | 10 × 16 | 140 | 10 × 16 | 113 | 10 × 20 | 122 | 10 × 20 | 141 |
| 10 | 10 × 16 | 145 | 10 × 20 | 135 | 10 × 20 | 135 | 12.5 × 20 | 165 |
| 22 | 12.5 × 20 | 297 | 12.5 × 25 | 250 | 12.5 × 20 | 296 | 16 × 25 | 260 |
| | | | | | 12.5 × 25 | 296 | | |
| 27 | 12.5 × 25 | 330 | 12.5 × 25 | 265 | 12.5 × 30 | 305 | 16 × 25 | 329 |
| 33 | 12.5 × 30 | 355 | 12.5 × 30 | 340 | 16 × 25 | 364 | 16 × 31.5 | 380 |
| | | | 16 × 20 | 345 | | | | |
| 39 | 16 × 25 | 400 | 16 × 25 | 400 | 16 × 31.5 | 423 | 16 × 35.5 | 434 |
| 47 | 16 × 25 | 480 | 16 × 25 | 450 | 16 × 31.5 | 478 | 18 × 31.5 | 468 |
| 68 | 16 × 35.5 | 627 | 18 × 31.5 | 580 | 18 × 31.5 | 590 | 18 × 40 | 630 |
| 82 | 16 × 40 | 770 | 16 × 40 | 620 | 18 × 35.5 | 670 | 18 × 45 | 685 |
| 100 | 18 × 35.5 | 875 | 18 × 35.5 | 770 | 18 × 40 | 794 | 18 × 51 | 800 |
| | | | | | | | 22 × 41 | 800 |
| 120 | 18 × 40 | 1003 | 18 × 45 | 900 | 18 × 51 | 940 | 22 × 51 | 960 |
| 150 | 18 × 51 | 1192 | | | | | | |

Ripple current (mA rms) at 105°C, 120Hz
Case size ØD×L (mm)

# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## RB High Temperature, For 125˚C Use Series

Solvent Proof
WV≦100V



· Load life of 2000 hours at 125˚C
· For Electronic Control unit and other high temperature applications
· Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV≦50: -55 ~ +125˚C, WV≧63: -40 ~ +125˚C |
| **Leakage current max.** | WV≦50: I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>WV≧63: 0.03CV +10μA (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 ~ 100 | 160 ~ 250 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.19 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.15 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 ~10 | 16 ~ 250 |
|---|---|---|
| Z-25˚C/Z+20˚C | 3 | 2 |
| Z-40˚C/Z+20˚C | 5 | 4 |

**Load life (after application of the rated voltage for 2000 hours at 125˚C)**

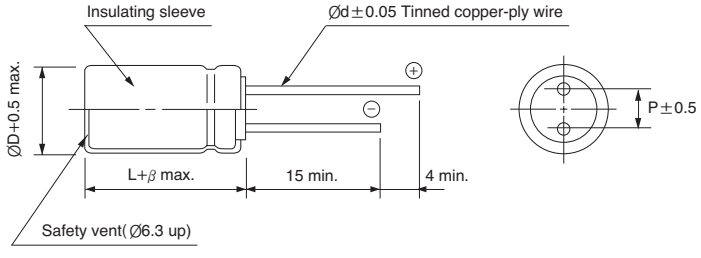
| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 300% of specified value |

Ø5, 6.3 and WV≧100 products are for 1000 hours

| | |
|---|---|
| **Shelf life (at 125˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | | | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV | Frequency / μF | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|---|
| 6.3~100 | ~ 47 | 0.38 | 0.50 | 0.78 | 1.00 | 1.00 | 1.00 |
| | 68 ~ 680 | 0.46 | 0.57 | 0.77 | 0.86 | 0.93 | 1.00 |
| | 1000 ~ | 0.57 | 0.67 | 0.77 | 0.77 | 0.88 | 1.00 |
| 160~250 | 1 ~ 33 | 0.44 | 0.56 | 0.78 | 0.89 | 0.94 | 1.00 |

# RB series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 6.3 | | 10 | | 16 | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz |
| 47 | | | | | 5×11 | 165 |
| 68 | | | 5×11 | 165 | 6.3×11 | 230 |
| 100 | 5×11 | 160 | 6.3×11 | 220 | 6.3×11 | 280 |
| 150 | 6.3×11 | 240 | 6.3×11 | 280 | 8×11.5 | 410 |
| 220 | 6.3×11 | 300 | 8×11.5 | 410 | 8×11.5 | 485 |
| 330 | 8×11.5 | 310 | 8×11.5 | 485 | 10×12.5 | 660 |
| 470 | 10×12.5 | 605 | 10×12.5 | 635 | 10×16 | 815 |
| 680 | 10×16 | 740 | 10×16 | 815 | 10×20 | 1075 |
| 1000 | 10×20 | 1005 | 10×20 | 1120 | 12.5×20 | 1490 |
| 1500 | 12.5×20 | 1290 | 12.5×20 | 1495 | 12.5×25 | 1755 |
| 2200 | 12.5×20 | 1520 | 12.5×25 | 1805 | 16×20 | 1900 |
| 3300 | 12.5×25 | 1805 | 16×20 | 1955 | 16×25 | 2210 |
| 4700 | 16×25 | 2045 | 16×31.5 | 2555 | 16×35.5 | 2830 |
| 6800 | 16×31.5 | 2505 | 16×35.5 | 2830 | 18×35.5 | 3060 |
| 10000 | 16×40 | 2905 | 18×40 | 3210 | | |
| 15000 | 18×40 | 3125 | | | | |

| WV / Item / μF | 25 | | 35 | | 50 | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz |
| 1.0 | | | | | 5×11 | 40 |
| 1.5 | | | | | 5×11 | 50 |
| 2.2 | | | | | 5×11 | 55 |
| 3.3 | | | | | 5×11 | 70 |
| 4.7 | | | | | 5×11 | 85 |
| 6.8 | | | | | 5×11 | 95 |
| 10 | | | | | 5×11 | 120 |
| 15 | | | | | 5×11 | 155 |
| 22 | | | 5×11 | 170 | 6.3×11 | 205 |
| 33 | 5×11 | 165 | 6.3×11 | 240 | 6.3×11 | 255 |
| 47 | 6.3×11 | 220 | 6.3×11 | 285 | 8×11.5 | 365 |
| 68 | 6.3×11 | 275 | 8×11.5 | 405 | 8×11.5 | 435 |
| 100 | 8×11.5 | 405 | 8×11.5 | 485 | 10×16 | 615 |
| 150 | 8×11.5 | 485 | 10×12.5 | 660 | 10×20 | 865 |
| 220 | 10×12.5 | 635 | 10×16 | 815 | 12.5×20 | 1100 |
| 330 | 10×16 | 790 | 10×20 | 1120 | 12.5×20 | 1330 |
| 470 | 10×20 | 1075 | 12.5×20 | 1480 | 12.5×25 | 1585 |
| 680 | 12.5×20 | 1470 | 12.5×25 | 1755 | 16×20 | 1720 |
| 1000 | 12.5×25 | 1755 | 16×20 | 1870 | 16×31.5 | 2240 |
| 1500 | 16×20 | 1870 | 16×31.5 | 2520 | 16×40 | 2545 |
| 2200 | 16×25 | 2165 | 16×35.5 | 2830 | 18×40 | 2705 |
| 3300 | 16×35.5 | 2830 | 18×40 | 3210 | | |
| 4700 | 18×40 | 3125 | | | | |

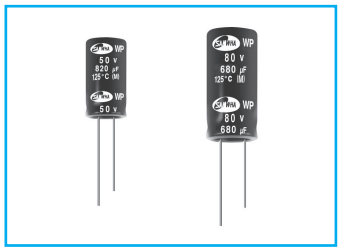
# RB series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 63 | | 100 | | 160 | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz |
| 1.0 | | | 8×11.5 | 25 | 10×12.5 | 20 |
| 2.2 | | | 8×11.5 | 45 | 10×16 | 32 |
| 3.3 | | | 10×16 | 60 | 10×16 | 42 |
| 4.7 | | | 10×16 | 70 | 10×20 | 50 |
| 10 | 8×11.5 | 80 | 10×20 | 110 | 12.5×20 | 85 |
| 22 | 10×16 | 150 | 12.5×25 | 205 | 16×25 | 155 |
| 33 | 10×20 | 200 | 16×25 | 280 | 16×31.5 | 210 |
| 47 | 12.5×20 | 280 | 16×31.5 | 370 | | |
| 100 | 12.5×25 | 445 | | | | |

| WV / Item / μF | 200 | | 250 | |
|---|---|---|---|---|
| | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 125°C 100kHz |
| 1.0 | 10×12.5 | 20 | 10×12.5 | 18 |
| 2.2 | 10×16 | 32 | 10×16 | 32 |
| 3.3 | 10×20 | 42 | 10×20 | 42 |
| 4.7 | 10×20 | 50 | 12.5×20 | 60 |
| 10 | 12.5×20 | 95 | 16×25 | 105 |
| 22 | 16×31.5 | 170 | | |

# WP 125˚C, Low ESR, Long Life Series



- Downsize and long life
- Low ESR at -40˚C
- Endurance with ripple current : 5000 hours at 125˚C
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +125˚C |
| **Leakage current max.** | I = 0.01CV or 3$\mu$A whichever is greater (after 2 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000$\mu$F : tan$\delta$ increases by 0.02 for each 1000$\mu$F from below value. |

| WV | 35 | 50 | 80 | 100 |
|---|---|---|---|---|
| tan$\delta$ | 0.12 | 0.10 | 0.10 | 0.10 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 35 | 50 | 80 | 100 |
|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 2 | 2 | 2 | 2 |
| Z-40˚C/Z+20˚C | 4 | 4 | 4 | 4 |

