

## RLA Series

### Features

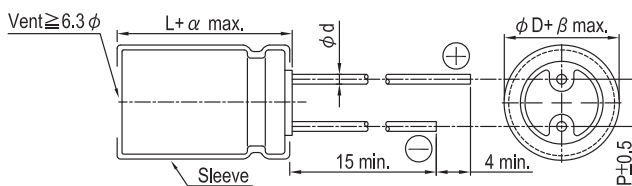
- 85°C, standard low leakage current series
- 2,000 hours assured
- RoHS compliance



### Specifications

Items	Performance																																		
Category Temperature Range	-40°C ~ +85°C																																		
Capacitance Tolerance	±20% (at 120 Hz, 20°C)																																		
Leakage Current (at 20°C)	$I = 0.002CV$ or $0.4 (\mu A)$ whichever is greater (after 2 minutes) Where, C = rated capacitance in $\mu F$ , V = rated DC working voltage in V																																		
Tan $\delta$ (at 120 Hz, 20°C)	<table border="1"> <thead> <tr> <th>Rated Voltage</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>Tan<math>\delta</math> (max)</td> <td>0.24</td> <td>0.21</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> <p>When the capacitance exceeds 1,000<math>\mu F</math>, 0.02 shall be added every 1,000<math>\mu F</math> increase.</p>	Rated Voltage	6.3	10	16	25	35	50	63	100	Tan $\delta$ (max)	0.24	0.21	0.16	0.14	0.12	0.10	0.09	0.08																
Rated Voltage	6.3	10	16	25	35	50	63	100																											
Tan $\delta$ (max)	0.24	0.21	0.16	0.14	0.12	0.10	0.09	0.08																											
Low Temperature Characteristics (at 120 Hz)	<p>Impedance ratio shall not exceed the values given in the table below.</p> <table border="1"> <thead> <tr> <th colspan="2">Rated Voltage</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 rowspan="2">Impedance Ratio</td> <td>Z(-25°C)/Z(+20°C)</td> <td>5</td> <td>4</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> <td>2</td> </tr> <tr> <td>Z(-40°C)/Z(+20°C)</td> <td>10</td> <td>8</td> <td>6</td> <td>4</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	Rated Voltage		6.3	10	16	25	35	50	63	100	Impedance Ratio	Z(-25°C)/Z(+20°C)	5	4	2	2	2	2	2	2	Z(-40°C)/Z(+20°C)	10	8	6	4	4	3	3	3					
Rated Voltage		6.3	10	16	25	35	50	63	100																										
Impedance Ratio	Z(-25°C)/Z(+20°C)	5	4	2	2	2	2	2	2																										
	Z(-40°C)/Z(+20°C)	10	8	6	4	4	3	3	3																										
Endurance	<table border="1"> <thead> <tr> <th>Test Time</th> <th>2,000 Hrs</th> </tr> </thead> <tbody> <tr> <td>Capacitance Change</td> <td>Within ±20% of initial value</td> </tr> <tr> <td>Tan<math>\delta</math></td> <td>Less than 200% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> </tbody> </table> <p>* The above specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage applied with rated ripple current for 2,000 hours at 85°C.</p>	Test Time	2,000 Hrs	Capacitance Change	Within ±20% of initial value	Tan $\delta$	Less than 200% of specified value	Leakage Current	Within specified value																										
Test Time	2,000 Hrs																																		
Capacitance Change	Within ±20% of initial value																																		
Tan $\delta$	Less than 200% of specified value																																		
Leakage Current	Within specified value																																		
Shelf Life Test	<table border="1"> <thead> <tr> <th>Test Time</th> <th>1,000 Hrs</th> </tr> </thead> <tbody> <tr> <td>Capacitance Change</td> <td>Within ±20% of initial value</td> </tr> <tr> <td>Tan<math>\delta</math></td> <td>Less than 200% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> </tbody> </table> <p>* The above specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 85°C without voltage applied.</p>	Test Time	1,000 Hrs	Capacitance Change	Within ±20% of initial value	Tan $\delta$	Less than 200% of specified value	Leakage Current	Within specified value																										
Test Time	1,000 Hrs																																		
Capacitance Change	Within ±20% of initial value																																		
Tan $\delta$	Less than 200% of specified value																																		
Leakage Current	Within specified value																																		
Ripple Current and Frequency Multipliers	<table border="1"> <thead> <tr> <th rowspan="2">Cap. (<math>\mu F</math>)</th> <th colspan="6">Freq. (Hz)</th> </tr> <tr> <th>60 (50)</th> <th>120</th> <th>500</th> <th>1k</th> <th>10k up</th> <th></th> </tr> </thead> <tbody> <tr> <td><math>\leq 100</math></td> <td>0.70</td> <td>1.00</td> <td>1.35</td> <td>1.55</td> <td>2.00</td> <td></td> </tr> <tr> <td><math>100 &lt; C \leq 1,000</math></td> <td>0.83</td> <td>1.00</td> <td>1.23</td> <td>1.32</td> <td>1.50</td> <td></td> </tr> <tr> <td><math>1,000 &lt; C</math></td> <td>0.90</td> <td>1.00</td> <td>1.10</td> <td>1.12</td> <td>1.15</td> <td></td> </tr> </tbody> </table>	Cap. ( $\mu F$ )	Freq. (Hz)						60 (50)	120	500	1k	10k up		$\leq 100$	0.70	1.00	1.35	1.55	2.00		$100 < C \leq 1,000$	0.83	1.00	1.23	1.32	1.50		$1,000 < C$	0.90	1.00	1.10	1.12	1.15	
Cap. ( $\mu F$ )	Freq. (Hz)																																		
	60 (50)	120	500	1k	10k up																														
$\leq 100$	0.70	1.00	1.35	1.55	2.00																														
$100 < C \leq 1,000$	0.83	1.00	1.23	1.32	1.50																														
$1,000 < C$	0.90	1.00	1.10	1.12	1.15																														

