

ALUMINUM ELECTROLYTIC CAPACITORS SPECIFICATION SHEET

Halogen Free

CUSTOMER PART No.		
Rubycon PART No.	YXJ SERIES (Option Code : FFC)	
DRAWING No.	RER - 200171	ISSUE No. 3
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RUBYCON CORPORATION
ENGINEERING DIVISION

1938-1, NISHIMINOWA, INA-SHI, NAGANO-KEN, JAPAN
TEL No. 0265-72-7116
FAX No. 0265-73-3380

DESIGN	HIROKI KOMATSU
	<i>H. Komatsu</i>
CHECK	TOSHIHIRO KOIKE
	<i>T. Koike</i>
APPROVAL	TAKESHI KOBAYASHI
	<i>T. Kobayashi</i>

1. Scope.

This specification covers polarized aluminum electrolytic capacitors with non-solid electrolyte for use in electronic equipments.

2. Reference Standard

JIS C 5141 (1991) and JIS C 5102 (1994) methods for testing.

3. Operating Temperature Range

-40°C to +105°C

4. Performance

Refer to Table-2

5. Style and Numbering System

(1) Style CE 04 (Radial Leaded)


(2) Numbering System	Rated Voltage	Series	Nominal Capacitance	Tolerance	Option	Lead Forming	Case size
	□□□	YXJ	□□□	M	FFC	□□	□□□ X □□□

6. Marking

Unless otherwise specified, capacitor shall be clearly marked the following items on its body.

Sleeve color: Black

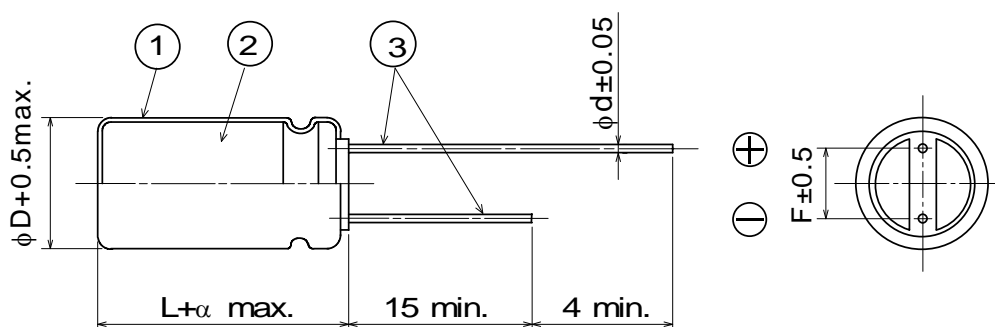
Lettering color: White

(1) Trade mark	Rubycon
(2) Rated Voltage	V
(3) Nominal Capacitance	μF
(4) Polarity	 (Negative Polarity)
(5) Series	YXJ
(6) Lot Number	
(7) Maximum Operating Temperature	105°C
(8) PET Sleeve mark	PET

7. Vent

On capacitors whose diameter is 6.3mm and greater, a safety vent shall be provided.

8. Diagram of dimensions. :unit mm



ϕD	5	6.3	8	10	12.5	16
ϕd	0.5		0.6			0.8
F	2.0	2.5	3.5	5.0		7.5
α	L \leq 16 : α =1.5			L \geq 20 : α =2.0		

①	Sleeve	P.E.T.
②	Case	Aluminum
③	Lead Wire	Tin plated

9. Standard size

◆Table-1 Standard size, Maximum permissible ripple current and Impedance, ESR

Rated voltage 10V (1A)				
Nominal capacitance (μ F)	Size $\phi D \times L$ (mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
100	5X11	150	0.90	3.6
220	5X11	250	0.40	1.2
330	6.3X11	400	0.22	0.87
470	6.3X11	400	0.22	0.87
1000	10X12.5	865	0.080	0.32
2200	10X20	1400	0.046	0.18
3300	12.5X20	1900	0.041	0.14
4700	12.5X25	2230	0.032	0.11
6800	16X25	2930	0.021	0.060
10000	16X31.5	3450	0.019	0.056