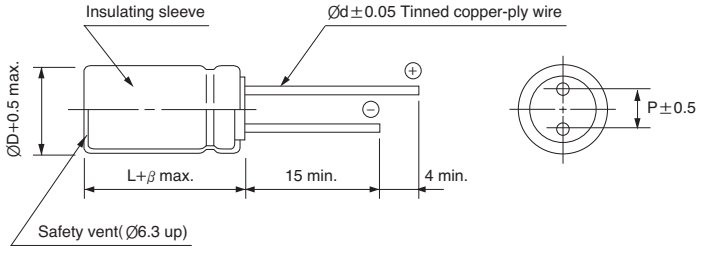
**Load life (after application of the rated voltage for 5000 hours at 125˚C)**

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±30% of initial value |
| tan$\delta$ | Less than 300% of specified value |

| **Shelf life (at 125˚C)** | After 1000 hours no load test, leakage current, capacitance and tan$\delta$ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |
|---|---|

## DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| $\mu$F \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| 270 ~ 560 | 0.50 | 0.85 | 0.95 | 0.99 | 1.00 |
| 680 ~ 1800 | 0.60 | 0.90 | 0.95 | 0.99 | 1.00 |
| 2200 ~ 3300 | 0.75 | 0.90 | 0.95 | 0.99 | 1.00 |
| 4700 ~ | 0.85 | 0.95 | 0.98 | 0.99 | 1.00 |

# WP series

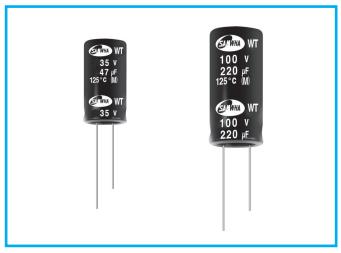
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 35 | | | 50 | | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz |
| 470 | | | | 12.5 × 20 | 0.065 | 1500 |
| 560 | 10 × 20 | 0.070 | 1700 | 12.5 × 25 | 0.060 | 1700 |
| 680 | 12.5 × 20 | 0.044 | 1820 | 12.5 × 25 | 0.048 | 1900 |
| | | | | 16 × 20 | 0.043 | 2040 |
| 820 | 12.5 × 25 | 0.042 | 2100 | 12.5 × 25 | 0.043 | 2150 |
| | | | | 12.5 × 30 | 0.041 | 2150 |
| 1000 | 12.5 × 25 | 0.033 | 2400 | 16 × 25 | 0.031 | 2620 |
| | | | | 18 × 20 | 0.039 | 2240 |
| 1200 | 12.5 × 30 | 0.029 | 2560 | 16 × 31.5 | 0.027 | 2940 |
| | 16 × 20 | 0.034 | 2280 | 18 × 25 | 0.029 | 2750 |
| 1500 | 18 × 20 | 0.032 | 2490 | 16 × 35.5 | 0.023 | 3300 |
| 1800 | 16 × 25 | 0.026 | 3100 | 18 × 31.5 | 0.026 | 3140 |
| 2200 | 16 × 31.5 | 0.023 | 3160 | 16 × 40 | 0.020 | 3720 |
| | 18 × 25 | 0.024 | 3200 | 18 × 35.5 | 0.022 | 3510 |
| 2700 | 16 × 35.5 | 0.020 | 3590 | 18 × 40 | 0.018 | 3940 |
| | 18 × 31.5 | 0.022 | 3390 | | | |
| 3300 | 16 × 40 | 0.017 | 4300 | | | |
| | 18 × 35.5 | 0.019 | 4200 | | | |
| 4700 | 18 × 40 | 0.016 | 4600 | | | |

| WV / Item / μF | 80 | | | 100 | | |
|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz |
| 270 | | | | 18 × 20 | 0.091 | 1690 |
| 300 | | | | 16 × 25 | 0.079 | 1990 |
| 330 | 12.5 × 30 | 0.085 | 1790 | 16 × 31.5 | 0.065 | 2200 |
| | 16 × 20 | 0.085 | 1790 | | | |
| 470 | 16 × 25 | 0.061 | 2140 | 16 × 35.5 | 0.056 | 2500 |
| | 12.5 × 30 | 0.10 | 2140 | | | |
| | 18 × 20 | 0.07 | 1910 | | | |
| 560 | 16 × 31.5 | 0.053 | 2330 | 16 × 40 | 0.046 | 2700 |
| | 18 × 25 | 0.049 | 2280 | | | |
| 680 | 16 × 25 | 0.045 | 2300 | 18 × 40 | 0.039 | 2880 |
| | 16 × 35.5 | 0.044 | 2580 | | | |
| 820 | 16 × 40 | 0.036 | 2900 | | | |
| | 18 × 35.5 | 0.035 | 2890 | | | |
| 1200 | 18 × 40 | 0.030 | 3210 | | | |

# WT High Temperature, For 125°C Use Long Life Series

Low Impedance  Solvent Proof



- Load life of 5000 hours at 125°C
- Low impedance at high frequency
- For electronic control unit and other high temperature applications
- Complied to the RoHS directive

RB ⇨ WT
Long life
Low Imp.

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +125°C |
| **Leakage Current max.** | I = 0.03CV or 3μA whichever is greater (after 2 minutes) |
| **Capacitance Tolerance** | ±20% at 120Hz, 20°C |
| **Dissipation Factor max. (at 120Hz, 20°C )** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.22 | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.10 | 0.08 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 100 |
|---|---|---|---|---|---|---|---|---|
| Z-25°C/Z+20°C | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| Z-40°C/Z+20°C | 6 | 6 | 4 | 3 | 3 | 3 | 3 | 3 |

**Load life (after application of the rated voltage for 5000 hours at 125°C)**

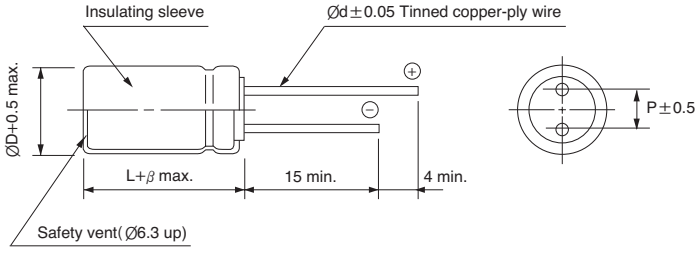
| | |
|---|---|
| Capacitance change | Within ±30% of initial value |
| tanδ | Less than 300% of the specified value |
| Leakage current | Less than specified value |

| ØD | ØD = 5, 6.3 | ØD = 8 | ØD ≧ 10 |
|---|---|---|---|
| Life time | 2000 hours | 3000 hours | 5000 hours |

| | |
|---|---|
| **Shelf life (at 125°C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 |
|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 |
| β | 1.5 | | | 2.0 | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 33 | 0.20 | 0.50 | 0.80 | 0.90 | 1.00 |
| 47 ~ 100 | 0.25 | 0.60 | 0.90 | 0.95 | 1.00 |
| 150 ~ 220 | 0.35 | 0.70 | 0.92 | 0.96 | 1.00 |
| 330 ~ 680 | 0.45 | 0.75 | 0.95 | 0.97 | 1.00 |
| 1000 ~ 1500 | 0.50 | 0.80 | 0.96 | 0.98 | 1.00 |
| 2200 ~ | 0.55 | 0.85 | 0.98 | 0.99 | 1.00 |

# WT series

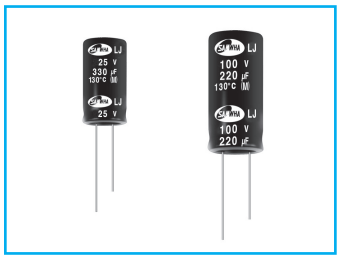
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz |
| 47 | | | | | | | | | | 5×11 | 0.80 | 250 |
| 68 | | | | 5×11 | 0.80 | 250 | 5×11 | 0.80 | 250 | 6.3×11 | 0.34 | 405 |
| 100 | 5×11 | 0.80 | 250 | 6.3×11 | 0.34 | 405 | 6.3×11 | 0.34 | 405 | 6.3×11 | 0.34 | 405 |
| 150 | 6.3×11 | 0.34 | 405 | 6.3×11 | 0.34 | 405 | 6.3×11 | 0.34 | 405 | 8×11.5 | 0.28 | 760 |
| 220 | 6.3×11 | 0.34 | 405 | 8×11.5 | 0.30 | 760 | 8×11.5 | 0.28 | 760 | 10×12.5 | 0.14 | 1030 |
| 330 | 8×11.5 | 0.28 | 760 | 8×11.5 | 0.28 | 760 | 10×12.5 | 0.14 | 1030 | 10×16 | 0.10 | 1430 |
| 470 | 10×12.5 | 0.14 | 1030 | 10×12.5 | 0.14 | 1030 | 10×16 | 0.10 | 1430 | 10×20 | 0.08 | 1500 |
| 680 | 10×16 | 0.10 | 1430 | 10×16 | 0.10 | 1430 | 10×20 | 0.06 | 1500 | 12.5×20 | 0.06 | 1720 |
| 1000 | 10×20 | 0.06 | 1500 | 10×20 | 0.06 | 1500 | 12.5×20 | 0.06 | 1720 | 12.5×25 | 0.05 | 1900 |
| 1500 | 12.5×20 | 0.06 | 1620 | 12.5×20 | 0.06 | 1720 | 12.5×25 | 0.05 | 1900 | | | |
| 2200 | 12.5×20 | 0.06 | 1720 | 12.5×25 | 0.05 | 1900 | | | | | | |
| 3300 | 12.5×25 | 0.05 | 1900 | | | | | | | | | |

| WV / Item / μF | 35 | | | 50 | | | 63 | | | 100 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz | ØD×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 125°C 100kHz |
| 10 | | | | | | | | | | | | |
| 22 | 5×11 | 0.80 | 250 | | | | | | | 10×12.5 | 0.80 | 480 |
| 33 | 6.3×11 | 0.36 | 405 | 8×11.5 | 0.70 | 300 | 8×11.5 | 1.50 | 150 | 10×12.5 | 0.80 | 480 |
| 47 | 6.3×11 | 0.36 | 405 | 8×11.5 | 0.70 | 440 | 10×12.5 | 0.59 | 530 | 10×16 | 0.65 | 630 |
| 68 | 8×11.5 | 0.36 | 760 | | | | | | | | | |
| 100 | 8×11.5 | 0.36 | 760 | 10×12.5 | 0.40 | 555 | 10×16 | 0.41 | 690 | 12.5×20 | 0.25 | 990 |
| 150 | 10×12.5 | 0.14 | 1030 | | | | | | | | | |
| 220 | 10×16 | 0.10 | 1430 | 10×20 | 0.15 | 930 | 12.5×20 | 0.16 | 1050 | 16×25 | 0.11 | 1500 |
| 330 | 12.5×20 | 0.06 | 1620 | 12.5×20 | 0.13 | 1330 | 12.5×25 | 0.12 | 1290 | 16×31.5 | 0.08 | 1790 |
| 470 | 12.5×20 | 0.06 | 1720 | 12.5×25 | 0.10 | 1650 | | | | | | |
| 680 | 12.5×25 | 0.05 | 1900 | 16×31.5 | 0.05 | 2430 | | | | | | |

