

Customer : \_\_\_\_\_  
(客 戶)

Part No. : \_\_\_\_\_  
(貴公司料號)

# SPECIFICATION FOR APPROVAL

## 承 認 書

Description : Organic Conductive Polymer Aluminum Electrolytic Capacitor  
(零件名稱)

Lelon Series : OCRU Series  
(立隆系列)

Lelon Part No.: ORU101M1EBK-0808  
(立隆料號)

### LELON ELECTRONICS CORP.

#### 立隆電子工業股份有限公司

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#### Approval Signatures

貴公司承認印

Approval 核准	Check 確認	Design 作成
		

Please Return One Copy with Your Approval  
承認後請寄回本圖一份

## Part Numbering System

### Product Code Guide – Radial Type

OCR series	470μF	±20%	6.3V	Bulk Package	Gas Type	8φ×11.5L	Pb-free Wire + PET Sleeve	
<b>OCR</b>	<b>471</b>	<b>M</b>	<b>0J</b>	<b>BK</b>	<b>-</b>	<b>0811</b>		
□□□	□□□	□	□□	□□	□	□□□□	□	
①	②	③	④	⑤	⑥	⑦	⑧	⑨
Series	Capacitance	Capacitance Tolerance	Rated Voltage	Lead Configuration & Package	Rubber Type	Case size	Lead Wire and Sleeve Type	Supplement Code

**① Series:**

Series is represented by a three-letter code. When the series name only has two letters, use a hyphen, “-”, to fill the third blank. When the series name has 4 letters, use the following series codes.

OCRZ→ ORZ; OCRK→ ORK; OCRU→ ORU

**② Capacitance:**

Capacitance in μF is represented by a three-digit code. The first two digits are significant and the third digit indicates the number of zeros following the significant figure. “R” represents the decimal point for capacitance under 10μF.

Example:

Capacitance	22	47	100	220	470	1,000	2,200	4,700
Part number	220	470	101	221	471	102	222	472

**③ Tolerance:**

K = -10% ~ +10%	M = -20% ~ +20%	V = -10% ~ +20%
-----------------	-----------------	-----------------

**④ Rated voltage:**

Rated voltage in volts (V) is represented by a two-digit code

Voltage (WV)	2.5	4	6.3	10	16	20	25	35	50	63
Code	0E	0G	0J	1A	1C	1D	1E	1V	1H	1J

**⑤ Lead configuration and package:**

BK = Bulk Package	TA = Formed Lead Taping
FC = Formed & Cut Lead	SA = Straight Lead Taping
CC = Cut Lead	SD = Bent Cathode Lead
SF = Snap-in & Formed Cut Lead	BC = Bent & Cut Lead (Leads in Right Direction)
SC = Snap-in & Cut Lead	BU = Bent & Cut Lead (Leads in Left Direction)

**⑥ Rubber type:**

- = Gas escape type	F = Flat rubber bung
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Note : For case size of 5φ, 6.3φ×6 ~ 8L and 8φ×8L in OCRZ, ORE, OCRK series of OP-CAP, flat rubber bung is the standard design, In these cases, use a hyphen, “-”, in this digit.

**⑦ Case size:**

The first two digits indicate case diameter and the last two digits indicate case length in mm.

φD×L	5×8	6.3×5.5	6.3×6	6.3×6.5	6.3×8	6.3×11	8×6.5	8×8	8×11.5
Code	<b>0508</b>	<b>0605</b>	<b>0606</b>	<b>0606</b>	<b>0608</b>	<b>0611</b>	<b>0807</b>	<b>0808</b>	<b>0811</b>
φD×L	8×12	10×10	10×12						
Code	<b>0812</b>	<b>1010</b>	<b>1012</b>						

Note: When a case size is required and not shown in the table, please contact with us for further discussion.

**⑧ Lead Wire and Sleeve Type:**

None = Standard design Pb-free wire + PET sleeve (aluminum e-cap) Pb-free wire + Coating case (OP-CAP)	T = Sn-Pb wire + PET sleeve
B = Sn-Bi wire + PET sleeve	

\* When a supplement code following a blank digit code of lead wire and sleeve type (standard design), use a hyphen, “-”, to fill the blank digit.

\* When the automotive control code is required, please contact with us for further discussion.