Rated voltage 16V (1C)				
Nominal capacitance (μ F)	Size $\phi D \times L$ (mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
47	5X11	250	0.40	1.2
100	5X11	250	0.40	1.2
220	6.3X11	400	0.22	0.87
330	6.3X11	400	0.22	0.87
470	8X11.5	640	0.13	0.52
1000	10X16	1210	0.062	0.25
2200	12.5X20	1900	0.041	0.14
3300	12.5X25	2230	0.032	0.11
4700	16X25	2930	0.021	0.060
6800	16X31.5	3450	0.019	0.056

Rated voltage 25V (1E)				
Nominal capacitance (μ F)	Size ϕ DxL(mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
33	5X11	250	0.40	1.2
47	5X11	250	0.40	1.2
100	5X11	250	0.40	1.2
220	6.3X11	400	0.22	0.87
330	8X11.5	640	0.13	0.52
470	10X12.5	865	0.080	0.32
1000	10X20	1400	0.046	0.18
2200	12.5X25	2230	0.032	0.11
3300	16X25	2930	0.021	0.060
4700	16X31.5	3450	0.019	0.056

Rated voltage 35V (1V)				
Nominal capacitance (μ F)	Size ϕ DxL(mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
33	5X11	250	0.40	1.2
47	5X11	250	0.40	1.2
100	6.3X11	400	0.22	0.87
220	8X11.5	640	0.13	0.52
330	10X12.5	865	0.080	0.32
470	10X16	1210	0.062	0.25
1000	12.5X20	1900	0.041	0.14
2200	16X25	2930	0.021	0.060
3300	16X31.5	3450	0.019	0.056

Rated voltage 50V (1H)				
Nominal capacitance (μ F)	Size ϕ DxL(mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
1	5X11	30	4.0	8.0
2.2	5X11	43	2.5	6.0
3.3	5X11	53	2.2	5.6
4.7	5X11	88	1.9	5.0
10	5X11	100	1.5	4.0
22	5X11	180	0.70	2.8
33	5X11	250	0.70	2.8
47	6.3X11	295	0.30	1.2
100	8X11.5	555	0.17	0.68
220	10X16	1050	0.084	0.34
330	10X20	1220	0.060	0.24
470	12.5X20	1660	0.045	0.15
1000	16X25	2730	0.032	0.096
2200	16X35.5	3150	0.019	0.057

Rated voltage 63V (1J)				
Nominal capacitance (μ F)	Size ϕ DxL(mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
10	5X11	173	0.88	3.5
22	5X11	173	0.88	3.5
33	6.3X11	278	0.35	1.4
47	6.3X11	278	0.35	1.4
100	10X12.5	725	0.15	0.60
220	10X20	1200	0.078	0.31
330	12.5X20	1570	0.060	0.19
470	12.5X25	1990	0.043	0.14
1000	16X25	2730	0.032	0.096

Rated voltage 100V (2A)				
Nominal capacitance (μ F)	Size ϕ DxL(mm)	Ripple Current (mA r.m.s./105°C,100kHz)	Impedance and ESR (Ω MAX)	
			20°C,100kHz	-10°C,100kHz
1	5X11	20	4.5	15.0
2.2	5X11	30	3.0	13.0
3.3	5X11	40	2.7	11.0
4.7	5X11	65	2.5	10.0
10	6.3X11	267	0.57	2.3
22	6.3X11	267	0.57	2.3
33	8X11.5	462	0.36	1.4
47	8X16	585	0.25	1.0
100	10X20	1040	0.12	0.52
220	12.5X25	1620	0.060	0.23
330	16X25	2210	0.044	0.16

