

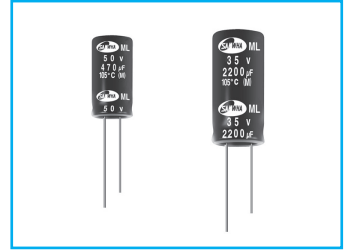
MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS



ML

Ultra Low Impedance, Long Life Series

I Z **I** Low Impedance **M** Miniaturized **S** Solvent Proof



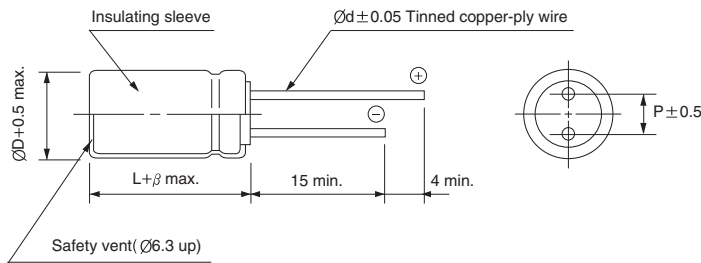
- Long Life compared with MZ series
- Enabled high ripple current by a reduction of impedance at high frequency
- High reliability withstanding 10000 hours load life at 105°C (6000/8000 hours for as specified below)
- Complied to the RoHS directive



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.																	
	<table border="1"> <tbody> <tr> <td>Leakage current</td> <td>Less than specified value</td> </tr> <tr> <td>Capacitance change</td> <td>Within ±25% of initial value</td> </tr> <tr> <td>tanδ</td> <td>Less than 200% of specified value</td> </tr> </tbody> </table>	Leakage current	Less than specified value	Capacitance change	Within ±25% of initial value	tanδ	Less than 200% of specified value											
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∅D	∅D = 5, 6.3	∅D = 8	∅D ≥ 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



∅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

MINIATURE TYPES

MINIATURE ALUMINUM ELECTROLYTIC CAPACITORS

ML 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	0.45	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°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	0.55	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	10×25	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			