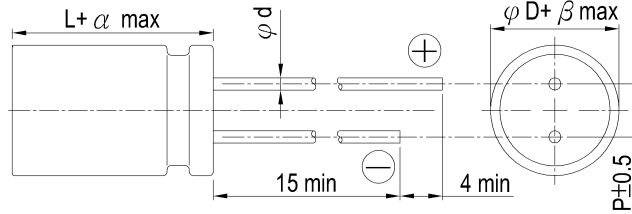
**⑨ Supplement code (Optional):**

For special control purpose

CUSTOMER :

CUSTOMER P/N:

PRODUCT DIMENSIONS



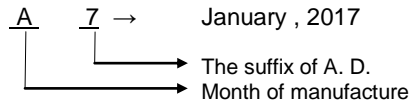
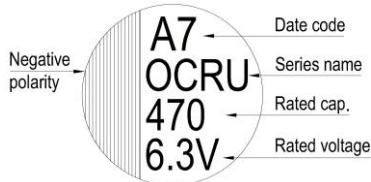
Unit: mm

$\phi$ D	8
L	8
P	3.5
$\phi$ d $\pm$ 0.05	0.6
$\alpha$	1.0
$\beta$	0.5

Items	Performance																		
Rated Voltage $V_R$	25 V																		
Capacitance $C_R$	100 $\mu$ F (120 Hz, 20°C)																		
Category Temperature Range	-55°C ~ +125°C																		
Capacitance Tolerance	-20 % ~ +20 % (120 Hz, 20°C)																		
Surge Voltage $V_S$	29.0 $V_{DC}$																		
Leakage Current (20°C)	$I_{LEAK} \leq 500 \mu$ A After 2 minutes																		
Tan $\delta$	$\leq 0.12$ (120 Hz, 20°C)																		
ESR $_{max}$ .	$< 24 m\Omega$ (100k ~300k Hz, 20°C)																		
Ripple Current ( $I_{AC,R} / r_{ms}$ )	1160 mA (100k Hz, 125°C)																		
Ripple Current (mA) and Frequency Multipliers	<table border="1"> <thead> <tr> <th>Frequency (Hz)</th> <th><math>120 \leq f &lt; 1k</math></th> <th><math>1k \leq f &lt; 10k</math></th> <th><math>10k \leq f &lt; 100k</math></th> <th><math>100k \leq f &lt; 500k</math></th> </tr> </thead> <tbody> <tr> <td>Multiplier</td> <td>0.05</td> <td>0.3</td> <td>0.7</td> <td>1.0</td> </tr> </tbody> </table>	Frequency (Hz)	$120 \leq f < 1k$	$1k \leq f < 10k$	$10k \leq f < 100k$	$100k \leq f < 500k$	Multiplier	0.05	0.3	0.7	1.0								
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Endurance and Moisture Resistance	<table border="1"> <thead> <tr> <th>Items</th> <th>Endurance</th> <th>Moisture Resistance</th> </tr> </thead> <tbody> <tr> <td>Test Time</td> <td>2,000 Hrs at 125°C; <math>V_R</math></td> <td>1,000 Hrs at 60°C; 90 ~ 95% R. H.</td> </tr> <tr> <td>Cap. Change</td> <td>Within <math>\pm</math>30 % of initial value</td> <td>Within <math>\pm</math>20 % of initial value</td> </tr> <tr> <td>Tan <math>\delta</math></td> <td>Less than 300% of specified value</td> <td>Less than 150% of specified value</td> </tr> <tr> <td>ESR</td> <td>Less than 300% of specified value</td> <td>Less than 150% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> <td>Within specified value</td> </tr> </tbody> </table>	Items	Endurance	Moisture Resistance	Test Time	2,000 Hrs at 125°C; $V_R$	1,000 Hrs at 60°C; 90 ~ 95% R. H.	Cap. Change	Within $\pm$ 30 % of initial value	Within $\pm$ 20 % of initial value	Tan $\delta$	Less than 300% of specified value	Less than 150% of specified value	ESR	Less than 300% of specified value	Less than 150% of specified value	Leakage Current	Within specified value	Within specified value
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Tan $\delta$	Less than 300% of specified value	Less than 150% of specified value																	
ESR	Less than 300% of specified value	Less than 150% of specified value																	
Leakage Current	Within specified value	Within specified value																	
Standards	JIS C 5101-26, IEC 60384-4																		
Remarks	RoHS Compliance, Halogen-free																		

\* For any doubt about measured values, measure the leakage current again after the following voltage treatment.  
Voltage treatment: Applying DC rated voltage to the capacitors for 2 hours at 105°C.