◆Table-2 PERFORMANCE

ITEMS		PERFORMANCE																							
1	Rated Voltage(WV) Surge Voltage (SV)	WV(V.DC)	10	16	25	35	50	63	100																
		SV(V.DC)	11.5	18.4	28.8	40.3	57.5	72.5	115																
2	Capacitance (Tolerance)	<Condition> Measure method is based on JIS C5102 and detailed condition shows below. Measuring Frequency : 120Hz±20% Measuring Voltage : Not more than 0.5Vrms Measuring Temperature : 20 ± 2 °C <Criteria> 1 to 10000µF (±20%)																							
3	Leakage Current	<Condition> The rated voltage shall be applied between terminals of capacitor such that the terminal voltage will reach the rated voltage within one minute and the leakage current shall be measured at 2 minutes after the voltage has reached the rated voltage across a 1000 ±10 Ω series protection resistor. Then the current value shall not exceed value calculated from following formula. <Criteria> $I=0.005CV$ where I : Leakage current in µA. C : Nominal capacitance in µF. V : Rated voltage in V.DC.																							
4	Dissipation Factor (tanδ:Tangent of loss angle)	<Condition> See ITEM 2, Nominal Capacitance, for measuring frequency, voltage and temperature. <Criteria> <table border="1"> <thead> <tr> <th>WV(V.DC)</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>0.19</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> When nominal capacitance is over 1000µF, tanδ shall be added 0.02 to the listed value with increase of every 1000µF.								WV(V.DC)	10	16	25	35	50	63	100	tanδ	0.19	0.16	0.14	0.12	0.10	0.09	0.08
WV(V.DC)	10	16	25	35	50	63	100																		
tanδ	0.19	0.16	0.14	0.12	0.10	0.09	0.08																		
5	Terminal Strength	<Condition> Tensile Strength of Terminals The body of capacitor shall be fixed and the tensile force of following table shall be applied to the terminal in lead out direction of the terminal for 10±1 seconds. Bending Strength of Terminals The body of capacitor shall be held in such a way that the regular lead-out axis of lead wire terminal becomes vertical. The weight of following table shall be suspended from the end of terminal. In this condition, after the body of sample is bent through 90 degrees, it shall be returned to the original position. Next the body shall be reversibly bent through 90 degrees and again returned to the original position. <table border="1"> <thead> <tr> <th>Diameter of lead wire</th> <th>Tensile force N{kgf}</th> <th>Bending force N{kgf}</th> </tr> </thead> <tbody> <tr> <td>0.5mm and less</td> <td>5{0.51}</td> <td>2.5{0.25}</td> </tr> <tr> <td>Over 0.5mm to 0.8mm incl</td> <td>10{1.0}</td> <td>5 {0.51}</td> </tr> </tbody> </table> <Criteria> Notable changes shall not be found, as breakage or looseness in the terminal. Capacitance Change : Within ±5% of the initial value								Diameter of lead wire	Tensile force N{kgf}	Bending force N{kgf}	0.5mm and less	5{0.51}	2.5{0.25}	Over 0.5mm to 0.8mm incl	10{1.0}	5 {0.51}							
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6	Temperature Coefficient and Drift	<p><Condition></p> <table border="1" data-bbox="544 360 1342 685"> <thead> <tr> <th>STEP</th> <th>Testing Temperature (°C)</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20±2</td> <td rowspan="6">Time to reach thermal equilibrium</td> </tr> <tr> <td>2</td> <td>-40±3</td> </tr> <tr> <td>3</td> <td>-25±3</td> </tr> <tr> <td>4</td> <td>20±2</td> </tr> <tr> <td>5</td> <td>105±2</td> </tr> <tr> <td>6</td> <td>20±2</td> </tr> </tbody> </table> <p>Capacitance, D.F. and Impedance shall be measured at 120Hz.</p> <p><Criteria></p> <table border="1" data-bbox="544 770 1477 1111"> <tbody> <tr> <td rowspan="2">STEP 2</td> <td>Capacitance Change</td> <td>Within ±20% of the value of STEP 1</td> </tr> <tr> <td>Impedance Ratio</td> <td>The value of ratio to STEP 1 not more than value of following table.</td> </tr> <tr> <td>STEP 3</td> <td>Impedance Ratio</td> <td>The value of ratio to STEP 1 not more than value of following table.