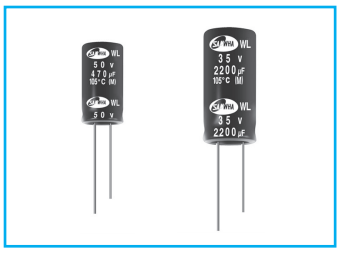
# WL Low Impedance Series

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

| 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 |

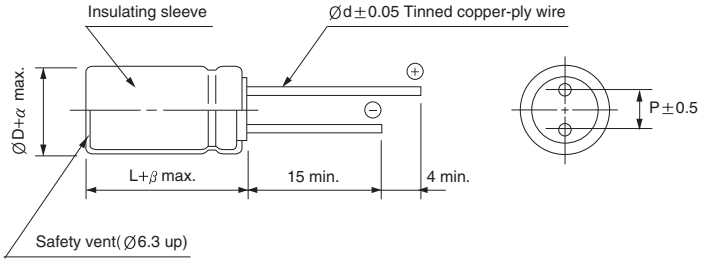
| WV | 6.3 | 10 | 16 | 25 ~ 100 | 160 ~ 250 | 350 ~ 450 | 500 |
|---|---|---|---|---|---|---|---|
| Z-25˚C/Z+20˚C | 4 | 3 | 2 | 2 | 3 | 6 | 8 |
| Z-40˚C/Z+20˚C | 8 | 6 | 4 | 3 | 4 | 10 | – |

| | |
|---|---|
| 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 | | |

## 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 |
| 39 ~ 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 |

# 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 | 3.5 | 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 | 10×25 | 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 | 10×16 | 230 | | | 10×20 | 300 | 10×20 | 180 |
| 22 | 10×20 | 440 | 10×20 | 440 | 12.5×20 | 480 | 12.5×20 | 270 |
| 33 | 10×20 | 560 | 12.5×20 | 590 | 12.5×25 | 630 | 16×20 | 600 |
| 47 | 12.5×20 | 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 | 16×31.5 | 1300 | 16×25 | 1500 | 18×25 | 1450 | 18×40 | 1250 |
| | | | | | 18×31.5 | | | |
| 220 | 16×31.5 | 1300 | 18×31.5 | 1700 | 18×35.5 | 1485 | | |
| | | | | | 18×40 | | | |
| 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 | | | | | 10×20 | 150 | | |
| 4.7 | | | | | 12.5×20 | 200 | | |
| 10 | 10×16 | 176 | | | 10×16 | 230 | 12.5×20 | 240 |
| | 10×20 | 180 | | | 12.5×25 | 315 | 12.5×25 | 260 |
| 22 | 12.5×25 | 300 | | | 12.5×25 | 525 | 12.5×30 | 420 |
| | | | | | 16×25 | 570 | 16×25 | 470 |
| 33 | 16×20 | 600 | | | 16×25 | 600 | 18×31.5 | 560 |
| 47 | 16×25 | 700 | 16×25 | 630 | 16×25 | 660 | 16×35.5 | 650 |
| | | | | | 16×31.5 | 720 | 18×31.5 | 620 |
| | | | | | 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 | 16×35.5 | 810 | 16×35.5 | 900 | 16×45 | 820 |
| | | | 18×25 | | 18×31.5 | 900 | 18×40 | 900 |
| 82 | 16×35.5 | 1150 | 16×40 | 960 | 16×40 | 1115 | 16×50 | 1000 |
| | | | | | 18×31.5 | 1115 | | |
| | | | 18×31.5 | 900 | 18×35.5 | 1200 | 18×40 | 1000 |
| 100 | 18×35.5 | 1200 | 16×40 | 1100 | 16×40 | 1100 | 16×50 | 1250 |
| | | | | | | | 18×45 | 1250 |
| | | | 18×35.5 | | 18×35.5 | 1200 | 20×41 | 1250 |
| 120 | 18×40 | 1270 | 16×50 | 1250 | 16×50 | 1500 | 22×45 | 1370 |
| | | | 18×40 | 1200 | 18×40 | 1500 | | |
| 150 | 20×41 | 1380 | | | 20×41 | 1600 | | |