Marking: Each capacitor shall be marked with the following information.



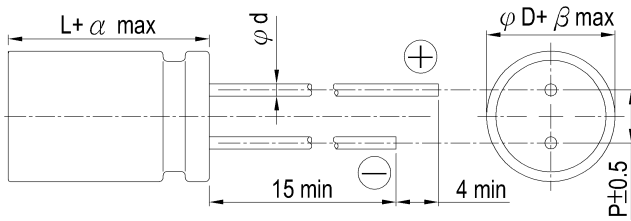
Month	1	2	3	4	5	6
Code	A	B	C	D	E	F
Month	7	8	9	10	11	12
Code	G	H	I	J	K	L

Marking color: Blue

\* Please refer to "Precautions and Guidelines for Aluminum Electrolytic Capacitors" section in Lelon's catalog for further details.

Publication Date	January 3, 2016	Approval Signatures:	Approved	Checked	Designed
Revision Date					
Version No.	1		Please return one copy with your approval		

Diagram of Dimensions:



Lead Spacing & Diameter Unit: mm

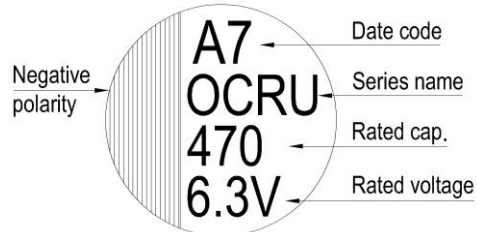
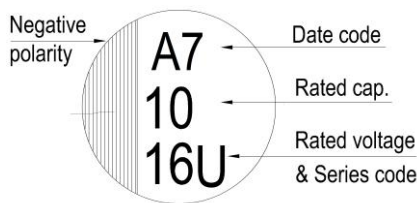
$\phi D$	6.3		8		10
L	8	11	11.5	12	12
P	2.5		3.5		5.0
$\phi d \pm 0.05$	0.6	0.5	0.6		
$\alpha$	1.0				
$\beta$	0.5				

Coated Case Marking:

Each capacitor shall be marked with the following information.

$\phi D = 6.3 \text{ mm}$

$\phi D = 8 \sim 10 \text{ mm}$



Description of Date Code:

A 7 → January, 2017

→ The last digit of A. D.  
 → Month of manufacture

Month	1	2	3	4	5	6
Code	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
Month	7	8	9	10	11	12
Code	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	<b>K</b>	<b>L</b>

Origin Code:

Huizhou: A7, B7, ..., K7, L7  
 Suzhou: 7A, 7B, ..., 7K, 7L

Marking Color: Blue

Packaging Quantity:

1. Radial Type in Bulk Pack (Long Lead):

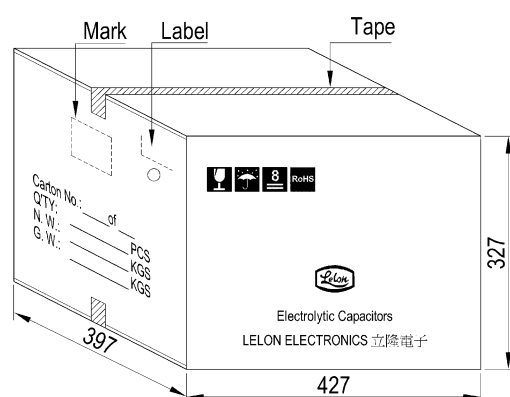
Case Size	Pcs / Bag	Pcs / Carton	Case Size	Pcs / Bag	Pcs / Carton
3φ × 5	1,000	60,000	10φ × 16L	500	7,000
4φ × 5 ~ 7L	1,000	50,000	10φ × 20 ~ 25L	500	6,000
5φ × 5 ~ 7L	1,000	40,000	10φ × 30 ~ 40L	400	4,000
*5φ × 8L	*1,000	*40,000	10φ × 45 ~ 50L	200	3,000
5φ × 11L	1,000	30,000	12.5φ × 16 ~ 20L	300	3,600
6.3φ × 5 ~ 7L	1,000	30,000	12.5φ × 25 ~ 35L	250	3,000
*6.3φ × 5.5 ~ 8L	*1,000	*30,000	12.5φ × 40L	250	3,000
6.3φ × 11L	1,000	20,000	12.5φ × 45 ~ 50L	100	2,000
	*1,000	*20,000	16φ × 16 ~ 25L	150	1,800
6.3φ × 15L	1,000	15,000	16φ × 31.5L	100	1,200
8φ × 5 ~ 9L	1,000	15,000	16φ × 35.5 ~ 40L	100	1,000
8φ × 11.5L	1,000	12,000	16φ × 45 ~ 50L	50	1,000
*8φ × 8L	*1,000	*15,000	18φ × 16L	150	1,800
*8φ × 12L	*1,000	*12,000	18φ × 20 ~ 35.5L	100	1,200
8φ × 15L	1,000	10,000	18φ × 40L	100	800
8φ × 20L	1,000	8,000	18φ × 45 ~ 50L	50	600
8φ × 25 ~ 30L	500	6,000	20φ × 40L	50	500
8φ × 35 ~ 50L	250	3,000	22φ	50	500
*10φ × 7.7 ~ 10L	*500	*12,000	25φ × 40L	25	300
10φ × 9L	1,000	12,000	25φ × 45 ~ 50L	25	250
10φ × 12.5 ~ 13L	500	8,000			

