



Capacitors'range (1 uF ~ 6800uF)

CAPACITOR

Standard Aluminium Electrolytic
Capacitors
(Voltages(10-450VDC))

Ver 1.0(November 2020) : Glomore
Ver 1.1 (June 2022): Glomore
Ver 1.2 (October 2022): Glomore
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Prepared By	Approved By	Customer Approval
		Signature with Company Seal

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1 This specification covers Leone Capacitor series” radial type aluminum electrolytic capacitors.

2 APPLICABLE SPECIFICATION

GB/T2693 GB/T5993

This approval sheet consulted the institute of GB/T2693 and GB/T5993

3 OPERATING TEMPERATURE RANGE

-40°C~+105°C Operating temperature range is the range of ambient temperature at which the capacitor can be operated continuously at rated voltage

4 ATMOSPHERIC CONDITION OF MEASUREMENTS:

Unless otherwise specified, the standard range of atmospheric conditions for making Measurements and tests are as follows

Ambient temperature :15 to 35°C

Relative humidity : 45 to 75%

Air pressure: 86kpa to 106kpa

If there may be doubt on the results, measurements shall be made within the following limits.

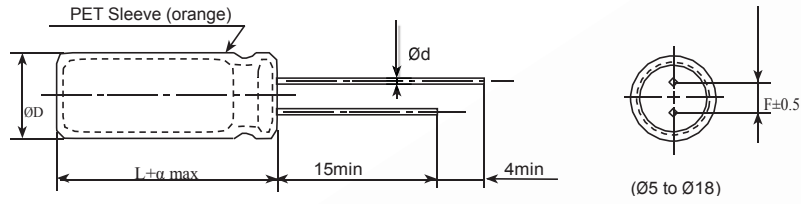
Ambient temperature :25 ±2°C

Relative humidity : 60 to 70%

Air pressure: 86kpa to 106kpa

5. Specifications

5.1



$\Phi D \pm 0.5$	5	6.3	8	10	12/13	16	18
$F \pm 0.5$	2.0	2.5	3.5	5		7.5	
$\Phi d \pm 0.05$	0.5	0.5	0.5	0.6		0.8	
L	11	9,11,12	9,12,14,16	13,17,20,25	18,20,25	18,20,25,31,35	20,25,30,35,40
α	2.0						

5.2

NO	Series	Voltage (V)	Capacitance (μF)	size (mm)	Tolerance	Tan δ @120Hz	Lc (μA) 2min	Ripple current (mA) @105°C 120Hz	Life (hours)
1		63	0.1	5*11	-20~+20%	≤ 0.10	14.5	5	3000h
2		63	0.22	5*11	-20~+20%	≤ 0.10	14.5	6	3000h
3		63	0.33	5*11	-20~+20%	≤ 0.10	14.5	6	3000h
4		63	0.47	5*11	-20~+20%	≤ 0.10	14.5	7	3000h
5		50	1	5*11	-20~+20%	≤ 0.12	14.9	13	3000h
6		50	2.2	5*11	-20~+20%	≤ 0.12	14.9	20	3000h
7		63	2.2	5*11	-20~+20%	≤ 0.10	14.5	20	3000h
8		160	2.2	6.3*12	-20~+20%	≤ 0.20	13.8	25	3000h
9		450	2.2	8*12	-20~+20%	≤ 0.25	13.8	35	3000h
10		50	3.3	5*11	-20~+20%	≤ 0.12	14.9	25	3000h
11		63	3.3	5*11	-20~+20%	≤ 0.10	14.5	28	3000h
12		50	4.7	5*11	-20~+20%	≤ 0.12	14.9	32	3000h
13		63	4.7	5*11	-20~+20%	≤ 0.10	14.5	32	3000h
14		400	4.7	8*12	-20~+20%	≤ 0.24	13.8	46	3000h
15		450	4.7	8*12	-20~+20%	≤ 0.25	13.8	58	3000h
16		50	6.8	5*11	-20~+20%	≤ 0.12	14.9	40	3000h

