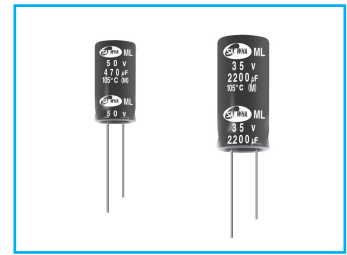


MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



Ultra Low Impedance, Long Life Series



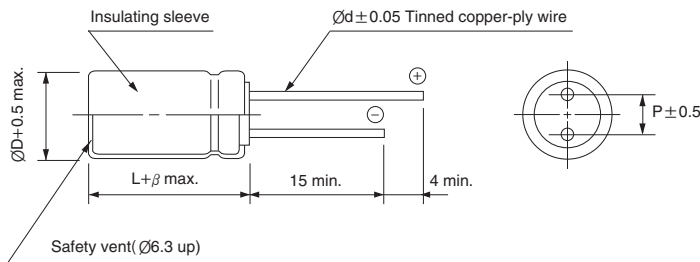
- Long Life compared with MZ series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 10000 hours load life at 105°C (6000/8000 hours for as specified below)
- Complied to the RoHS directive



| Item | Characteristics | | | | | | | | | | | | | | | | | |
|--|---|-----------------------------------|-------------|---------|---------|-----------|------------|------------|-------------|-----|------|------|------|------|------|------|------|------|
| Operating temperature range | -40 ~ +105°C | | | | | | | | | | | | | | | | | |
| Leakage current max. | I = 0.01CV or 3µA whichever is greater (after 2 minutes) 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. | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>WV</th> <th>6.3</th> <th>10</th> <th>16</th> <th>25</th> <th>35</th> <th>50</th> <th>63</th> <th>100</th> </tr> </thead> <tbody> <tr> <td>tanδ</td> <td>0.22</td> <td>0.19</td> <td>0.16</td> <td>0.14</td> <td>0.12</td> <td>0.10</td> <td>0.09</td> <td>0.08</td> </tr> </tbody> </table> | 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 |
| 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 | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | |
| Shelf life (at 105°C) | <table border="1"> <thead> <tr> <th>∅D</th> <th>∅D = 5, 6.3</th> <th>∅D = 8</th> <th>∅D ≥ 10</th> </tr> </thead> <tbody> <tr> <td>Life time</td> <td>6000 hours</td> <td>8000 hours</td> <td>10000 hours</td> </tr> </tbody> </table> | ∅D | ∅D = 5, 6.3 | ∅D = 8 | ∅D ≥ 10 | Life time | 6000 hours | 8000 hours | 10000 hours | | | | | | | | | |
| | ∅D | ∅D = 5, 6.3 | ∅D = 8 | ∅D ≥ 10 | | | | | | | | | | | | | | |
| Life time | 6000 hours | 8000 hours | 10000 hours | | | | | | | | | | | | | | | |
| | 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



| ∅D | 5 | 6.3 | 8 | 10 | 12.5 | 16 | 18 |
|----|-----|-----|-----|-----|------|-----|-----|
| P | 2.0 | 2.5 | 3.5 | 5.0 | 5.0 | 7.5 | 7.5 |
| ∅d | 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 |
| 39 ~ 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 |

ML series

● DIMENSIONS & MAXIMUM PERMISSIBLE RIPPLE CURRENT

| WV Item μF | 6.3 | | | 10 | | | 16 | | | 25 | | |
|------------------|--------------|--|--|--------------|--|--|--------------|--|--|--------------|--|--|
| | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 10 | | | | | | | 5×11 | 0.35 | 250 | 5×11 | 0.35 | 250 |
| 22 | 5×11 | 0.35 | 250 | 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 | 5×11 | 0.35 | 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 | 0.25 | 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 | 0.08 | 760 | 8×11.5 | 0.10 | 760 | 10×12.5 | 0.053 | 1030 |
| 390 | 6.3×11 | 0.15 | 405 | 8×11.5 | 0.072 | 760 | 8×11.5 | 0.10 | 760 | 8×15 | 0.072 | 1250 |
| 470 | 8×11.5 | 0.072 | 760 | 8×11.5 | 0.072 | 760 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.038 | 1430 |
| 560 | 8×11.5 | 0.072 | 630 | 10×12.5 | 0.053 | 650 | 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 | 10×20 | 0.027 | 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 | 0.027 | 1820 | 12.5×20 | 0.025 | 2360 | 16×20 | 0.015 | 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 | 0.022 | 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 | | | |
| 6800 | 16×25 | 0.015 | 3460 | 16×31.5 | 0.015 | 3680 | | | | | | |
| 10000 | 16×31.5 | 0.015 | 3680 | 18×35.5 | 0.014 | 3800 | | | | | | |

| WV Item μF | 35 | | | 50 | | | 63 | | | 100 | | |
|------------------|--------------|--|--|--------------|--|--|--------------|--|--|--------------|--|--|
| | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz | ∅D×L (mm) | Impedance (Ω)max. 20°C 100kHz | Ripple current (mA rms) 105°C 100kHz |
| 10 | 5×11 | 0.55 | 250 | 5×11 | 0.60 | 250 | 5×11 | 0.45 | 165 | 6.3×11 | 0.50 | 205 |
| 22 | 5×11 | 0.50 | 250 | 5×11 | 0.45 | 250 | 6.3×11 | 0.37 | 265 | 8×11.5 | 0.30 | 355 |
| 33 | 5×11 | 0.45 | 250 | 6.3×11 | 0.25 | 405 | 6.3×11 | 0.37 | 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 | 10×16 | 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 | 0.10 | 540 | 10×12.5 | 0.15 | 760 | 8×20 | 0.25 | 700 |
| 100 | 8×11.5 | 0.10 | 760 | 8×11.5 | 0.10 | 760 | 10×16 | 0.10 | 945 | 10×20 | 0.18 | 800 |
| | | | | | | | | | | 12.5×20 | 0.10 | 1045 |
| 150 | 8×11.5 | 0.10 | 760 | 10×12.5 | 0.061 | 1030 | 8×20 | 0.120 | 1200 | 12.5×25 | 0.080 | 1195 |
| | | | | | | | 10×20 | 0.080 | | | | |
| 220 | 10×12.5 | 0.053 | 1030 | 10×16 | 0.038 | 1430 | 10×25 | 0.070 | 1300 | 16×25 | 0.060 | 1600 |
| 330 | 10×16 | 0.038 | 1430 | 10×20 | 0.032 | 1820 | 12.5×20 | 0.040 | 1495 | 16×31.5 | 0.040 | 1750 |
| 470 | 8×20 | 0.038 | 1600 | 12.5×20 | 0.025 | 2360 | 16×20 | 0.037 | 1990 | 18×40 | 0.030 | 2060 |
| | 10×20 | 0.027 | 1820 | | | | | | | | | |
| 680 | 12.5×20 | 0.025 | 2360 | 12.5×25 | 0.020 | 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 | | | | 18×40 | 0.02 | 3500 | | | |

MINIATURE TYPES