Remark: “\*” Suitable for CAP04 type (OP-CAP).

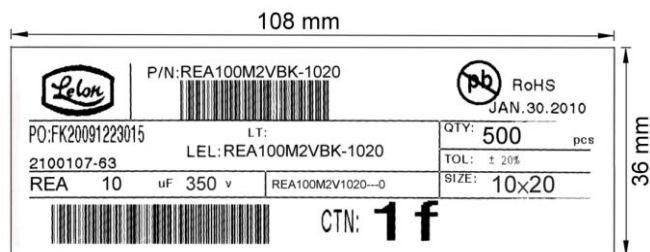
Packing Figure:

a) Outer Box

Unit: mm



b) Label



## Endurance Characteristic:

No.	Item	Conditions	Specification															
1	Rotational Temperature Test	Capacitor is placed in an oven whose temperature follow specific regulation to change. The specific regulation is " +25°C (3 min.) → -55°C (30 min.) → +25°C (3min.) → +125°C (30 min.) → +25°C (3 min.) ", and it is called a cycle. The test totals 10 cycles. And then the capacitor shall be subjected to standard atmospheric conditions for 4 hours, after which meaurments shall be made.	Capacitance change	Within ±10% of the initial value.														
			Tanδ	Within specified value														
			Leakage Current	Within specified value														
			Physical	No broken and undamaged														
2	High Temperature Endurance Life Test	1. Capacitors shall be placed in oven with application of rated voltage for 2.5~4V: 1,000 +48/-0 hours 6.3~20v: 2,000 +72/-0 hours at 125°C. 2. Then the capacitor shall be subjected to standard atmospheric conditions for 4 hours, after which measurements shall be made.	Capacitance change	Within ±30% of the initial value.														
			Tanδ	Less than 300% of specified value														
			ESR	Less than 300% of specified value														
			Leakage Current	Within specified value														
3	Moisture Resistance	Capacitors shall be exposed for 1000 +48/-0 hrs in an atmosphere of 90 ~ 95% R.H. at 60±3°C. And then the capacitor shall be subjected to standard atmospheric conditions for 4 hours, after which measurements shall be made.	Capacitance change	Within ±20% of the initial value.														
			Tanδ	Less than 150% of specified value														
			ESR	Less than 150% of specified value														
			Leakage Current	Within specified value														
4	Vibration Test	1. Fix it at the point 4mm or less form body. For ones of 12.5mm or more in diameter or 25mm or more length, use separate fixture. 2. Direction and during of vibration: 3 orthogonal directions mutually each for 2 hrs (total of 6 hrs). 3. Frequency: 10 to 55 Hz reciprocation for 1min. 4. Total amplitude : 1.5mm	Capacitance change	Within ±10% of the initial value.														
			Tanδ	Within specified value														
			ESR	Within specified value														
			Leakage Current	Within specified value														
5.	Resistance to Soldering Heat Test	The section of lead below 4mm from the body of capacitor must be immersed in 260±5°C liquid tin 10±1 seconds, than, after removing the following specifications shall be satisfied when capacitor terminal is restored to 20°C within two hours or over an hour.	Capacitance change	Within ±10% of the initial value.														
			Tanδ	Within specified value														
			ESR	Within specified value														
			Leakage Current	Within specified value														
6	Surge Voltage Test	The capacitor shall be subjected to 1000 cycles at 15~35°C. Protective series resistor a 1KΩ each consisting of a charge period of 30±5 seconds, followed by discharge period of approximately 5.5 minutes.  Applying voltage: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Rated Voltage(V)</td> <td>2.5</td> <td>4</td> <td>6.3</td> <td>10</td> <td>16</td> <td>20</td> </tr> <tr> <td>Surge Voltage(V)</td> <td>2.9</td> <td>4.6</td> <td>7.2</td> <td>12.0</td> <td>18.0</td> <td>23.0</td> </tr> </table> Refer to JIS C 5101-25: 2009	Rated Voltage(V)	2.5	4	6.3	10	16	20	Surge Voltage(V)	2.9	4.6	7.2	12.0	18.0	23.0	Capacitance change	Within ±20% of the initial value.
			Rated Voltage(V)	2.5	4	6.3	10	16	20									
			Surge Voltage(V)	2.9	4.6	7.2	12.0	18.0	23.0									
			Tanδ	Less than 150% of specified value														
ESR	Less than 150% of specified value																	
7	Thermal Shock Test	Capacitor is placed in an oven whose temperature follow specific regulation to change. The specific regulation is - 55 ± 3°C (30 min.) → +125 ± 3°C (30 min.), and it is called a cycle. The test totals 10 cycles.	Capacitance change	Within ±10% of the initial value.														
			Tanδ	Within specified value														
			ESR	Within specified value														
			Leakage Current	Within specified value														
			Physical	No broken and undamaged														

