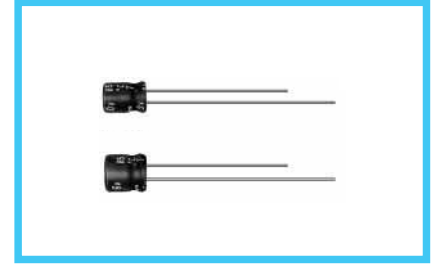
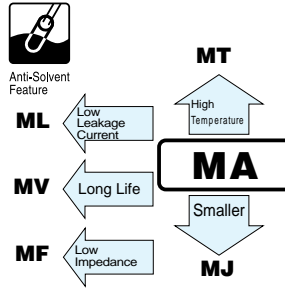


# ALUMINUM ELECTROLYTIC CAPACITORS

**MA** series 5mmL, Standard, For General Purposes

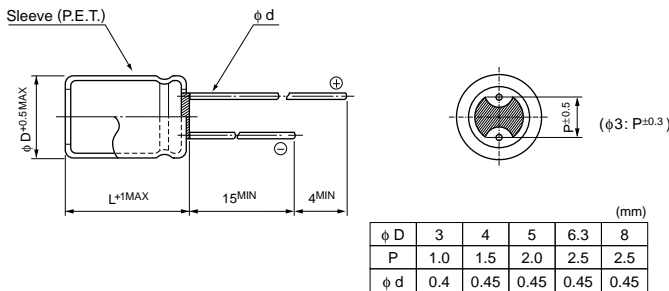
- Standard series with 5mm height.
- Adapted to the RoHS directive (2002/95/EC).