</td> </tr> <tr> <td rowspan="3">STEP 5</td> <td>Capacitance Change</td> <td>Within ±25% of the value of STEP 1</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than the specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Not more than 8 times the specified value</td> </tr> <tr> <td rowspan="3">STEP 6</td> <td>Capacitance Change</td> <td>Within ±10% of the value of STEP 1</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than the specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Not more than the specified value</td> </tr> </tbody> </table> <table border="1" data-bbox="544 1137 1235 1272"> <tbody> <tr> <td>WV(V.DC)</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> <td>63</td> <td>100</td> </tr> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>3</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>5</td> <td>4</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> <td>3</td> </tr> </tbody> </table>	STEP	Testing Temperature (°C)	Time	1	20±2	Time to reach thermal equilibrium	2	-40±3	3	-25±3	4	20±2	5	105±2	6	20±2	STEP 2	Capacitance Change	Within ±20% of the value of STEP 1	Impedance Ratio	The value of ratio to STEP 1 not more than value of following table.	STEP 3	Impedance Ratio	The value of ratio to STEP 1 not more than value of following table.	STEP 5	Capacitance Change	Within ±25% of the value of STEP 1	Dissipation Factor	Not more than the specified value	Leakage Current	Not more than 8 times the specified value	STEP 6	Capacitance Change	Within ±10% of the value of STEP 1	Dissipation Factor	Not more than the specified value	Leakage Current	Not more than the specified value	WV(V.DC)	10	16	25	35	50	63	100	Z(-25°C)/Z(+20°C)	3	2	2	2	2	2	2	Z(-40°C)/Z(+20°C)	5	4	3	3	3	3	3
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7	Load Life Test	<p><Condition></p> <p>Capacitor under the test shall be applied the rated voltage continuously through 1000 Ω series protective resistor at 105±2°C for following test period. After the test and returned in standard condition for 1 to 2 hours, and the capacitor shall meet following requirements.</p> <table border="1" data-bbox="544 1451 1134 1662"> <thead> <tr> <th rowspan="2">Case dia</th> <th colspan="2">Life time</th> </tr> <tr> <th>10WV</th> <th>16 to 100WV</th> </tr> </thead> <tbody> <tr> <td>φ5, φ6.3</td> <td>5000⁺⁷²₀</td> <td>5000⁺⁷²₀</td> </tr> <tr> <td>φ8, φ10</td> <td>6000⁺⁷²₀</td> <td>7000⁺⁷²₀</td> </tr> <tr> <td>φ12.5 to φ18</td> <td>8000⁺⁷²₀</td> <td>10000⁺⁷²₀</td> </tr> </tbody> </table> <p><Criteria></p> <table border="1" data-bbox="544 1711 1477 1877"> <tbody> <tr> <td>Leakage Current</td> <td>Not more than the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 200% of the specified value</td> </tr> <tr> <td>ESR</td> <td>Not more than 300% of the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found, except sleeve</td> </tr> </tbody> </table>	Case dia	Life time		10WV	16 to 100WV	φ5, φ6.3	5000 ⁺⁷² ₀	5000 ⁺⁷² ₀	φ8, φ10	6000 ⁺⁷² ₀	7000 ⁺⁷² ₀	φ12.5 to φ18	8000 ⁺⁷² ₀	10000 ⁺⁷² ₀	Leakage Current	Not more than the specified value	Capacitance Change	Within ±20% of the initial value	Dissipation Factor	Not more than 200% of the specified value	ESR	Not more than 300% of the specified value	Appearance	Notable changes shall not be found, except sleeve																																						
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8	Shelf Life Test	<p><Condition> Capacitors shall be stored at 105±2°C with no voltage applied for 96 hours. After the test and returned in standard condition for 1 to 2 hours and the capacitor shall meet following requirements. (If any doubt arises on the judgment, the capacitors shall be subjected to voltage treatment specified in JIS C 5141,5.2.)</p> <p><Criteria></p> <table border="1" data-bbox="531 528 1477 678"> <tr> <td>Leakage Current</td> <td>Not more than 120% of the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±10% of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 150% of the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found</td> </tr> </table>	Leakage Current	Not more than 120% of the specified value	Capacitance Change	Within ±10% of the initial value	Dissipation Factor	Not more than 150% of the specified value	Appearance	Notable changes shall not be found		