No.	Item	Conditions																
8	Mechanical Characteristics Test	<p>1. The test is about lead tabs strength.</p> <p>2. Tension Test: The lead tabs shall not be broken or any malformed condition after fixing capacitor vertically and pressing the following weight on the lead tabs of capacitor for 10±1 secs.</p> <table border="1" data-bbox="657 309 1230 461"> <thead> <tr> <th>Lead tabs diameter (mm)</th> <th>Weight (Kgf)</th> </tr> </thead> <tbody> <tr> <td>≤ 0.5</td> <td>0.5</td> </tr> <tr> <td>0.6 ~ 0.8</td> <td>1.0</td> </tr> <tr> <td>&gt; 0.8</td> <td>2.0</td> </tr> </tbody> </table> <p>3. Bending Test: The capacitor is held in vertical position. Attach a weight to the lead tabs, slowly rotate the capacitor 90° to a same way in the opposite direction. Repeat it again (5 secs / cycle). The lead tabs shall not be broken or cracked.</p> <table border="1" data-bbox="657 573 1230 725"> <thead> <tr> <th>Lead tabs diameter (mm)</th> <th>Weight (Kgf)</th> </tr> </thead> <tbody> <tr> <td>≤ 0.5</td> <td>0.25</td> </tr> <tr> <td>0.6 ~ 0.8</td> <td>0.50</td> </tr> <tr> <td>&gt; 0.8</td> <td>1.00</td> </tr> </tbody> </table>	Lead tabs diameter (mm)	Weight (Kgf)	≤ 0.5	0.5	0.6 ~ 0.8	1.0	> 0.8	2.0	Lead tabs diameter (mm)	Weight (Kgf)	≤ 0.5	0.25	0.6 ~ 0.8	0.50	> 0.8	1.00
Lead tabs diameter (mm)	Weight (Kgf)																	
≤ 0.5	0.5																	
0.6 ~ 0.8	1.0																	
> 0.8	2.0																	
Lead tabs diameter (mm)	Weight (Kgf)																	
≤ 0.5	0.25																	
0.6 ~ 0.8	0.50																	
> 0.8	1.00																	
9	Solderability Test	After the lead wire fully immersed in the solder for 2±0.5 secs at a temperature of 245±5°C, the solder coating must be more than 95%.																
10	Failure Rate Level	Examination of resistance to solder heat. Test temperature : 105±3°C Applied voltage : Apply D.C. voltage equal to rated voltage. Confidence level : 60 %																
11	Coating Case	The color of coating case will turn light khaki from colorless with long duration in high temperature. Should there is any concern with the color changing of coating case, please consult with us.																
12	Standards	Satisfies Characteristic W of JIS C 5101-1																
13	Remarks	OP-CAP is appropriate for the products of non-concussive environment, if it needs to be applied on concussive environment, we suggest that the capacitors should be fixed by glue and it cannot exceed the condition of concussive spec.																