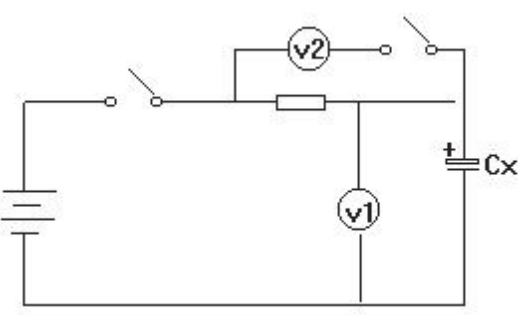
17		63	6.8	5*11	-20~+20%	≤ 0.10	14.5	40	3000h
18		450	6.8	10*13	-20~+20%	≤ 0.25	13.8	80	3000h
19		50	10	5*11	-20~+20%	≤ 0.12	13.5	47	3000h
20		100	10	6.3*12	-20~+20%	≤ 0.08	13.5	50	3000h
21		250	10	10*13	-20~+20%	≤ 0.20	13.5	68	3000h
22		400	10	10*12.5	-20~+20%	≤ 0.24	13.8	85	3000h
23		450	10	10*17	-20~+20%	≤ 0.25	13.8	95	3000h
24		400	15	8*16	-20~+20%	≤ 0.24	13.8	125	3000h
25		25	22	5*11	-20~+20%	≤ 0.16	13	58	3000h
26		50	22	5*11	-20~+20%	≤ 0.12	13.5	70	3000h
27		63	22	5*11	-20~+20%	≤ 0.10	14.5	80	3000h
28		400	22	13*21	-20~+20%	≤ 0.24	13.8	165	3000h
29		450	22	16*25	-20~+20%	≤ 0.25	13.8	165	3000h
30		450	27	16*25	-20~+20%	≤ 0.25	13.8	185	3000h
31		25	33	5*11	-20~+20%	≤ 0.16	13	69	3000h
32		35	33	5*11	-20~+20%	≤ 0.14	13.5	77	3000h
33		50	33	5*11	-20~+20%	≤ 0.12	13.5	85	3000h
34		63	33	6*12	-20~+20%	≤ 0.10	14.5	100	3000h
35		450	33	16*25	-20~+20%	≤ 0.25	13.8	250	3000h
36		35	47	5*11	-20~+20%	≤ 0.14	13.5	110	3000h
37		50	47	6*11	-20~+20%	≤ 0.12	13.5	115	3000h
38		63	47	6*11	-20~+20%	≤ 0.10	14.5	125	3000h
39		100	47	8*12	-20~+20%	≤ 0.08	13.8	180	3000h
40		450	47	16*25	-20~+20%	≤ 0.25	13.8	300	3000h
41		450	68	16*25	-20~+20%	≤ 0.25	13.8	490	3000h
42		16	100	5*11	-20~+20%	≤ 0.18	13.5	115	3000h
43		35	100	6*12	-20~+20%	≤ 0.14	13.5	160	3000h
44		63	100	8*12	-20~+20%	≤ 0.10	14.5	200	3000h
45		100	100	10*17	-20~+20%	≤ 0.08	13.5	285	3000h
46		400	100	18*30	-20~+20%	≤ 0.24	13.5	530	3000h
47		450	100	18*35	-20~+20%	≤ 0.25	13.8	650	3000h
48		16	220	6*11	-20~+20%	≤ 0.18	13.5	220	3000h
49		35	220	8*12	-20~+20%	≤ 0.14	13.5	255	3000h
50		50	220	10*13	-20~+20%	≤ 0.12	13.5	345	3000h
51		16	330	6*12	-20~+20%	≤ 0.18	13.5	230	3000h
52		25	330	8*12	-20~+20%	≤ 0.16	13	310	3000h
53		35	330	8*16	-20~+20%	≤ 0.14	13.5	400	3000h
54		50	330	10*17	-20~+20%	≤ 0.12	13.5	450	3000h
55		63	330	10*20	-20~+20%	≤ 0.10	14.5	540	3000h
56		10	470	6.3*12	-20~+20%	≤ 0.22	13.5	235	3000h
57		16	470	8*12	-20~+20%	≤ 0.18	13.5	375	3000h