# LJ 130˚C, Long Life, Low Impedance Series

Low Impedance | Miniaturized | Solvent Proof WV≦100V



- For LED Lighting, LED Display
- High reliability withstanding 4000 hours load life at 130˚C
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +130˚C(10 ~ 100WV), -25 ~ +130˚C(200, 400WV) |
| **Leakage current max.** | WV ≦ 100: I = 0.01CV or 3μA whichever is greater (after 2 min.) I = 0.03CV or 4μA whichever is greater (after 1 min.)<br>WV > 100: I = 0.02CV + 15μA (after 5 min.) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 200 | 400 |
|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.19 | 0.16 | 0.14 | 0.12 | 0.1 | 0.09 | 0.08 | 0.15 | 0.2 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 10 | 16 | 25 | 35 | 50 | 63 | 100 | 200 | 400 |
|---|---|---|---|---|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 6 |
| Z-40˚C/Z+20˚C | 6 | 4 | 3 | 3 | 3 | 3 | 3 | - | - |

**Load life (after application of the rated voltage for 4000 hours at 130˚C)**

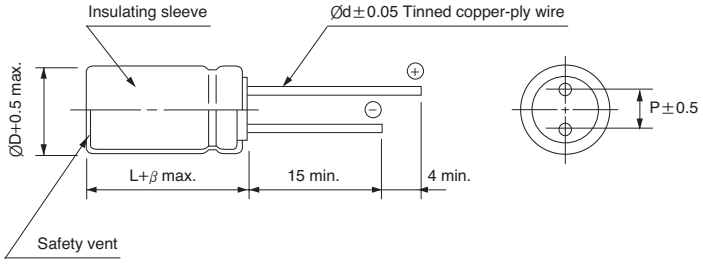
| | 10 ~ 100WV | 200, 400WV |
|---|---|---|
| Rated voltage (Vdc) | | |
| Capacitance change | Within ±30% of initial value | Within ±20% of initial value |
| tanδ | Within ±300% of initial value | Within ±200% of initial value |
| Leakage current | Less than specified value | |

| ØD | Life time(hrs) | |
|---|---|---|
| | ~100V | 200, 400V |
| ØD = 6.3 | 1,000 | - |
| ØD = 8,10 | 2,000 | 3,000 |
| ØD ≧ 12.5 | 4,000 | - |

**Shelf life (at 130˚C)**: After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 8 | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|---|
| P | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 1.5 | 2.0 | | | |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| WV | Frequency / μF | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|
| 10~100 | ~ 4.7 | 0.42 | 0.60 | 0.80 | 0.90 | 1.00 |
| | 10 ~ 33 | 0.55 | 0.75 | 0.90 | 0.95 | 1.00 |
| | 47 ~ 330 | 0.70 | 0.85 | 0.95 | 0.98 | 1.00 |
| | 470 ~ 1500 | 0.75 | 0.90 | 0.98 | 1.00 | 1.00 |
| | 2200 ~ | 0.80 | 0.95 | 1.00 | 1.00 | 1.00 |
| 200, 400 | ~ 5.6 | 0.20 | 0.40 | 0.80 | 0.90 | 1.00 |
| | 6.8 ~ 15 | 0.30 | 0.60 | 0.90 | 0.95 | 1.00 |
| | 22 ~ | 0.50 | 0.80 | 0.90 | 0.95 | 1.00 |

# LJ series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

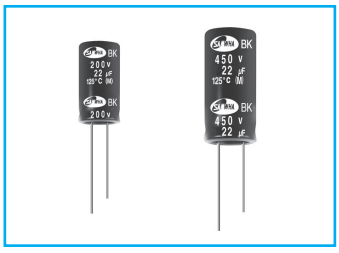
| WV / Item / μF | 10 | | | 16 | | | 25 | | | 35 | | | 50 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz |
| 4.7 | | | | | | | | | | | | | 8×11.5 | 1.000 | 100 |
| 10 | | | | | | | | | | | | | 8×11.5 | 0.800 | 200 |
| 22 | | | | | | | | | | | | | 8×11.5 | 0.800 | 260 |
| 33 | | | | | | | | | | | | | 8×11.5 | 0.600 | 300 |
| 47 | | | | | | | | | | | | | 8×11.5 | 0.600 | 300 |
| 100 | | | | | | | | | | 8×11.5 | 0.220 | 360 | 10×12.5 | 0.180 | 520 |
| 220 | | | | | | | 8×11.5 | 0.220 | 360 | 10×12.5 | 0.150 | 620 | 10×20 | 0.082 | 890 |
| 330 | 8×11.5 | 0.220 | 360 | 8×11.5 | 0.220 | 360 | 10×12.5 | 0.150 | 620 | 10×16 | 0.100 | 800 | 12.5×20 | 0.065 | 1000 |
| 470 | 10×12.5 | 0.150 | 620 | 10×12.5 | 0.150 | 620 | 10×16 | 0.100 | 800 | 10×20 | 0.073 | 960 | 12.5×25 | 0.051 | 1200 |
| 1000 | 10×20 | 0.070 | 960 | 10×20 | 0.070 | 960 | 12.5×20 | 0.060 | 1100 | 12.5×25 | 0.040 | 1430 | 16×31.5 | 0.037 | 2180 |
| 2200 | 12.5×25 | 0.040 | 1430 | 12.5×25 | 0.040 | 1430 | 16×31.5 | 0.034 | 2300 | 16×35.5 | 0.031 | 2550 | 18×40 | 0.029 | 2800 |
| 3300 | 16×25 | 0.038 | 1900 | 16×31.5 | 0.034 | 2300 | 16×35.5 | 0.031 | 2550 | 18×35.5 | 0.028 | 2800 | | | |
| 4700 | 16×31.5 | 0.034 | 2300 | 16×35.5 | 0.031 | 2550 | | | | | | | | | |

| WV / Item / μF | 63 | | | 100 | | | 200 | | 400 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | IMP. (Ω)max. 20°C 100kHz | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 130°C 100kHz | ØD×L (mm) | Ripple current (mA rms) 130°C 100kHz |
| 1.0 | | | | | | | | | 8×11.5 | 65 |
| 1.5 | | | | | | | | | 8×11.5 | 75 |
| | | | | | | | | | 8×15 | 80 |
| 1.8 | | | | | | | | | 8×11.5 | 75 |
| | | | | | | | | | 8×15 | 85 |
| 2.2 | | | | | | | | | 8×11.5 | 75 |
| | | | | | | | | | 8×15 | 90 |
| | | | | | | | | | 8×20 | 110 |
| 2.7 | | | | | | | | | 8×15 | 95 |
| | | | | | | | | | 8×20 | 115 |
| 3.3 | | | | | | | | | 8×20 | 120 |
| 4.7 | | | | 8×11.5 | 1.300 | 100 | 8×11.5 | 120 | 8×20 | 120 |
| | | | | | | | | | 10×16 | 125 |
| 5.6 | | | | | | | 8×11.5 | 130 | 10×16 | 130 |
| | | | | | | | 8×15 | 180 | 10×20 | 145 |
| 6.8 | | | | | | | 8×11.5 | 130 | 10×20 | 150 |
| | | | | | | | 8×15 | 180 | | |
| 10 | | | | 8×11.5 | 1.000 | 200 | 8×15 | 200 | | |
| | | | | | | | 8×20 | 240 | | |
| 15 | | | | | | | 8×15 | 200 | | |
| | | | | | | | 8×20 | 240 | | |
| 22 | | | | 8×11.5 | 1.000 | 220 | 8×20 | 240 | | |
| | | | | | | | 10×16 | 240 | | |
| 33 | 8×11.5 | 0.500 | 250 | 10×12.5 | 0.670 | 260 | 10×20 | 320 | | |
| 47 | 10×12.5 | 0.370 | 400 | 10×16 | 0.330 | 330 | | | | |
| 100 | 10×16 | 0.300 | 450 | 12.5×20 | 0.170 | 670 | | | | |
| 220 | 12.5×20 | 0.120 | 820 | 16×25 | 0.130 | 1100 | | | | |
| 330 | 12.5×25 | 0.102 | 1000 | 16×31.5 | 0.100 | 1300 | | | | |
| 470 | 16×25 | 0.089 | 1500 | 18×31.5 | 0.092 | 1600 | | | | |
| 1000 | 16×31.5 | 0.076 | 1850 | | | | | | | |
| 1500 | 18×40 | 0.063 | 2350 | | | | | | | |

# BK For PSU, High Temperature Series

· High reliability withstanding 5000 hours load life at 125˚C
· Suitable for compact energy saving lamp
· Complied to the RoHS directive

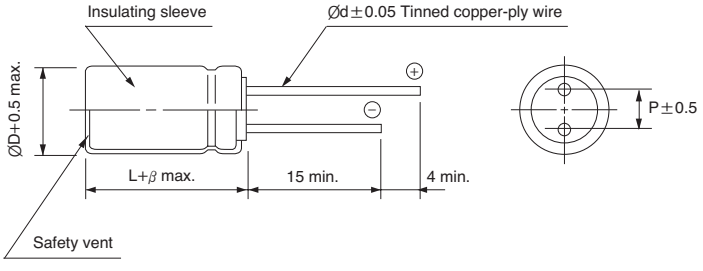
RH ⇨ BK
High Temp.