## Precautions and Guidelines for Organic Conductive Polymer Aluminum Capacitors

**Organic conductive polymer capacitor (OP-CAP)** is specially structured using with a solid electrolyte of conductive polymers, has several advantages over non-solid aluminum capacitors due to its compact size, wide operation temperature range, high resistance against ripple current, and especially, low ESR. The only disadvantage, however, is their low working voltage. Over past few years, Lelon has developed a number of series of OP-CAPs. Please refer to following guidelines for obtaining the highest performance and stable quality by using OP-CAP series products.

### 1. Guidelines for Circuit design

#### (1) Polarity

OP-CAPs are basically nothing but aluminum electrolytic capacitors with solid electrolyte. Therefore, they must be installed with the correct polarity. Usage in the reverse polarity results into a short-circuit condition that may damage or even explode the capacitor.

In addition, it may affect circuit functionality.

#### (2) Operating Voltage

Applied DC voltage must not exceed rated voltage of an OP-CAP. Applying higher voltage across a capacitor terminals than its rated voltage will cause overheating due to higher leakage currents, and dielectric/insulation deterioration that will ultimately affect a capacitor's performance. The OPCAP, however, is capable of working under short-time transient voltages such as DC transients and peak AC ripples. Note that the result of DC voltage overlapped with peak ripple voltage should not exceed rated voltage.

#### (3) Ripple Current

One of the key functions of any capacitor is removal of the ripple current i.e. the RMS value of AC flowing through a capacitor. But, a ripple current higher than rated ripple current will drop resultant capacitance, cause undue internal heating and thus reduces life span of the capacitor. In extreme cases, internal high temperature will cause the pressure relief vent to operate while destroying the device. Overall, it is important to note that an electrolytic capacitor must be used within a permissible range of ripple current.

#### (4) Operating Temperature

Capacitors should be used within a permissible range of operating temperatures. Use of a capacitor at a higher temperature than maximum rated temperature will considerably shorten its life. Usage of capacitors at an ambient room temperature assure their longer life.

#### (5) Leakage Current

Leakage current flows through a capacitor when DC voltage is applied across it. Leakage current varies with changes in ambient temperature and applied DC voltage level and its time of application. Overvoltage situation, presence of moisture, and thermal stresses, especially occurring during the soldering process can enhance leakage current. Initial leakage current is usually higher and does not decrease until voltage is applied for a certain period of time. It is recommended to keep initial leakage current within specified levels.

#### (6) Charge and Discharge

OP-CAPs are unsuitable for rapid charging/discharging circuits. Such usage may either cause reduction in overall capacitance or damage due to overheating. **Note that a protection circuit is required when inrush current in an OP-CAP exceeds 10 A.**

#### (7) Condition of Use

OP-CAP shall not be used / exposed to:

- Fluids including water, saltwater spray, oil, fumes, highly humidity or condensed climates, etc.
- Ambient conditions containing hazardous gases/fumes like hydrogen sulfide, sulfuric acid, nitrous acid, chlorine or bromine gas, ammonia, etc.
- Ozone, ultraviolet rays and radiation.
- Severe vibrations or physical shocks that exceeding the in specifications.

#### (8) Consideration to Circuit Design

- Please ensure whether application, operating and mounting

conditions satisfy the conditions specified in the catalog before installation of an OP-CAP. Please consult Lelon, if any of the conditions are beyond the conditions specified in the catalog.

- Heat-generating components or heat sinks should not be placed closer to OP-CAPs on the PCB to avoid premature failure. A cooling system is recommended to improve their reliable working.
- Electrical characteristics and performance of OP-CAPs are affected by variation of applied voltage, ripple current, ripple frequency and operating temperature. Therefore, these parameters shall not exceed specified values in the catalog.
- OP-CAPs may be connected in the parallel fashion for increasing total capacitance and/or for achieving higher ripple current capability. But, such design may cause unequal current flow through each of the capacitors due to differences in their impedances.
- When two or more capacitors are connected in series, voltage across each capacitor may differ and fall below the applied voltage. A resistor should be placed across each capacitor so as to match applied voltage with voltage across a capacitor.
- Please consult Lelon while selecting a capacitor for high-frequency switching circuit or a circuit that undergoes rapid charging/ discharging.
- Standard outer sleeve/ coating material of the capacitor is not a perfect electrical insulator therefore is unsuitable for the applications that requires perfect electrical insulation. Please consult Lelon, if your application requires perfect electrical insulation.
- Tilting or twisting capacitor body is not recommended once it is soldered to the PCB.