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Appearance	Notable changes shall not be found											
9	Load Life with ripple Test	<p><Condition> Capacitor under the test shall be applied the rated voltage continuously through 1000 Ω series protective resistor (with maximum ripple current) at 105±2°C for 1000⁺⁴⁸₀ hours. After the test and returned in standard condition for 1 to 2 hours, and the capacitor shall meet following requirements.</p> <p><Criteria></p> <table border="1" data-bbox="531 893 1477 1066"> <tr> <td>Leakage Current</td> <td>Not more than the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±20% of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 200% of the specified value</td> </tr> <tr> <td>ESR</td> <td>Not more than 300% of the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found, except sleeve</td> </tr> </table>	Leakage Current	Not more than the specified value	Capacitance Change	Within ±20% of the initial value	Dissipation Factor	Not more than 200% of the specified value	ESR	Not more than 300% of the specified value	Appearance	Notable changes shall not be found, except sleeve
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ESR	Not more than 300% of the specified value											
Appearance	Notable changes shall not be found, except sleeve											
10	Surge Voltage	<p><Condition> Capacitor shall be applied the surge voltage through a (100±50)/C_R [kΩ] resistor in series for 30±5 seconds in every 6±0.5 minutes at 15 to 35°C. Procedure shall be repeated 1000 times. Then the capacitors shall be left under normal humidity for 1 to 2 hours before measurement. [C_R : Nominal Capacitance (μF)]</p> <p><Criteria></p> <table border="1" data-bbox="531 1301 1477 1451"> <tr> <td>Leakage Current</td> <td>Not more than 120% of the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±10% of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 150% of the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found</td> </tr> </table> <p>◇ This test simulates over voltage at abnormal situations, and not be hypothesizing that over voltage is always applied.</p>	Leakage Current	Not more than 120% of the specified value	Capacitance Change	Within ±10% of the initial value	Dissipation Factor	Not more than 150% of the specified value	Appearance	Notable changes shall not be found		
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11	Vibration Test	<p><Condition> Testing shall be done out in 3 AXIS for 2 hours each (total 6 hours) as below. Fix lead wire at a point not more than 4mm from the body , use mounting device separately for the one with a diameter 12.5mm and greater or with a length 25mm and longer.</p> <table border="1" data-bbox="531 1682 1137 1771"> <tr> <td>Vibration frequency range</td> <td>: 10 to 55Hz</td> </tr> <tr> <td>Peak to peak amplitude</td> <td>: 1.5mm</td> </tr> <tr> <td>Sweep rate</td> <td>: 10 to 55 to 10Hz, In about 1min.</td> </tr> </table> <p><Criteria></p> <table border="1" data-bbox="531 1816 1477 1928"> <tr> <td>Capacitance (During test)</td> <td>Measured value shall be stable. (The time from one end to the other of the vibration frequency within last 30 minutes at last direction.)</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found</td> </tr> </table>	Vibration frequency range	: 10 to 55Hz	Peak to peak amplitude	: 1.5mm	Sweep rate	: 10 to 55 to 10Hz, In about 1min.	Capacitance (During test)	Measured value shall be stable. (The time from one end to the other of the vibration frequency within last 30 minutes at last direction.)	Appearance	Notable changes shall not be found
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Capacitance (During test)	Measured value shall be stable. (The time from one end to the other of the vibration frequency within last 30 minutes at last direction.)											
Appearance	Notable changes shall not be found											