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +125˚C |
| **Leakage current max.** | I = 0.03CV+15㎂A (CV≦1000),<br>I = 0.02CV+25㎂A (CV〉1000) (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 160 / 200 / 250 / 350 / 400 / 450<br>tanδ: 0.15 / 0.15 / 0.15 / 0.20 / 0.24 / 0.24 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 160 / 200 / 250 / 350 / 400 / 450<br>Z-25˚C/Z+20˚C: 3 / 3 / 3 / 3 / 6 / 6<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 6 / 6 / 6 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 125˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 125˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## ● DRAWING

Unit : mm




| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 2.0 | | | |

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| Frequency | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|
| Coefficient | 0.30 | 0.40 | 0.70 | 0.90 | 0.95 | 1.00 |

# BK series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| μF \ WV | 160 | | 200 | | 250 | |
|---|---|---|---|---|---|---|
| 3.3 | | | | | 10 × 12.5 | 135 |
| 4.7 | 10 × 12.5 | 135 | 10 × 12.5 | 150 | 10 × 12.5 | 150 |
| | | | | | 10 × 16 | 180 |
| 10 | 10 × 12.5 | 165 | 10 × 12.5 | 195 | 10 × 16 | 210 |
| | 10 × 16 | 210 | 10 × 16 | 240 | 10 × 20 | 255 |
| 22 | 10 × 20 | 420 | 10 × 20 | 420 | 12.5 × 20 | 450 |
| | | | | | 10 × 20 | 580 |
| 33 | 12.5 × 20 | 600 | 12.5 × 20 | 600 | 12.5 × 25 | 675 |
| | | | 10 × 20 | 580 | 12.5 × 20 | 650 |
| 47 | 12.5 × 20 | 780 | 12.5 × 20 | 780 | 12.5 × 25 | 900 |
| 56 | 12.5 × 20 | 900 | 12.5 × 20 | 1220 | 16 × 20 | 1100 |
| 68 | 12.5 × 20 | 1100 | 12.5 × 25 | 1250 | 16 × 25 | 1200 |
| 75 | 12.5 × 25 | 1220 | 12.5 × 25 | 1300 | 18 × 20 | 1400 |
| 82 | 12.5 × 25 | 1300 | 12.5 × 25 | 1400 | 18 × 20 | 1730 |
| | | | | | 16 × 25 | 1730 |
| 100 | 16 × 20 | 1340 | 16 × 20 | 1500 | 16 × 25 | 1850 |
| 120 | 16 × 20 | 1500 | 18 × 20 | 1610 | 18 × 25 | 1910 |
| 150 | 16 × 25 | 1610 | 16 × 25 | 1730 | | |
| 180 | 18 × 25 | 1730 | 18 × 25 | 1850 | | |

Ripple current (mA rms) at 125°C, 100kHz
Case size ØD×L (mm)

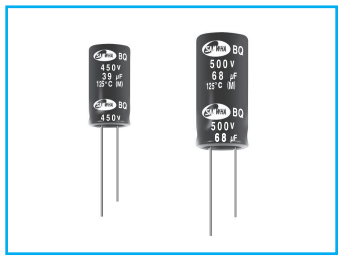
| μF \ WV | 350 | | 400 | | 450 | |
|---|---|---|---|---|---|---|
| 2.2 | 10 × 12.5 | 135 | 10 × 12.5 | 135 | | |
| 3.3 | 10 × 16 | 180 | 10 × 16 | 150 | | |
| 4.7 | 10 × 16 | 195 | 10 × 20 | 255 | | |
| | 10 × 20 | 255 | | | | |
| 10 | 12.5 × 20 | 375 | 12.5 × 20 | 375 | 12.5 × 20 | 232 |
| 18 | 12.5 × 20 | 438 | 12.5 × 20 | 650 | 16 × 20 | 320 |
| 22 | 12.5 × 20 | 500 | 12.5 × 25 | 700 | 16 × 25 | 415 |
| 27 | 12.5 × 25 | 575 | 12.5 × 25 | 775 | 16 × 25 | 450 |
| 33 | 12.5 × 25 | 650 | 16 × 20 | 888 | 16 × 25 | 480 |
| | 16 × 20 | 900 | | | | |
| 39 | 16 × 20 | 950 | 16 × 25 | 1013 | 16 × 31.5 | 514 |
| 47 | 16 × 25 | 1100 | 16 × 25 | 1125 | 16 × 31.5 | 548 |
| | | | 18 × 20 | 1088 | 18 × 25 | 548 |
| 56 | 16 × 25 | 1400 | 18 × 25 | 1375 | 16 × 35.5 | 650 |
| | 18 × 20 | 1400 | | | 18 × 31.5 | 650 |
| 68 | 18 × 25 | 1500 | 16 × 31.5 | 1413 | 18 × 35.5 | 720 |
| 75 | 18 × 25 | 1730 | 16 × 35.5 | 1520 | 18 × 35.5 | 750 |
| 82 | | | 16 × 35.5 | 1613 | 18 × 40 | 880 |
| | | | 16 × 40 | 1688 | | |
| | | | 18 × 31.5 | 1600 | | |
| 100 | | | 18 × 35.5 | 1665 | | |

# BQ

## For PSU, Long Life, High Temperature Series

- High reliability withstanding 5000 hours load life at 125˚C
- Suitable for compact energy saving lamp
- Complied to the RoHS directive

BK ⇨ **BQ**
Long Life



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +125˚C |
| **Leakage current max.** | I = 0.03CV+15㎂ (CV≦1000),<br>I = 0.02CV+25㎂ (CV〉1000) (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 450 / 500<br>tanδ: 0.24 / 0.25 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 450 / 500<br>Z-25˚C/Z+20˚C: 6 / 6<br>Z-40˚C/Z+20˚C: 6 / 6 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 125˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±20% of initial value<br>tanδ: Less than 200% of specified value |
| **Shelf life (at 125˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## ● DRAWING (See page 163)

Unit : mm

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

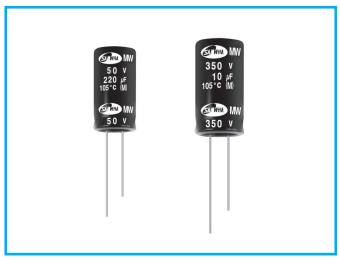
| ㎌ \ WV | 450 | | 500 | |
|---|---|---|---|---|
| **22** | 16 × 20 | 690 | 16 × 20 | 675 |
| **27** | 16 × 20 | 788 | 16 × 25 | 800 |
| | | | 18 × 20 | 788 |
| **33** | 16 × 20 | 860 | 18 × 25 | 900 |
| **39** | 16 × 25 | 1000 | 16 × 31.5 | 1013 |
| | | | 18 × 25 | 1000 |
| **47** | 16 × 31.5 | 1163 | 16 × 35.5 | 1150 |
| | 18 × 25 | 1150 | 18 × 31.5 | 1150 |
| **56** | 16 × 35.5 | 1325 | 16 × 40 | 1313 |
| | | | 18 × 35.5 | 1313 |
| **68** | 16 × 40 | 1513 | 18 × 40 | 1500 |
| | 18 × 31.5 | 1438 | | |
| **82** | 18 × 35.5 | 1650 | 18 × 45 | 1700 |
| **100** | 18 × 40 | 1665 | | |

Ripple current (mA rms) at 105˚C, 100kHz
Case size ØD×L (mm)

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| Frequency | 60Hz | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|---|
| **Coefficient** | 0.30 | 0.40 | 0.70 | 0.90 | 0.95 | 1.00 |

# MW High Ripple Current Series

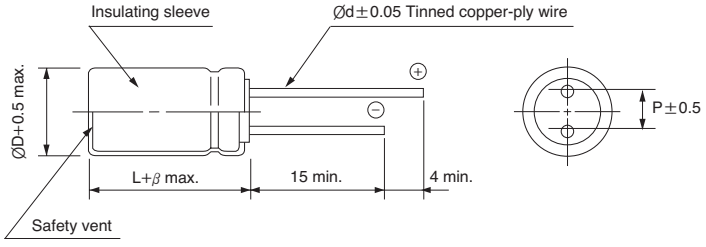


- Load life of 5000 hours at 105˚C
- Voltage range 25 ~ 500V
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | WV: 25 ~ 450 / 500; Temperature range: -40 ~ +105˚C / -25 ~ +105˚C |
| **Leakage current max.** | WV≤100: I = 0.01CV or 3μA whichever is greater (after 2 min.) I = 0.03CV or 4μA whichever is greater (after 1 min.); WV>100: I = 0.02CV+15μA (after 5 min.) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | WV: 25 / 35 / 50 / 160 / 200 / 250 / 350 / 400 / 450 / 500; tanδ: 0.14 / 0.12 / 0.10 / 0.15 / 0.15 / 0.15 / 0.20 / 0.24 / 0.24 / 0.24 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 25 / 35 / 50 / 160 / 200 / 250 / 350 / 400 / 450 / 500; Z-25˚C/Z+20˚C: 2 / 2 / 2 / 3 / 3 / 4 / 4 / 6 / 6 / 6; Z-40˚C/Z+20˚C: 3 / 3 / 3 / 4 / 4 / 4 / 8 / 10 / 10 / - |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage. Rated voltage (Vdc): 25 ~ 50 / 160 ~ 500; Capacitance change: Within ±25% of initial value / Within ±20% of initial value; tanδ: Less than 200% of specified value; Leakage current: Less than specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 10 |
|---|---|
| P | 5.0 |
| Ød | 0.6 |
| β | 1.0 |