### Diagram of Dimensions



Lead Spacing and Diameter								Unit: mm
$\phi D$	5	6.3	8	10	12.5	16	18	
P	2.0	2.5	3.5	5.0	5.0	7.5	7.5	
$\phi d$	0.5		0.6			0.8		
$\alpha$	L < 20: 1.5, L ≥ 20: 2.0							
$\beta$	0.5							



Dimension:  $\phi D \times L$ (mm)  
Ripple Current: mA/rms at 120 Hz, 85°C

### Dimension and Permissible Ripple Current

Cap.( $\mu$ F)	Contents	6.3V (0J)		10V (1A)		16V (1C)		25V (1E)		35V (1V)		50V (1H)		63V (1J)		100V (2A)	
		$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA	$\phi D \times L$	mA
2.2	2R2											5×11	29			5×11	33
3.3	3R3											5×11	35			5×11	40
4.7	4R7							5×11	31	5×11	40	5×11	42	5×11	45	5×11	48
10	100					5×11	44	5×11	54	5×11	58	5×11	65	5×11	70	6.3×11	80
22	220			5×11	59	5×11	75	5×11	80	5×11	87	5×11	95	6.3×11	115	8×11.5	135
33	330	5×11	55	5×11	84	5×11	90	5×11	97	5×11	105	6.3×11	125	6.3×11	140	10×12.5	195
47	470	5×11	79	5×11	100	5×11	110	5×11	115	6.3×11	145	6.3×11	150	8×11.5	190	10×16	255
100	101	5×11	130	5×11	145	6.3×11	180	6.3×11	190	8×11.5	240	8×11.5	255	10×12.5	320	12.5×20	450
220	221	6.3×11	230	6.3×11	250	8×11.5	300	8×11.5	320	10×12.5	420	10×16	490	10×20	565	16×25	810
330	331	6.3×11	280	8×11.5	350	8×11.5	370	10×12.5	470	10×16	570	10×20	650	12.5×20	765	16×25	990
470	471	8×11.5	380	8×11.5	415	10×12.5	520	10×16	620	10×20	740	12.5×20	860	12.5×25	990	16×31.5	1,250
1,000	102	10×12.5	650	10×16	790	10×20	910	12.5×20	1,090	12.5×25	1,300	16×25	1,530	16×31.5	1,700		
2,200	222	12.5×20	1,150	12.5×20	1,240	12.5×25	1,420	16×25	1,660	16×31.5	1,890	18×35.5	2,160				
3,300	332	12.5×20	1,380	12.5×25	1,590	16×25	1,840	16×31.5	2,070	18×35.5	2,340						
4,700	472	16×25	1,880	16×25	1,980	16×31.5	2,260	18×35.5	2,520	18×40	2,690						

### Part Numbering System

RLA Series	470 $\mu$ F	$\pm 20\%$	6.3V	Bulk Package	Gas Type	8 $\phi$ × 11.5L	Pb-free and PET sleeve
<b>RLA</b>	<b>471</b>	<b>M</b>	<b>0J</b>	<b>BK</b>	-	<b>0811</b>	
Series Name	Capacitance	Capacitance Tolerance	Rated Voltage	Lead Configuration and Package	Rubber Type	Case Size	Lead Wire and Sleeve type

Note: For more details, please refer to "Part Numbering System (Radial Type)" on page 13.