12	Solderability	<p><Condition> Terminals of the capacitor shall be immersed in flux (ethanol solution of the rosin, 25 wt% rosin) for 5 to 10 seconds and shall be immersed in the solder bath (235±5°C) and held for 2±0.5 seconds, and pulled out at the same speed.</p> <p><Criteria> At least 90% of circumferential surface of dipped portion of the terminal shall be covered with new solder.</p>																																		
13	Resistance to Solder Heat	<p><Condition> Terminals of the capacitor shall be immersed into solder bath at 260±5°C for 10±1 seconds up to 1.5 to 2.0mm from the body of capacitor. Then the capacitors shall be left under the normal temperature and normal humidity for 1 to 2 hours before measurement.</p> <p><Criteria></p> <table border="1" data-bbox="533 752 1477 902"> <tr> <td>Leakage Current</td> <td>Not more than the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±5% of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found</td> </tr> </table>	Leakage Current	Not more than the specified value	Capacitance Change	Within ±5% of the initial value	Dissipation Factor	Not more than the specified value	Appearance	Notable changes shall not be found																										
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14	Resistance to Damp Heat (Steady State)	<p><Condition> Capacitor shall be stored in the ambient of 40±2°C and relative humidity 90 to 95% for 240±8 hours. Then the capacitors shall be left under the normal temperature and normal humidity for 1 to 2 hours before measurement.</p> <p><Criteria></p> <table border="1" data-bbox="533 1104 1477 1252"> <tr> <td>Leakage Current</td> <td>Not more than the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within ±15% of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found</td> </tr> </table>	Leakage Current	Not more than the specified value	Capacitance Change	Within ±15% of the initial value	Dissipation Factor	Not more than the specified value	Appearance	Notable changes shall not be found																										
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15	Maximum Permissible Ripple Current	<p>(1)The maximum permissible ripple current is the maximum A.C. current at 100kHz and can be applied at maximum operating temperature. (2)The combined value of D.C. voltage and the peak A.C. voltage shall not exceed the rated voltage and shall not be reverse voltage.</p> <p><Frequency Coefficient></p> <table border="1" data-bbox="533 1449 1477 1561"> <thead> <tr> <th colspan="2">Frequency(Hz)</th> <th>60(50)</th> <th>120(100)</th> <th>1k</th> <th>10k</th> <th>100k</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Coefficient</td> <td>1 to 330</td> <td>0.35</td> <td>0.50</td> <td>0.75</td> <td>0.85</td> <td>1.00</td> </tr> <tr> <td>330 to 1500</td> <td>0.45</td> <td>0.65</td> <td>0.85</td> <td>0.90</td> <td>1.00</td> </tr> <tr> <td>1500 to 10000</td> <td>0.53</td> <td>0.75</td> <td>0.90</td> <td>0.95</td> <td>1.00</td> </tr> </tbody> </table> <p>< Temperature Coefficient ></p> <table border="1" data-bbox="533 1610 1174 1668"> <thead> <tr> <th>Ambient Temperature(°C)</th> <th>105</th> <th>85</th> <th>65≥</th> </tr> </thead> <tbody> <tr> <td>Coefficient</td> <td>1.0</td> <td>1.7</td> <td>2.1</td> </tr> </tbody> </table> <p>◇Temperature coefficient shows a limit of ripple current exceeding the rated ripple current that can be passed through a capacitor at each temperature when the life expectancy of a capacitor becomes to be nearly equal with the lifetime at the rated maximum operating temperature. ◇Use of aluminum electrolytic capacitor under ripple voltage with wide amplitude is equivalent to quick charge-discharge operation. When ripple voltage with the amplitude over 70Vp-p is expected for the products with rated voltage over 100V, please contact us.</p>	Frequency(Hz)		60(50)	120(100)	1k	10k	100k	Coefficient	1 to 330	0.35	0.50	0.75	0.85	1.00	330 to 1500	0.45	0.65	0.85	0.90	1.00	1500 to 10000	0.53	0.75	0.90	0.95	1.00	Ambient Temperature(°C)	105	85	65≥	Coefficient	1.0	1.7	2.1
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16	High temperature high humidity shelf	<p><Condition> Capacitors shall be stored in the ambient temperature of 85 ± 2 °C and relative humidity of 80~85% for 1000^{+48}_0 hours. Then the capacitors shall be left under the normal temperature and normal humidity for 2~4 hours before measurement.</p> <p><Criteria></p> <table border="1" data-bbox="533 499 1476 647"> <tr> <td>Leakage Current</td> <td>Not more than 120% of the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within $\pm 10\%$ of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 150% of the specified value</td> </tr> <tr> <td>Appearance</td> <td>Notable changes shall not be found</td> </tr> </table>	Leakage Current	Not more than 120% of the specified value	Capacitance Change	Within $\pm 10\%$ of the initial value	Dissipation Factor	Not more than 150% of the specified value	Appearance	Notable changes shall not be found							
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17	Storage at low temperature	<p><Condition> Capacitors shall be stored in the ambient temperature of -55 ± 2 °C for 96 hours. Then the capacitors shall be left under the normal temperature and normal humidity for 2~4 hours before measurement.</p> <p><Criteria></p> <table border="1" data-bbox="533 855 1476 965"> <tr> <td>Leakage Current</td> <td>Not more than 120% of the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within $\pm 10\%$ of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 150% of the specified value</td> </tr> </table>	Leakage Current	Not more than 120% of the specified value	Capacitance Change	Within $\pm 10\%$ of the initial value	Dissipation Factor	Not more than 150% of the specified value									
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18	Thermal shock	<p><Condition> Capacitors shall be put into the chamber and held at the temperature of each step 1 to 2 shown in following table for the specified duration by turns. This operation is counted 1 cycle, and repeated for the 5 cycles. Then the capacitors shall be left under the normal temperature and normal humidity for 2 ± 1 hours before measurement.</p> <table border="1" data-bbox="533 1193 1169 1319"> <thead> <tr> <th>STEP</th> <th>Temperature (°C)</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40 ± 2</td> <td>30min.</td> </tr> <tr> <td>2</td> <td>85 ± 2</td> <td>30min.</td> </tr> </tbody> </table> <p><Criteria></p> <table border="1" data-bbox="533 1368 1476 1478"> <tr> <td>Leakage Current</td> <td>Not more than 120% of the specified value</td> </tr> <tr> <td>Capacitance Change</td> <td>Within $\pm 10\%$ of the initial value</td> </tr> <tr> <td>Dissipation Factor</td> <td>Not more than 150% of the specified value</td> </tr> </table>	STEP	Temperature (°C)	Duration	1	-40 ± 2	30min.	2	85 ± 2	30min.	Leakage Current	Not more than 120% of the specified value	Capacitance Change	Within $\pm 10\%$ of the initial value	Dissipation Factor	Not more than 150% of the specified value
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10. Halogen free Specification