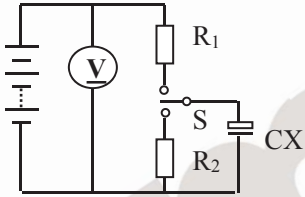
58	35	470	10*17	-20~+20%	≤ 0.14	13.5	525	3000h
59	63	470	13*21	-20~+20%	≤ 0.10	14.5	695	3000h
60	100	470	16*25	-20~+20%	≤ 0.08	13.5	810	3000h
61	63	1000	16*25	-20~+20%	≤ 0.10	14.5	1185	3000h
62	16	2200	10*20	-20~+20%	≤ 0.18	13.5	1050	3000h
63	35	2200	13*25	-20~+20%	≤ 0.14	13.5	1300	3000h
64	50	2200	16*30	-20~+20%	≤ 0.12	13.5	1400	3000h
65	63	2200	18*35	-20~+20%	≤ 0.10	14.5	1800	3000h
66	16	3300	13*21	-20~+20%	≤ 0.18	13.5	1300	3000h
67	25	3300	16*25	-20~+20%	≤ 0.16	13	1500	3000h
68	35	3300	16*30	-20~+20%	≤ 0.14	13.5	1680	3000h
69	50	3300	18*35	-20~+20%	≤ 0.12	13.5	1780	3000h
70	16	4700	13*25	-20~+20%	≤ 0.18	13.5	1650	3000h
71	25	4700	16*25	-20~+20%	≤ 0.16	13	1800	3000h
72	50	4700	22*40	-20~+20%	≤ 0.12	13.5	2080	3000h
73	35	4700	18*30	-20~+20%	≤ 0.14	13.5	1920	3000h
74	25	6800	16*30	-20~+20%	≤ 0.16	13	2050	3000h
75	50	6800	22*40	-20~+20%	≤ 0.12	13.5	3300	3000h
76	63	1	5*11	-20~+20%	≤ 0.10	14.5	13	3000h
77	63	10	5*11	-20~+20%	≤ 0.10	14.5	45	3000h
78	25	47	5*11	-20~+20%	≤ 0.16	13	105	3000h
79	25	100	6*11	-20~+20%	≤ 0.16	13	145	3000h
80	50	100	8*12	-20~+20%	≤ 0.12	13.5	200	3000h
81	25	220	8*12	-20~+20%	≤ 0.16	13	240	3000h
82	63	220	10*17	-20~+20%	≤ 0.10	14.5	380	3000h
83	25	470	8*12	-20~+20%	≤ 0.16	13	410	3000h
84	50	470	10*20	-20~+20%	≤ 0.12	13.5	600	3000h
85	16	1000	10*13	-20~+20%	≤ 0.18	13.5	540	3000h
86	25	1000	10*17	-20~+20%	≤ 0.16	13	680	3000h
87	35	1000	10*20	-20~+20%	≤ 0.14	13.5	860	3000h
88	50	1000	13*25	-20~+20%	≤ 0.12	13.5	900	3000h
89	25	2200	13*21	-20~+20%	≤ 0.16	13	1230	3000h
90	100	1000	18*35	-20~+20%	≤ 0.08	14.5	1060	3000h
91	25	820	10*17	-20~+20%	≤ 0.12	0.038	1430	3000h
92	25	680	10*17	-20~+20%	≤ 0.12	0.063	1030	3000h
93	450	150	18*35	-20~+20%	≤ 0.25	3	700	2000h

5.3 Frequency correction factor for ripple current

(Hz) Frequency	120	1K	10K	100K
16V~450V	0.5	0.8	0.9	1.0

6. Reliability Test:

NO	Item	Conditions	Specifications
6.1	Capacitance	Measuring frequency : 120HZ±20% Measuring circuit: Series equivalent circuit Measuring voltage: 0.5Vrms or less +1.5 to 2.0 VDC	Capacitance Tolerance -20~+20%
6.2	Dissipation Factor	Testing condition are the same as 5.1 for capacitance	Refer to table 1.
6.3	Leakage current	<p>The rated voltage shall be applied across the capacitor and its protective resistor which shall be $1000 \pm 10 \Omega$. The leakage current shall then be measured after an electrocution period of 2 min. The leakage current shall be calculated by the following equation.</p> $(I) = E/R_s$ <p>Leakage current: E: Voltage measured with DC voltmeter</p> <p>Resistance of the protective resistor measurement circuit</p>  <p>voltage drop method) $R_s: (1000 \pm 10 \Omega)$ protective resistor</p> <p>DC voltmeter or electronic voltmeter S1: switch S2: Protective switch for a voltmeter CX: test capacitance</p>	$I_C \leq 0.02CV + 10 (\mu A)$ I _C : Leakage current(μA) C: Capacitance (μF) V: Rated voltage(V)