### 2. Caution for Assembling Capacitors

#### (1) Mounting

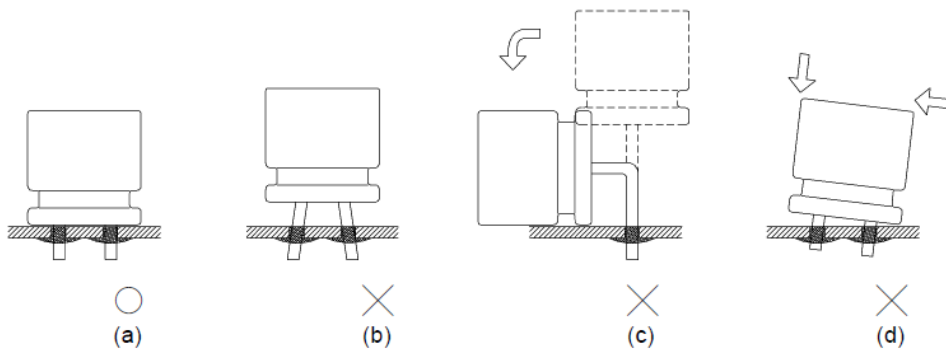
- OP-CAPs are not recommended to re-use in other circuits once they are mounted and powered in a circuit.
- OP-CAPs may hold static charge between its anode and cathode, which is recommended to be discharge through a 1k $\Omega$  resistor before use.
- A long storage of capacitors may result into its insulation deterioration. This can lead to a high leakage current when voltage is applied that may damage the capacitor. Capacitors following a long storage period must undergo voltage treatment/re-forming. Capacitors are charged by applying rated DC voltage through a resistor of 1k $\Omega$  in series at least for an hour. It is recommended to increase applied voltage gradually using a voltage regulator unit once capacitors are assembled on the board. The charging should be followed by discharging through a 1k $\Omega$  resistor.
- Please check capacitor rated voltage before mounting.
- Please check capacitor polarity before mounting.
- Please don't drop OP-CAPs on the floor/hard object.
- Please don't deform the capacitor during installation.
- Please confirm whether the lead spacing of the capacitors match with its pad spacing/footprint on PCB prior to installation.
- Please avoid excessive mechanical shocks to OP-CAPs during auto-insertion process, inspection or centering operations.



**(2) Soldering**

- (a) Please confirm that soldering conditions, especially temperature and contact time are within our specifications. Dip or flow soldering temperature should be limited at  $260 \pm 5^\circ\text{C}$  for  $10 \pm 1\text{sec}$ . Please do not dip capacitor body into molten solder. An OP-CAP's life will be negatively affected if these conditions are violated.
- (b) Storage of capacitors in *high humidity* conditions is likely to affect the solderability of lead wires and terminals
- (c) **Reflow soldering should ONLY be used for SMD type conductive polymer capacitors.** Please check the reflow profile prior to using such type of capacitors. The temperature and duration shall not exceed the specified temperature and duration in the catalogue. If required temperature or duration is higher than the value specified, please consult Lelon before use.

- (d) Usually OP-CAPs are not designed to withstand multiple reflow processes. Please consult Lelon if repeated reflowing is unavoidable.
- (e) Incorrect mounting on PCB with improper external strength applied on its lead wires or capacitor body after soldering may damage an OP-CAP's internal structure, cause short circuit, or lead to high leakage current. Do not bend or twist the capacitor body after soldering. Referring to the drawings below only case (i) is recommended.
  - (i) Correct soldering
  - (ii) Hole-to-hole spacing on PCB differs from the lead spacing of lead wires.
  - (iii) Lead wires are bent after soldering.
  - (iv) Capacitor body doesn't stand vertical on PCB after soldering.



**(3) Cleaning PCBs After Soldering**

- (a) Following chemicals are not recommended for cleaning: Solvent containing halogen ions, Alkaline solvent, Xylene, Acetone, Terpene, petro-based solvent.
- (b) Recommended cleaning conditions: Fatty-alcohol - Pine Alpha ST-100S, Clean Through-750H and IPA (isopropyl alcohol) are examples of the most acceptable cleaning agents. Temperature of the cleaning agent must not exceed  $60^\circ\text{C}$ . Flux content in the cleaning agents should be limited to 2 Wt. %. Overall length of cleaning process (e.g., immersion, ultrasonic or other) shall be within 5 minutes (5 ~ 7mm height within 3 minutes).