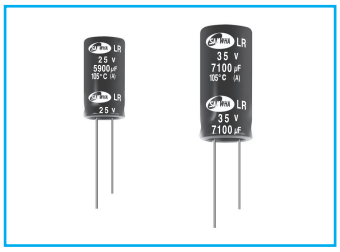
| Vdc | Cap.(μF) | ØD×L (mm) | Rated ripple current (mA rms / 105˚C) | | |
|---|---|---|---|---|---|
| | | | 120Hz | 50kHz | 100kHz |
| 25 | 470 | 10×12.5 | 680 | 1987 | 2092 |
| 35 | 330 | | 680 | 1862 | 1960 |
| 50 | 220 | | 495 | 1568 | 1650 |
| 160 | 27 | | 240 | 608 | 640 |
| 200 | 22 | | 220 | 565 | 595 |
| 250 | 6.8 | | 123 | 323 | 340 |
| 250 | 15 | | 174 | 485 | 510 |
| 350 | 10 | | 145 | 394 | 415 |
| 400 | 8.2 | | 132 | 342 | 360 |
| 450 | 3.3 | | 92 | 292 | 307 |
| 500 | 4.7 | | 88 | 230 | 250 |

# LR

For Airbag application
Series

- High capacitance, low impedance, and good low temperature behavior
- High reliability withstanding 5000 hours load life at 105˚C
- Complied to the RoHS directive

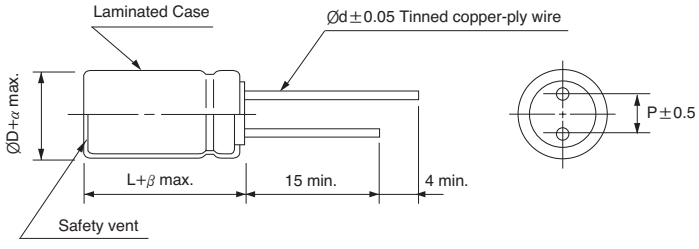
MK ⇨ **LR**
High Capacitance



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -55 ~ +105˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes)<br>I = 0.03CV or 4μA whichever is greater (after 1 minutes) |
| **Capacitance tolerance** | 0 to + 30% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.<br>WV: 25 / 35<br>tanδ: 0.20 / 0.14 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 25 / 35<br>Z-55˚C/Z+20˚C: 3 / 3 |
| **Load life** | After an application of DC bias voltage plus the rated AC ripple current for 5000 hours at 105˚C. The measurement shall meet the following limits. The DC voltage plus the peak AC voltage combined must not exceed the rated voltage.<br>Leakage current: Less than specified value<br>Capacitance change: Within ±30% of initial value<br>tanδ: Less than 300% of specified value |
| **Shelf life (at 105˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

## DRAWING

Unit : mm




| ØD | 16 | 18 |
|---|---|---|
| P | 7.5 | 7.5 |
| Ød | 0.8 | 0.8 |
| β | 2.0 | |

## DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

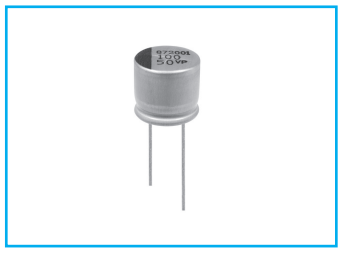
| μF \ WV | 25 | | | μF | 35 | | |
|---|---|---|---|---|---|---|---|
| **4200** | 16 × 20 | 0.033 | 2250 | **2500** | 16 × 20 | 0.033 | 2250 |
| **5300** | 18 × 20 | 0.029 | 2500 | **3100** | 18 × 20 | 0.029 | 2500 |
| **5900** | 16 × 25 | 0.024 | 2600 | **3500** | 16 × 25 | 0.024 | 2600 |
| **7500** | 18 × 25 | 0.022 | 2800 | **4500** | 18 × 25 | 0.022 | 2800 |
| **8000** | 16 × 31.5 | 0.021 | 3200 | **4700** | 16 × 31.5 | 0.021 | 3200 |
| **9500** | 16 × 35.5 | 0.019 | 3500 | **5600** | 16 × 35.5 | 0.019 | 3500 |
| **10000** | 18 × 31.5 | 0.019 | 3500 | **6000** | 18 × 31.5 | 0.019 | 3500 |
| **11000** | 16 × 40 | 0.017 | 3800 | **6600** | 16 × 40 | 0.017 | 3800 |
| **11000** | 18 × 35.5 | 0.017 | 3700 | **7100** | 18 × 35.5 | 0.017 | 3700 |
| **14000** | 18 × 40 | 0.015 | 4000 | **8400** | 18 × 40 | 0.015 | 4000 |

Ripple current (mA rms) at 105˚C, 100kHz
Imp.(Ω) at 20˚C,100kHz
Case size ØD×L (mm)

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| **2500 ~ 3500** | 0.75 | 0.90 | 0.95 | 0.97 | 1.00 |
| **4200 ~ 14000** | 0.85 | 0.95 | 0.98 | 0.99 | 1.00 |

# VP 135˚C, Long Life, Low Impedance Series



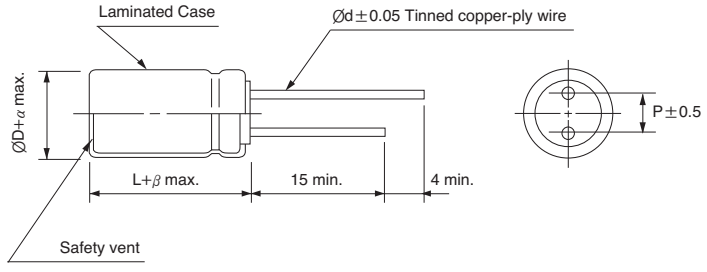
- Applied Laminated case series
- Suited for automobile applications
- Complied to the RoHS directive
- AEC-Q200 compliant. Please contact us for details

RB ⇨ VP
Long Life
High Temp.

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +135˚C |
| **Leakage current max.** | I = 0.01CV or 3μA whichever is greater (after 2 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value.<br>WV: 25 / 35 / 50 / 63 / 80<br>tanδ: 0.14 / 0.12 / 0.10 / 0.10 / 0.08 |
| **Low temperature characteristics (Impedance ratio at 120Hz)** | WV: 25 / 35 / 50 / 63 / 80<br>Z-25˚C/Z+20˚C: 2 / 2 / 2 / 2 / 2<br>Z-40˚C/Z+20˚C: 4 / 4 / 4 / 4 / 4 |
| **Load life (after application of the rated voltage for 3000 hours at 135˚C)** | Leakage current: Less than specified value<br>Capacitance change: Within ±30% of initial value<br>tanδ: Less than 300% of specified value |
| **Shelf life (at 135˚C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |

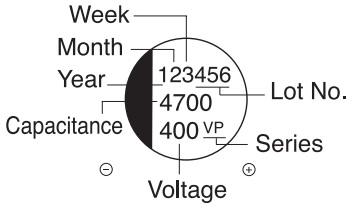
## DRAWING

Unit : mm

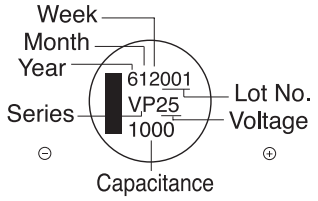



| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 0.5 | | | |
| β | 2.0 | | | |

(Ø10)




(Ø12.5≤)




## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 120Hz | 1kHz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|---|
| ~ 330 | 0.50 | 0.85 | 0.95 | 0.97 | 1.00 |
| 470 ~ 1500 | 0.55 | 0.90 | 0.98 | 0.99 | 1.00 |
| 2200 ~ | 0.60 | 0.95 | 1.00 | 1.00 | 1.00 |

# VP series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| VW (Vdc) | Cap (μF) | Case size ØD×L(mm) | tanδ | ESR(20℃) (Ωmax. / 100kHz) | Rated ripple current | |
|---|---|---|---|---|---|---|
| | | | | | 125℃ | 135℃ |
| 25 | 2000 | 12.5 × 20 | 0.16 | 0.042 | 2760 | 1690 |
| | 3000 | 12.5 × 25 | 0.18 | 0.033 | 3480 | 2010 |
| | 3300 | 16 × 20 | 0.18 | 0.035 | 3040 | 1860 |
| | 3600 | 12.5 × 30 | 0.18 | 0.028 | 4490 | 2900 |
| | 4300 | 18 × 20 | 0.20 | 0.034 | 3250 | 1870 |
| | 4700 | 12.5 × 35 | 0.20 | 0.025 | 5140 | 3190 |
| | 4700 | 16 × 25 | 0.20 | 0.028 | 4260 | 2870 |
| | 5100 | 12.5 × 40 | 0.22 | 0.024 | 5810 | 3470 |
| | 5600 | 16 × 31.5 | 0.22 | 0.023 | 5480 | 3400 |
| | 6200 | 18 × 25 | 0.24 | 0.027 | 4500 | 2900 |
| | 7500 | 16 × 35.5 | 0.26 | 0.020 | 6070 | 3630 |
| | 7500 | 18 × 31.5 | 0.26 | 0.022 | 5600 | 3470 |
| | 9100 | 16 × 40 | 0.30 | 0.019 | 6810 | 3930 |
| | 10000 | 18 × 35.5 | 0.32 | 0.019 | 6280 | 3750 |
| | 12000 | 18 × 40 | 0.36 | 0.018 | 7070 | 4080 |
| 35 | 1300 | 12.5 × 20 | 0.12 | 0.042 | 2760 | 1690 |
| | 1800 | 12.5 × 25 | 0.12 | 0.033 | 3480 | 2010 |
| | 2000 | 16 × 20 | 0.14 | 0.035 | 3040 | 1860 |
| | 2200 | 12.5 × 30 | 0.14 | 0.028 | 4490 | 2900 |
| | 2400 | 18 × 20 | 0.14 | 0.034 | 3250 | 1870 |
| | 2700 | 12.5 × 35 | 0.14 | 0.025 | 5140 | 3190 |
| | 3000 | 16 × 25 | 0.16 | 0.028 | 4260 | 2870 |
| | 3300 | 12.5 × 40 | 0.16 | 0.024 | 5810 | 3470 |
| | 3600 | 16 × 31.5 | 0.16 | 0.023 | 5480 | 3400 |
| | 3900 | 18 × 25 | 0.16 | 0.027 | 4500 | 2900 |
| | 4300 | 16 × 35.5 | 0.18 | 0.020 | 6070 | 3630 |
| | 4700 | 18 × 31.5 | 0.18 | 0.022 | 5600 | 3470 |
| | 5600 | 16 × 40 | 0.20 | 0.019 | 6810 | 3930 |
| | 6200 | 18 × 35.5 | 0.22 | 0.019 | 6280 | 3750 |
| | 7500 | 18 × 40 | 0.24 | 0.018 | 7070 | 4080 |
| 50 | 620 | 12.5 × 20 | 0.10 | 0.073 | 2400 | 1470 |
| | 820 | 12.5 × 25 | 0.10 | 0.058 | 3350 | 2260 |
| | 1000 | 16 × 20 | 0.10 | 0.050 | 2960 | 1870 |
| | 1100 | 12.5 × 30 | 0.10 | 0.048 | 4220 | 2520 |
| | 1300 | 18 × 20 | 0.10 | 0.042 | 4810 | 2780 |
| | 1300 | 12.5 × 35 | 0.10 | 0.042 | 4040 | 2500 |
| | 1300 | 16 × 25 | 0.10 | 0.042 | 3130 | 2110 |
| | 1600 | 12.5 × 40 | 0.10 | 0.037 | 5240 | 3020 |
| | 1600 | 16 × 31.5 | 0.10 | 0.035 | 5130 | 2960 |
| | 1800 | 18 × 25 | 0.10 | 0.033 | 4230 | 2530 |
| | 2200 | 16 × 35.5 | 0.12 | 0.029 | 5480 | 3160 |
| | 2400 | 18 × 31.5 | 0.12 | 0.028 | 5240 | 3020 |
| | 2700 | 16 × 40 | 0.12 | 0.025 | 5930 | 3420 |
| | 3000 | 18 × 35.5 | 0.14 | 0.024 | 5870 | 3390 |
| | 3600 | 18 × 40 | 0.14 | 0.023 | 6420 | 3700 |