NO	Items	Conditions	Specifications
6.4	Surge Voltage	<p>The capacitor shall be subjected to 1000 cycles at a temperature specified below, each consisting of a charge period of 30 ± 5s, followed by a discharge period of approx 5min.30 s. And the capacitor shall be stored 1-2 hours under standard atmospheric conditions to obtain thermal stability , after which measurement shall be made</p> <p>Test voltage: see 3</p> <p>Test Temperature : $15 \sim 30^{\circ}\text{C}$</p> <p>Measurement circuit</p>  <p>R1: (1KΩ) Protective series resistor (1KΩ) V: DC Voltage R2: Discharge resistor (1KΩ) S: Switch Cx: Test Capacitor</p>	<p>Leakage Current: Not more than the specified value</p> <p>Capacitance change: Within $\pm 15\%$ of the initial value</p> <p>Dissipation Factor : Not more than the specified value</p>
6.5	Safety vent Test	<p>The capacitor is shall be connected in inverse polarity, and applied DC current at 1A constant, The pressure relief device shall open in such a way as to avoid any danger of fire or explosion of capacitor elements (Terminal and mental foil etc.) or cover</p>	

6.6	Temperature Characteristic	<p>The capacitor shall be subjected in turn to the procedures specified below.</p> <table border="1" data-bbox="651 293 1201 730"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>20±2°C</td> <td></td> </tr> <tr> <td>2</td> <td>-25°C</td> <td>2h</td> </tr> <tr> <td>3</td> <td>20±2°C</td> <td></td> </tr> <tr> <td>4</td> <td>105°C</td> <td>2h</td> </tr> <tr> <td>5</td> <td>20±2°C</td> <td></td> </tr> </table> <p>* The capacitor should be stored at each temperature until measured impedance or capacitance are stabilized .</p> <table border="1" data-bbox="434 938 1418 1238"> <tr> <td rowspan="2">Step 2</td> <td>Impedance ratio</td> <td>1 (Page 6) refer to table 1</td> </tr> <tr> <td>Change in capacitance</td> <td>within -20~+20% of step 1</td> </tr> <tr> <td>Step 4</td> <td>Change in capacitance</td> <td>within -20~+20% of step 1</td> </tr> </table> <p>Step 1: Capacitance, Dissipation Factor and impedance shall be measured.</p> <p>Step 2 : After the capacitor being stored for 2 hours, Capacitance, Dissipation Factor and impedance shall be Measured. The measurement shall be made at thermal stability.</p> <p>Step 4 : After the capacitor being stored for 2 hours, Capacitance, Dissipation Factor and impedance shall be Measured. The measurement shall be made at thermal stability.</p>				1	20±2°C		2	-25°C	2h	3	20±2°C		4	105°C	2h	5	20±2°C		Step 2	Impedance ratio	1 (Page 6) refer to table 1	Change in capacitance	within -20~+20% of step 1	Step 4	Change in capacitance	within -20~+20% of step 1
1	20±2°C																											
2	-25°C	2h																										
3	20±2°C																											
4	105°C	2h																										
5	20±2°C																											
Step 2	Impedance ratio	1 (Page 6) refer to table 1																										
	Change in capacitance	within -20~+20% of step 1																										
Step 4	Change in capacitance	within -20~+20% of step 1																										

No.	Items	Conditions	Specifications
6.7	Load life	The capacitor shall be placed in a circulating air oven at an ambient temperature of $105\pm 2^{\circ}\text{C}$. It must not be subjected to direct radiation from heating elements. DC voltage and the rated ripple current shown in table shall be applied for a period of 10000 hours. The sum of the DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitor. It shall be subjected to standard atmospheric for 16 hours, after which measurement shall be made.	Leakage current : Not more than Initial specified value Capacitance change : Within $\pm 30\%$ of initial value dissipation factor : Not more than 300% of initial specified value
6.8	Shelf life	The capacitors are then stored with no voltage at a temperature of $105\pm 2^{\circ}\text{C}$ for 1000 h and then resumed 16 hours.	Leakage current : Not more than 200% of initial specified value Capacitance change : Within $\pm 20\%$ of initial value dissipation factor : Not more than 200% of initial specified value

Table 1

NO	Item	Conditions	Specifications										
6.9	Solder ability	Solder press time: $2.5\pm 0.5\text{s}$ Solder temperature: $255+5/-0^{\circ}\text{C}$	At least 90% of Circumferential surface of the dipped portion of termination shall be covered with new solder										
6.10	terminal Strength	10 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>0.5</td> <td>0.6</td> <td>0.8</td> <td>1.0</td> </tr> <tr> <td></td> <td>5.0</td> <td>10</td> <td></td> <td>20</td> </tr> </table>		0.5	0.6	0.8	1.0		5.0	10		20	When the capacitance is measured, there shall be no
	0.5	0.6	0.8	1.0									
	5.0	10		20									