All homogeneous materials within capacitor shall meet the criteria in the following table. A homogeneous material has uniform composition throughout and cannot be mechanically disjointed into different materials.

<Criteria>	
Substances	Permissible Limit (by weight)
Bromine (Br)	≤900 ppm
Chlorine (Cl)	≤900 ppm
Total concentration of Br+Cl	≤1500 ppm

Notes on use of aluminum electrolytic capacitors

(1) Charge and discharge

Do not use for the circuit that repeats quick charge or discharge.

(2) External stress

Do not apply excessive force of pushing, pulling bending, and/or twisting to the main body, lead wire and terminals.

(3) Heat resistance at soldering process

In the soldering process of PC board with Capacitors mounted, secondary shrinkage or crack of sleeve may be observed when soldering temperature is too high and /or soldering time is too long.

If lead wire of other components or pattern of double sided PC board touches the capacitor, the similar failure may be also originated at pre-heating, heating at hardening process of adhesive and soldering process.

(4) Insulation and PC board mounting

Sleeve is for marking purpose only.

It is not recognized as insulation materials.

When double sided PC board is employed, note that it could cause a short circuit if lead wire of other components or pattern of double sided PC board touches capacitor. Please avoid circuit pattern runs underneath capacitor.

In addition, case and cathode terminal are not insulated.

(5) Adhesives and coating materials

Do not use the adhesives and coating materials that contain halogenated organic solvents or chloroprene as polymer.

(6) Storage

Keep at a normal temperature and humidity. During a long storage time, leakage current will be increased. To prevent heat rise or any trouble that high leakage current possibly causes, voltage treatment is recommended for the capacitors that have been stored for a long time.

<Storage Condition>

*Aluminum electrolytic capacitors should not be stored in high temperatures or where there is a high level of humidity. The suitable storage condition is 5°C-35°C and less than 75% in relative humidity.

*Aluminum electrolytic capacitors should not be stored in damp conditions such as water, saltwater spray or oil spray.

*Do not store aluminum electrolytic capacitors in an environment full of hazardous gas (hydrogen sulfide, sulfurous acid gas, nitrous acid, chlorine gas, ammonia or bromine gas).

*Aluminum electrolytic capacitors should not be stored under exposure to ozone, ultraviolet rays or radiation.

(7) Fumigation and halogenated flame retardant

It may cause corrosion of internal electrodes, aluminum cases and terminal surface when the following conditions exist.

*Fumigation of wooden pallets before shipment to disinfect vermin.

*Existence of components or parts that contain halogenated flame retardant agent (bromine etc.) together with capacitors.

*When halogenated detergents of antiseptics for preventing infection of epidemic diseases contact directly to capacitors.

(8) PC board cleaning after soldering

Please consult us when cleaning is subjected.

◆Guide to application except the above are described in our catalog and EIAJ RCR-2367C.

EIAJ RCR-2367C : "Safety Application Guide for fixed aluminum electrolytic capacitors for use in electronic equipment."

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