# VP series

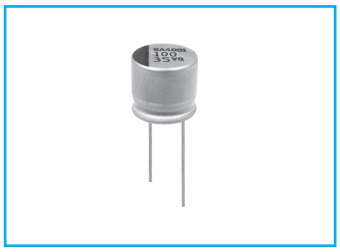
## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| VW (Vdc) | Cap (μF) | Case size ØD×L(mm) | tanδ | ESR(20°C) (Ωmax. / 100kHz) | Rated ripple current | |
|---|---|---|---|---|---|---|
| | | | | | 125°C | 135°C |
| 63 | 390 | 12.5 × 20 | 0.10 | 0.072 | 1640 | 1420 |
| | 560 | 12.5 × 25 | 0.10 | 0.052 | 2520 | 2050 |
| | 680 | 16 × 20 | 0.10 | 0.053 | 2140 | 1910 |
| | 750 | 12.5 × 30 | 0.10 | 0.042 | 3110 | 2630 |
| | 910 | 18 × 20 | 0.10 | 0.035 | 3760 | 2970 |
| | 910 | 12.5 × 35 | 0.10 | 0.044 | 2350 | 2100 |
| | 1000 | 16 × 25 | 0.10 | 0.038 | 2940 | 2680 |
| | 1100 | 12.5 × 40 | 0.10 | 0.031 | 4610 | 3260 |
| | 1200 | 16 × 31.5 | 0.10 | 0.034 | 3860 | 3050 |
| | 1300 | 18 × 25 | 0.10 | 0.033 | 3080 | 2810 |
| | 1600 | 16 × 35.5 | 0.10 | 0.027 | 4590 | 3420 |
| | 1600 | 18 × 31.5 | 0.10 | 0.028 | 4080 | 3220 |
| | 1800 | 16 × 40 | 0.10 | 0.025 | 5190 | 3670 |
| | 2200 | 18 × 35.5 | 0.12 | 0.022 | 5220 | 3690 |
| | 2400 | 18 × 40 | 0.12 | 0.021 | 5660 | 3820 |
| 80 | 270 | 12.5 × 20 | 0.08 | 0.072 | 1640 | 1420 |
| | 390 | 12.5 × 25 | 0.08 | 0.052 | 2520 | 2050 |
| | 470 | 16 × 20 | 0.08 | 0.053 | 2140 | 1910 |
| | 510 | 12.5 × 30 | 0.08 | 0.042 | 3110 | 2630 |
| | 620 | 18 × 20 | 0.08 | 0.035 | 3760 | 2970 |
| | 620 | 12.5 × 35 | 0.08 | 0.044 | 2350 | 2100 |
| | 680 | 16 × 25 | 0.08 | 0.038 | 2940 | 2680 |
| | 750 | 12.5 × 40 | 0.08 | 0.031 | 4610 | 3260 |
| | 750 | 16 × 31.5 | 0.08 | 0.034 | 3860 | 3050 |
| | 820 | 18 × 25 | 0.08 | 0.033 | 3080 | 2810 |
| | 1000 | 16 × 35.5 | 0.08 | 0.027 | 4590 | 3420 |
| | 1100 | 18 × 31.5 | 0.08 | 0.028 | 4080 | 3220 |
| | 1300 | 16 × 40 | 0.08 | 0.025 | 5190 | 3670 |
| | 1300 | 18 × 35.5 | 0.08 | 0.022 | 5220 | 3690 |
| | 1600 | 18 × 40 | 0.08 | 0.021 | 5660 | 3820 |

# VQ 150°C, High Temperature Range Series

- Applied Laminated case series
- Suited for automobile applications
- Complied to the RoHS directive
- AEC-Q200 compliant. Please contact us for details

VP ⇨ VQ
High Temp.



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +150°C |
| **Leakage current max.** | I = 0.03CV or 4μA whichever is greater (after 1 minute) |
| **Capacitance tolerance** | ±20% at 120Hz, 20°C |
| **Dissipation factor max. (at 120Hz, 20°C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|
| tanδ | 0.20 | 0.16 | 0.14 | 0.12 | 0.10 | 0.10 | 0.08 | 0.08 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|
| Z-25°C/Z+20°C | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Z-40°C/Z+20°C | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

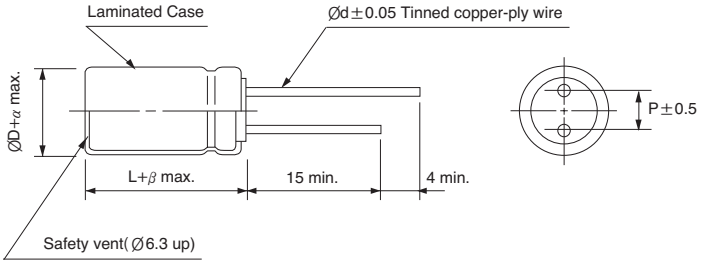
**Load life (after application of the rated voltage for 1000 hours at 150°C)**

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±30% of initial value |
| tanδ | Less than 300% of specified value |

| **Shelf life (at 150°C)** | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20°C by the KS C IEC 60384 - 4 |
|---|---|

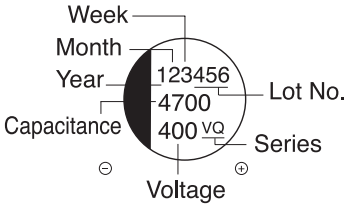
## DRAWING

Unit : mm

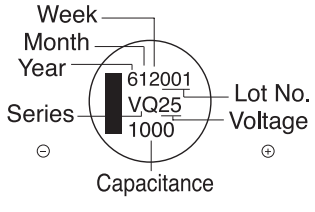



| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| α | 0.5 | | | |
| β | 2.0 | | | |

(Ø10)




(Ø12.5)




## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| CV \ Frequency | 120Hz | 1kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|
| **1000 ≦ CV** | 0.67 | 0.91 | 0.95 | 1.00 |
| **1000 > CV** | 0.50 | 0.83 | 0.91 | 1.00 |

# VQ series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / Item / μF | 10 | | 16 | | 25 | | 35 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz |
| 82 | | | | | | | 10 × 12.5 | 620 |
| 100 | | | | | | | 10 × 16 | 660 |
| 220 | | | | | 10 × 16 | 660 | 12.5 × 20 | 700 |
| 330 | | | 10 × 16 | 660 | 12.5 × 20 | 760 | 12.5 × 25 | 840 |
| 470 | 10 × 12.5 | 660 | 10 × 20 | 760 | 12.5 × 25 | 840 | 12.5 × 30 | 1000 |
| | | | | | | | 16 × 25 | 1000 |
| 1000 | 10 × 20 | 760 | 12.5 × 25 | 840 | 16 × 25 | 1100 | 18 × 31.5 | 1700 |
| 2200 | 12.5 × 25 | 840 | 16 × 25 | 1100 | 18 × 31.5 | 1700 | | |
| 3300 | 16 × 25 | 1100 | 18 × 31.5 | 1700 | | | | |
| 4700 | 18 × 25 | 1700 | | | | | | |
| 5600 | 18 × 31.5 | 1900 | | | | | | |

| WV / Item / μF | 50 | | 63 | | 80 | | 100 | |
|---|---|---|---|---|---|---|---|---|
| | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz | ØD×L(mm) | Ripple current (mA rms) 150°C, 100kHz |
| 33 | | | | | | | 10 × 12.5 | 260 |
| 47 | | | | | 10 × 12.5 | 260 | 10 × 16 | 330 |
| 56 | | | 10 × 12.5 | 450 | 10 × 16 | 330 | 10 × 16 | 390 |
| 68 | | | 10 × 16 | 650 | 10 × 16 | 390 | 10 × 20 | 465 |
| 100 | 10 × 16 | 700 | 10 × 20 | 820 | 10 × 20 | 465 | 12.5 × 20 | 670 |
| 220 | 12.5 × 20 | 890 | 12.5 × 25 | 1000 | 12.5 × 25 | 670 | 12.5 × 30 | 1100 |
| 330 | 12.5 × 25 | 1000 | 12.5 × 30 | 1300 | | | 18 × 31.5 | 1500 |
| 470 | 12.5 × 30 | 1200 | 16 × 25 | 1500 | 18 × 25 | 1600 | 18 × 31.5 | 1750 |
| 560 | 16 × 25 | 1300 | 18 × 25 | 1650 | 18 × 31.5 | 1700 | | |
| 680 | | | 18 × 31.5 | 1850 | 18 × 31.5 | 1900 | | |