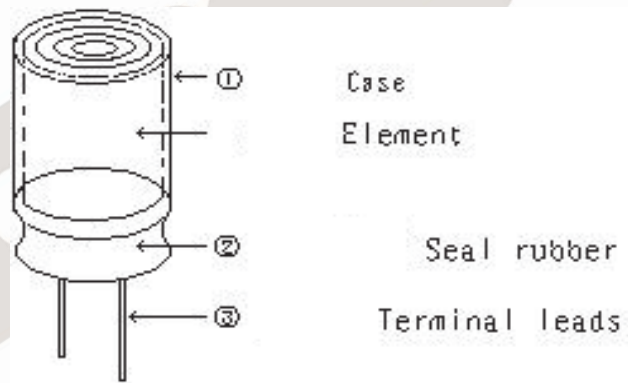
		<p>Tensile strength of termination: A static load of* IN shall be applied to the terminal in the axial direction and acting in a direction away from the body for 10 sec.</p> <p>Bending strength of termination: Hang the specified dead weight of*2N,then bent the body through 90°with The same speed ,again return to the original position Carry out this operation in 5 sec.</p>	<p>intermittent contacts or open –or short –circuiting . There shall be no such mechanical damage as terminal damage etc.</p>
6.11	Resistance to Vibration	<p>IEC60068-2-6</p> <p>To comply with IEC60068-2-6</p> <p>Direction and duration of vibration: 3 orthogonal directions mutually each for 2h,Total 6h.</p>	<p>When the capacitance is measured, there shall be no intermittent contacts or open –or short –circuiting . There shall be no such mechanical damage as terminal damage etc.</p>

NO	Item	Experiment method	Performance
6.12	Resistance to soldering heat	<p>Test Temperature: 270±5°C</p> <p>Test time: 10±0.5s</p>	<p>Variation of capacitance: Within ±10% of the initial value Dissipation factor: Not more than the specified value. Leakage current: Not more than the specified value. Appearance: No remarkable abnormality.</p>

<p>6.13</p> <p>Resistance to damp heat (steady state)</p>	<p>IEC60068-2-3</p> <p>To comply with IEC60068-2-3 Test temperature: 40±2°C Test time : 240±8h Relative humidity: 90~95% After completion of test, the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurements shall be made.</p>	<p>Variation of capacitance: Within ±15% of the value before test. Dissipation factor: Not more than the specified value Leakage Current :Not more than the specified value Appearance: No remarkable abnormality.</p>
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7. Frame and material

7.1 (Frame drawing)



8**8.1 Important information on the application of aluminum electrolytic capacitors****(1) DC electrolytic capacitors are polarized**

When reverse voltage is applied on DC electrolytic capacitor, the capacitor will become short circuited please use non polarized capacitors in the circuit are damage due to abnormal current flows through the capacitors since the circuit where the positive voltage may be applied to the cathode terminal.

(2) When capacitor is used at higher voltage than the rated voltage, leakage current increases, characteristics drastically deteriorate and damage in a short period may occur as a result .please take extra caution that the peak voltage should not exceed the rated voltage.

(3) When aluminum electrolytic capacitors for general purpose are employed in rapid charge and discharge application, its life expectancy may be shortened by capacitance decrease, heat rise, etc.

(4) Store the capacitor

I creased leakage current is common in aluminum capacitors which have been stored for long period of time .The higher the storage temperature, the higher the leakage current increase therefore please take precautions concerning the storage location. The leakage current causes problems in the circuit, apply voltage (aging) before using.

(5) Ripple current applied to capacitor should not exceed the rated value.

Excessive heat will reduce capacitance and result in shortened life of capacitor if ripple currents exceeding the limit

specified rated value are applied .the peak value of the ripple voltage should be less than the rated voltage.

(6) Lead stress

When a strong force is applied to the lead wires or terminals. Stress is put on the internal connections. This may result in short circuit, open circuit or increased leakage current .It is not advisable to bend or handle a capacitor after it has been soldered to the PC board.

(7)

In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinkage or crack of PVC sleeve may be observed when solder temperature is too high or dipping time is too long.

(8)

A PC board must be designed so its hole pitch coincides with the lead pitch(lead spacing) of the capacitor specified by the catalog or specifications .When a capacitor is forcibly inserted into an unmatched hole pitch ,a stress is put on the leads This could result In a short circuit or increased leakage current.

8.2 This product is lead free and environmental friendly

This product is according to the standard of RoHS , it means the max capacitance of six harmful material not over the following request:

Cd	-100PPM	PB	-1000PPM	Hg	-1000PPM
Cr ⁴ (6)	-1000PPM	PBBs	-1000PPM	PBDEs	-1000PPM