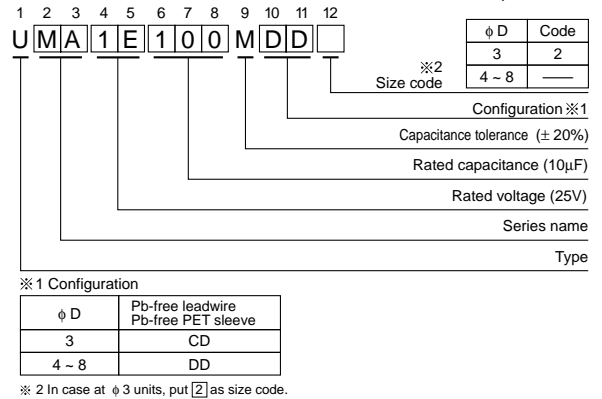
## Specifications

Item	Performance Characteristics																									
Category Temperature Range	-40 ~ +85°C																									
Rated Voltage Range	4 ~ 50V																									
Rated Capacitance Range	0.1 ~ 470μF																									
Rated Capacitance Tolerance	±20% at 120Hz, 20°C																									
Leakage Current	After 2 minutes' application of rated voltage, leakage current is not more than 0.01CV or 3(μA), whichever is greater.																									
tan δ	Measurement frequency : 120Hz, Temperature : 20°C																									
	<table border="1"> <tr> <td>Rated voltage (V)</td> <td>4</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td rowspan="2">Figures in ( ) are for MR series.</td> </tr> <tr> <td>tan δ (MAX.)</td> <td>0.35</td> <td>0.24 (0.30)</td> <td>0.20 (0.24)</td> <td>0.16 (0.20)</td> <td>0.14 (0.18)</td> <td>0.12 (0.16)</td> <td>0.10 (0.13)</td> </tr> </table>	Rated voltage (V)	4	6.3	10	16	25	35	50	Figures in ( ) are for MR series.	tan δ (MAX.)	0.35	0.24 (0.30)	0.20 (0.24)	0.16 (0.20)	0.14 (0.18)	0.12 (0.16)	0.10 (0.13)								
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tan δ (MAX.)	0.35	0.24 (0.30)	0.20 (0.24)	0.16 (0.20)	0.14 (0.18)	0.12 (0.16)	0.10 (0.13)																			
Stability at Low Temperature	Measurement frequency : 120Hz																									
	<table border="1"> <tr> <td colspan="2">Rated voltage (V)</td> <td>4</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td rowspan="2">Impedance ratio ZT / Z20 (MAX.)</td> <td>Z-25°C / Z+20°C</td> <td>7</td> <td>4</td> <td>3</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z-40°C / Z+20°C</td> <td>15</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> </tr> </table>	Rated voltage (V)		4	6.3	10	16	25	35	50	Impedance ratio ZT / Z20 (MAX.)	Z-25°C / Z+20°C	7	4	3	2	2	2	2	Z-40°C / Z+20°C	15	8	6	4	4	3
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	Z-40°C / Z+20°C	15	8	6	4	4	3	3																		
Endurance	After 2000 hours' application of rated voltage at 85°C, capacitors meet the characteristic requirements listed at right.																									
	<table border="1"> <tr> <td>Capacitance change</td> <td>Within ±20% of initial value (MR series &amp; φ 3 product : Within ±25%)</td> </tr> <tr> <td>tan δ</td> <td>200% or less of initial specified value</td> </tr> <tr> <td>Leakage current</td> <td>Initial specified value or less</td> </tr> </table>	Capacitance change	Within ±20% of initial value (MR series & φ 3 product : Within ±25%)	tan δ	200% or less of initial specified value	Leakage current	Initial specified value or less																			
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Leakage current	Initial specified value or less																									
Shelf Life	After leaving capacitors under no load at 85°C for 1000 hours, they meet the specified value for endurance characteristics listed above.																									
Marking	Printed with white color letter on black sleeve.																									

## Radial Lead Type



## Type numbering system (Example : 25V 10μF)



## Dimensions

Cap. (μF)	V	φ D × L (mm)							
		4	6.3	10	16	25	35	50	
	Code	0G	0J	1A	1C	1E	1V	1H	
0.1	0R1							4×5(3×5)	1.0(1.0)
0.22	R22							4×5(3×5)	2.0(2.0)
0.33	R33							4×5(3×5)	2.8(2.8)
0.47	R47							4×5(3×5)	4.0(4.0)
1	010							4×5(3×5)	8.4(8.0)
2.2	2R2						3×5	8.4	• 4×5 13(10)
3.3	3R3						• 4×5 15(10)	4×5	17
4.7	4R7				3×5	10	• 4×5 16(12)	4×5	18
10	100		3×5 15		• 4×5 23(18)	5×5 27	5×5 29	5×5 29	6.3×5 33
22	220	3×5 19	• 4×5 28(21)	5×5 33	5×5 37	6.3×5 42	6.3×5 46	6.3×5 46	□ 8×5 52(48)
33	330	4×5 28	5×5 37	5×5 41	○ 6.3×5 49(43)	6.3×5 52	□ 8×5 62(52)	8×5 71	
47	470	4×5 33	5×5 45	○ 6.3×5 52(43)	6.3×5 58	□ 8×5 70(62)	8×5 80		
100	101	5×5 56	○ 6.3×5 70(68)	□ 8×5 80(76)	□ 8×5 92(86)	8×5 110			
220	221	6.3×5 96	□ 8×5 110(90)	8×5 135					
330	331	8×5 145	8×5 170						
470	471	8×5 185							

Size φ 3 × 5 is available for capacitors marked. "•"/ Size φ 5 × 5 is available for capacitors marked. "○"  
 Size φ 6.3 × 5 is available for capacitors marked. "□" In such a case, [M/R] will be put at 2nd and 3rd digit of type numbering system.

Rated Ripple (mA rms) at 85°C 120Hz  
 ( ) = φ 3 units and MR series.

## Frequency coefficient of rated ripple current

Frequency	50 Hz	120 Hz	300 Hz	1 kHz	10 kHz ~
Coefficient	0.70	1.00	1.17	1.36	1.50

Please refer to page 21, 22, 23 about the formed or taped product spec.  
 Please refer to page 3 for the minimum order quantity.