# VX 150˚C, High Temperature Range Series



- Applied Laminated case series
- Suited for automobile applications
- Complied to the RoHS directive
- AEC-Q200 compliant. Please contact us for details

VQ ⇨ VX
Long Life

| Item | Characteristics |
|---|---|
| Operating temperature range | -40 ~ +150˚C |
| Leakage current max. | I = 0.03CV or 4㎂ whichever is greater (after 1 minutes) |
| Capacitance tolerance | ±20% at 120Hz, 20˚C |
| Dissipation factor max. (at 120Hz, 20˚C) | Capacitance > 1000㎌ : tanδ increases by 0.02 for each 1000㎌ from below value. |

| WV | 50 | 63 | 80 | 100 |
|---|---|---|---|---|
| tanδ | 0.10 | 0.10 | 0.08 | 0.08 |

| Low temperature characteristics (Impedance ratio at 120Hz) | | | | |
|---|---|---|---|---|
| WV | 50 | 63 | 80 | 100 |
| Z-25˚C/Z+20˚C | 2 | 2 | 2 | 2 |
| Z-40˚C/Z+20˚C | 4 | 4 | 4 | 4 |

| Load life (after application of the rated voltage for 2000 hours at 150˚C) | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±30% of initial value |
| tanδ | Less than 300% of specified value |

| Shelf life (at 150˚C) | After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4 |
|---|---|

## ● DRAWING (See page 168)

Unit : mm

| ØD | 10 | 12.5 | 16 | 18 |
|---|---|---|---|---|
| P | 5.0 | 5.0 | 7.5 | 7.5 |
| Ød | 0.6 | 0.6 | 0.8 | 0.8 |
| β | 2.0 | | | |

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| ㎌ \ WV | 50 | | 63 | | 80 | | 100 | |
|---|---|---|---|---|---|---|---|---|
| 68 | | | | | | | 12.5 × 20 | 760 |
| 100 | | | | | 12.5 × 20 | 820 | 12.5 × 25 | 950 |
| 220 | | | 12.5 × 25 | 1040 | 16 × 25 | 1250 | 16 × 31.5 | 1380 |
| 330 | 12.5 × 20 | 770 | 16 × 25 | 1170 | 16 × 31.5 | 1480 | 18 × 31.5 | 1430 |
| 470 | 12.5 × 25 | 960 | 16 × 25 | 1280 | 18 × 31.5 | 1530 | | |
| 560 | 16 × 25 | 1080 | 16 × 31.5 | 1520 | | | | |
| 680 | 16 × 25 | 1190 | 16 × 35.5 | 1520 | | | | |
| 1000 | 16 × 31.5 | 1420 | | | | | | |

Ripple current (mA rms) at 150˚C, 100kHz
Case size ØD×L (mm)

## ● FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| ㎌ \ Frequency | 120Hz | 10kHz | 50kHz | 100kHz≦ |
|---|---|---|---|---|
| 1000 ≦ CV | 0.67 | 0.91 | 0.95 | 1.00 |
| 1000 > CV | 0.50 | 0.83 | 0.91 | 1.00 |

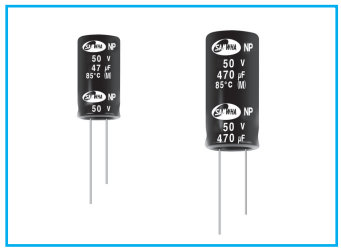
# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## NP Non-Polarized Series

Non-polarized

Solvent Proof
WV≦100V

SD ⇨ NP
Non-polar



- Standard non-polarized series
- Designed for use in circuits with reversing polarity
- Higher voltage ratings available up to 250V
- Load life of 2000 hours at 85˚C
- Complied to the RoHS directive

| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +85˚C |
| **Leakage current max.** | I = 0.03CV or 3μA whichever is greater (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160 | 200,250 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.25 | 0.23 | 0.20 | 0.15 | 0.15 | 0.12 | 0.12 | 0.12 | 0.12 | 0.15 | 0.20 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 | 25 ~ 100 | 160 ~ 250 |
|---|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 4 | 3 | 2 | 2 | 3 |
| Z-40˚C/Z+20˚C | 10 | 8 | 6 | 4 | 5 |

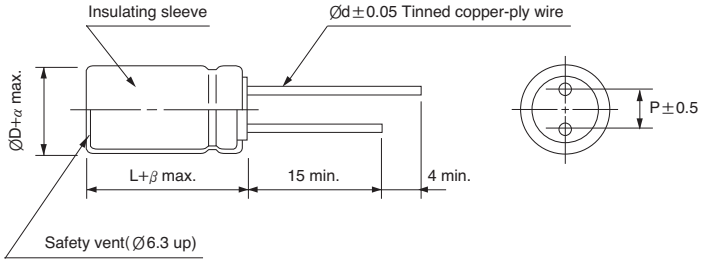
**Load life (after application of the rated voltage for 2000 hours at 85˚C)**

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 200% of specified value |
| Test method | Polarity reverse each 250 hours |

**Shelf life (at 85˚C)**: After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 |
|---|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | | | | 1.0 |
| β | 1.5 | | | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 50Hz | 120Hz | 1kHz | 10kHz≦ |
|---|---|---|---|---|
| ~ 47 | 0.75 | 1.00 | 1.55 | 2.00 |
| 68 ~ 680 | 0.80 | 1.00 | 1.34 | 1.50 |
| 1000 ~ | 0.85 | 1.00 | 1.13 | 1.15 |

# NP series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / μF | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 | 160 | 200 | 250 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | | | | | | 5×11<br>18 | 5×11<br>18 | 5×11<br>18 | 5×11<br>18 | | | |
| 1.5 | | | | | | 5×11<br>21 | 5×11<br>21 | 5×11<br>21 | 5×11<br>21 | | | |
| 2.2 | | | | | | 5×11<br>26 | 5×11<br>26 | 5×11<br>26 | 5×11<br>26 | | | |
| 3.3 | | | | | | 5×11<br>32 | 5×11<br>32 | 5×11<br>32 | 5×11<br>32 | 10×16<br>49 | 10×16<br>42 | 10×20<br>46 |
| 4.7 | | | | | | 5×11<br>38 | 5×11<br>38 | 5×11<br>38 | 6.3×11<br>44 | 10×16<br>59 | 10×20<br>55 | 12.5×20<br>63 |
| 6.8 | | | | | | 5×11<br>46 | 5×11<br>46 | 6.3×11<br>52 | 8×11.5<br>62 | 10×20<br>77 | 12.5×20<br>78 | 12.5×20<br>78 |
| 10 | | | | | | 5×11<br>55 | 6.3×11<br>64 | 6.3×11<br>64 | 8×11.5<br>75 | 12.5×20<br>109 | 12.5×20<br>95 | 12.5×25<br>103 |
| 15 | | | | | 5×11<br>61 | 6.3×11<br>78 | 6.3×11<br>78 | 8×11.5<br>92 | 10×12.5<br>107 | 12.5×20<br>134 | 12.5×25<br>127 | 16×25<br>140 |
| 22 | | | | 5×11<br>73 | 6.3×11<br>84 | 6.3×11<br>94 | 8×11.5<br>111 | 10×12.5<br>129 | 10×16<br>142 | 12.5×25<br>177 | 16×25<br>170 | 16×31.5<br>186 |
| 33 | | | 5×11<br>78 | 6.3×11<br>103 | 6.3×11<br>103 | 8×11.5<br>136 | 10×12.5<br>158 | 10×16<br>173 | 10×20<br>189 | 16×25<br>240 | 16×35.5<br>239 | 18×35.5<br>256 |
| 47 | | 5×11<br>87 | 6.3×11<br>107 | 6.3×11<br>123 | 8×11.5<br>145 | 10×12.5<br>189 | 10×16<br>207 | 10×20<br>226 | 12.5×20<br>265 | 16×35.5<br>329 | 18×40<br>321 | |
| 68 | 5×11<br>100 | 6.3×11<br>120 | 6.3×11<br>129 | 8×11.5<br>175 | 10×12.5<br>203 | 10×16<br>249 | 10×20<br>272 | 12.5×20<br>319 | 12.5×25<br>348 | 18×35.5<br>425 | | |
| 100 | 6.3×11<br>139 | 6.3×11<br>145 | 8×11.5<br>184 | 10×12.5<br>247 | 10×16<br>270 | 10×20<br>329 | 10×20<br>329 | 12.5×20<br>387 | 16×25<br>468 | | | |
| 150 | 6.3×11<br>171 | 8×11.5<br>210 | 10×12.5<br>262 | 10×16<br>331 | 10×20<br>361 | 10×20<br>404 | 12.5×20<br>474 | 12.5×25<br>516 | 16×25<br>573 | | | |
| 220 | 8×11.5<br>244 | 10×12.5<br>295 | 10×16<br>347 | 10×20<br>437 | 10×20<br>437 | 12.5×20<br>574 | 12.5×25<br>625 | 16×25<br>694 | 16×35.5<br>797 | | | |
| 330 | 10×12.5<br>347 | 10×16<br>396 | 10×20<br>464 | 10×20<br>535 | 12.5×20<br>628 | 16×25<br>850 | 16×25<br>850 | 16×35.5<br>976 | 18×40<br>1098 | | | |
| 470 | 10×16<br>454 | 10×20<br>516 | 10×20<br>553 | 12.5×20<br>750 | 12.5×25<br>818 | 16×31.5<br>1110 | 16×35.5<br>1164 | 18×40<br>1311 | 22×41<br>1443 | | | |
| 680 | 10×20<br>595 | 12.5×20<br>729 | 12.5×20<br>781 | 12.5×25<br>984 | 16×25<br>1091 | 18×35.5<br>1503 | 18×40<br>1577 | 22×41<br>1736 | | | | |
| 1000 | 12.5×20<br>847 | 12.5×20<br>883 | 12.5×25<br>1033 | 16×25<br>1323 | 16×35.5<br>1519 | 18×40<br>1912 | 22×41<br>2105 | | | | | |
| 1500 | 12.5×20<br>999 | 12.5×25<br>1132 | 16×25<br>1338 | 16×35.5<br>1748 | 18×40<br>1968 | 22×41<br>2386 | | | | | | |
| 2200 | 12.5×25<br>1272 | 16×25<br>1463 | 16×35.5<br>1781 | 18×40<br>2254 | 22×41<br>2481 | | | | | | | |
| 3300 | 16×25<br>1672 | 16×35.5<br>1985 | 18×40<br>2360 | 22×41<br>2890 | | | | | | | | |
| 4700 | 16×35.5<br>2221 | 18×40<br>2579 | 22×41<br>2987 | | | | | | | | | |
| 6800 | 18×41<br>2840 | 22×41<br>3214 | | | | | | | | | | |
| 10000 | 22×41<br>3516 | ← Case size ØD×L (mm)<br>← Ripple current (mA rms) at 85°C, 120Hz | | | | | | | | | | |

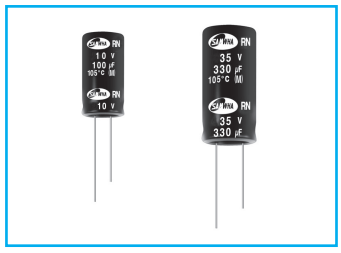
# MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

## RN Non-Polarized, Wide Temperature Range Series

Non-polarized Solvent Proof

- Wide operating temperature range of -40 ~ +105˚C
- Designed for use in circuits with reversing polarity
- Complied to the RoHS directive

RD ⇨ RN
Non-polar



| Item | Characteristics |
|---|---|
| **Operating temperature range** | -40 ~ +105˚C |
| **Leakage current max.** | I = 0.03CV or 3μA whichever is greater (after 5 minutes) |
| **Capacitance tolerance** | ±20% at 120Hz, 20˚C |
| **Dissipation factor max. (at 120Hz, 20˚C)** | Capacitance > 1000μF : tanδ increases by 0.02 for each 1000μF from below value. |

| WV | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|---|
| tanδ | 0.24 | 0.20 | 0.16 | 0.16 | 0.14 | 0.12 | 0.12 | 0.12 | 0.12 |

**Low temperature characteristics (Impedance ratio at 120Hz)**

| WV | 6.3 | 10 | 16 | 25 ~ 100 |
|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 4 | 3 | 2 | 2 |
| Z-40˚C/Z+20˚C | 8 | 6 | 4 | 3 |

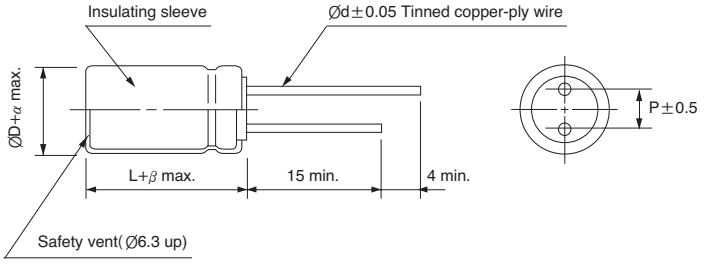
**Load life (after application of the rated voltage for 1000 hours at 105˚C)**

| | |
|---|---|
| Leakage current | Less than specified value |
| Capacitance change | Within ±20% of initial value |
| tanδ | Less than 200% of specified value |
| Test method | Polarity reverse each 250 hours |

**Shelf life (at 105˚C)**: After 1000 hours no load test, leakage current, capacitance and tanδ are same as load life value. The measurement shall be performed at 20˚C by the KS C IEC 60384 - 4

## DRAWING

Unit : mm




| ØD | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 | 22 |
|---|---|---|---|---|---|---|---|---|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 | 10.0 |
| Ød | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 | 1.0 |
| α | 0.5 | | | | | | | 1.0 |
| β | 1.5 | | | 2.0 | | | | 3.0 |

## FREQUENCY COEFFICIENT OF PERMISSIBLE RIPPLE CURRENT

| μF \ Frequency | 50Hz | 120Hz | 1kHz | 10kHz≦ |
|---|---|---|---|---|
| ~ 47 | 0.75 | 1.00 | 1.55 | 2.00 |
| 68 ~ 680 | 0.80 | 1.00 | 1.34 | 1.50 |
| 1000 ~ | 0.85 | 1.00 | 1.13 | 1.15 |

# RN series

## ● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV / μF | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | | | | | | 5 × 11<br>11 | 5 × 11<br>12 | 5 × 11<br>12 | |
| 1.5 | | | | | | 5 × 11<br>14 | 5 × 11<br>15 | 5 × 11<br>15 | 5 × 11<br>16 |
| 2.2 | | | | | | 5 × 11<br>17 | 5 × 11<br>18 | 5 × 11<br>18 | 5 × 11<br>19 |
| 3.3 | | | | | | 5 × 11<br>21 | 5 × 11<br>23 | 6.3 × 11<br>26 | 6.3 × 11<br>27 |
| 4.7 | | | | | 5 × 11<br>23 | 5 × 11<br>25 | 6.3 × 11<br>31 | 6.3 × 11<br>31 | 8 × 11.5<br>39 |
| 6.8 | | | | 5 × 11<br>26 | 5 × 11<br>27 | 6.3 × 11<br>34 | 6.3 × 11<br>37 | 8 × 11.5<br>44 | 10 × 12.5<br>54 |
| 10 | | | 5 × 11<br>31 | 5 × 11<br>31 | 6.3 × 11<br>38 | 6.3 × 11<br>41 | 8 × 11.5<br>53 | 10 × 12.5<br>62 | 10 × 12.5<br>65 |
| 15 | | 5 × 11<br>34 | 5 × 11<br>38 | 6.3 × 11<br>44 | 8 × 11.5<br>55 | 8 × 11.5<br>60 | 10 × 12.5<br>76 | 10 × 12.5<br>76 | 10 × 16<br>88 |
| 22 | 5 × 11<br>38 | 5 × 11<br>41 | 6.3 × 11<br>53 | 8 × 11.5<br>63 | 8 × 11.5<br>67 | 10 × 12.5<br>84 | 10 × 16<br>101 | 10 × 16<br>101 | |
| 33 | 5 × 11<br>46 | 6.3 × 11<br>58 | 8 × 11.5<br>77 | 8 × 11.5<br>77 | 10 × 12.5<br>95 | 10 × 16<br>113 | 10 × 16<br>124 | 10 × 20<br>135 | |
| 47 | 6.3 × 11<br>63 | 6.3 × 11<br>69 | 8 × 11.5<br>92 | 10 × 12.5<br>106 | 10 × 16<br>125 | 10 × 20<br>147 | 10 × 20<br>161 | 12.5 × 20<br>189 | |
| 68 | 6.3 × 11<br>76 | 8 × 11.5<br>98 | 10 × 12.5<br>128 | 10 × 16<br>140 | 10 × 20<br>164 | 10 × 20<br>177 | 12.5 × 20<br>227 | 12.5 × 25<br>248 | |
| 100 | 8 × 11.5<br>109 | 10 × 12.5<br>139 | 10 × 16<br>170 | 10 × 20<br>185 | 10 × 20<br>198 | 12.5 × 20<br>251 | 12.5 × 25<br>300 | 16 × 25<br>333 | |
| 150 | 10 × 12.5<br>155 | 10 × 16<br>186 | 10 × 20<br>227 | 12.5 × 20<br>267 | 12.5 × 20<br>285 | 12.5 × 25<br>336 | 16 × 25<br>408 | 16 × 35.5<br>468 | |
| 220 | 10 × 12.5<br>188 | 10 × 20<br>246 | 12.5 × 20<br>323 | 12.5 × 20<br>323 | 12.5 × 25<br>376 | 16 × 25<br>451 | 16 × 35.5<br>567 | 18 × 35.5<br>609 | |
| 330 | 10 × 16<br>252 | 12.5 × 20<br>354 | 12.5 × 20<br>396 | 12.5 × 25<br>431 | 16 × 25<br>511 | 16 × 35.5<br>634 | 18 × 35.5<br>745 | 18 × 40<br>782 | |
| 470 | 10 × 20<br>328 | 12.5 × 20<br>422 | 12.5 × 25<br>515 | 16 × 25<br>571 | 16 × 35.5<br>701 | 18 × 35.5<br>812 | 18 × 40<br>933 | 22 × 41<br>1027 | |
| 680 | 12.5 × 20<br>464 | 12.5 × 25<br>554 | 16 × 25<br>687 | 16 × 35.5<br>788 | 18 × 35.5<br>904 | 18 × 40<br>1025 | 22 × 41<br>1236 | | |
| 1000 | 12.5 × 25<br>613 | 16 × 25<br>745 | 16 × 35.5<br>956 | 18 × 35.5<br>1026 | 18 × 40<br>1151 | 22 × 41<br>1368 | | | |
| 1500 | 16 × 25<br>800 | 16 × 35.5<br>999 | 18 × 35.5<br>1184 | 18 × 40<br>1243 | 22 × 41<br>1451 | | | | |
| 2200 | 16 × 35.5<br>1072 | 18 × 35.5<br>1242 | 18 × 40<br>1428 | 22 × 41<br>1572 | | | | | |
| 3300 | 18 × 35.5<br>1361 | 18 × 40<br>1534 | 22 × 41<br>1835 | ← Case size ØD×L (mm)<br>← Ripple current (mA rms) at 105°C, 120Hz | | | | | |
| 4700 | 18 × 40<br>1650 | 22 × 41<br>1942 | | | | | | | |
| 6800 | 22 × 41<br>2060 | | | | | | | | |

# 5 LARGE ALUMINUM ELECTROLYTIC CAPACITORS