**3. Maintenance Inspection**

Periodic inspection of OP-CAPs is absolutely necessary, especially when they are used with industrial equipment. The following items should be checked:

- (1) Appearance: bloated, vent operated, leaked, etc.
- (2) Electrical characteristic: Capacitance, Tan  $\delta$ , leakage current, and other specified items listed in specifications.

Lelon recommends replacement of the capacitors if any of the abovementioned items fail to meet the specifications.

**4. Storage**

- (1) The most suitable conditions for aluminum capacitor storage are  $5^\circ\text{C} \sim 35^\circ\text{C}$  with indoor relative humidity less than 75%. High temperature and/or humidity storage is detrimental to the capacitors.
- (2) OP-CAPs shall not be stored in wet or damp atmospheres containing water, brine, fumes or oil.
- (3) Capacitors storage area shall neither be exposed to hazardous gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium, etc. nor to acidic/ alkaline solutions.
- (4) OP-CAPs shall not be exposed to ozone, ultraviolet rays or radiation.
- (5) Storage bags shall be opened just before usage. Please restore unused capacitors as soon as possible. Sealed and secured capacitors are likely to provide better solderability in next usage. Shelf-life of OP-CAPs are as follows:

Series name	Before unseal	After unseal
OCV, OCVZ, OCVU, OVH, OVK, OVA, OVE, OVG, OVS, OVF, OVD,	Within 1 year after delivery (Unopened condition)	Within 30 days from opening package
OCR, OCRZ, OCRK, OCRU, ORE, ORS, ORA, ORG, ORC, ORF, ORB, ORD	Within 1 year after delivery (Unopened condition)	Within 7 days from opening package

※ It is not applied to the regulation of JEDEC J-STD-020 (Rev. C).

**5. Estimation of life time**

$$L_r = L_0 \times 10^{\frac{T_0 - T_r}{20}}$$

Lr: Estimated lifetime (hrs)

L<sub>0</sub>: Base lifetime specified at maximum operating temperature with applied the DC voltage

T<sub>0</sub>: Rated maximum operating temperature ( $^\circ\text{C}$ )

T<sub>r</sub>: Actual ambient temperature ( $^\circ\text{C}$ )

OCV, OCVZ, OVH, OVK, OCVU, OCR, OCRZ, ORE, OCRK, OCRU	OVA, OVE, OVG, OVS, OVF, OVD, ORS, ORA, ORG, ORC, ORF, ORB, ORD & Aluminum Electrolytic Capacitors
$105^\circ\text{C} \cong 2,000$ Hours	$105^\circ\text{C} \cong 2,000$ Hours
$95^\circ\text{C} \cong 6,324$ Hours	$95^\circ\text{C} \cong 4,000$ Hours
$85^\circ\text{C} \cong 20,000$ Hours	$85^\circ\text{C} \cong 8,000$ Hours
$75^\circ\text{C} \cong 63,245$ Hours	$75^\circ\text{C} \cong 16,000$ Hours

Please note that

- (1) Maximum life is 15 years
- (2) Ripple current in application should be less than or equal to ripple current specified in catalogue

**6. Disposal**

Please consult with a local industrial waste disposal specialist when disposing of aluminum electrolytic capacitors.

## 7. Environmental Consideration

Lelon already have received ISO 14000 certificate. Cadmium (Cd), Lead (Pb), Mercury (Hg), Hexavalent Chromium (Cr<sup>6+</sup>), PBB, PBDE, DEHP, BBP, DBP and DIBP have never been using in capacitor. If you need "Halogen-free" products, please consult with us

## 8. AEC-Q200 Compliance

Automotive Electronics Counsel (AEC) has established various

electronic component qualification/reliability standards in order to serve automotive electronics industry. AEC-Q200 standard is dedicated for passive components like capacitors, inductors, etc. and is widely adopted domestically as well as internationally. Lelon offers compliant product designs and support services to satisfy customers' product requirements, including the ACE-Q200 required criteria of the reliability tests. Lelon's capacitors are professionally designed to outperform all requirements of ACE-Q200.

For further details, please refer to

IEC 60384-4- Fixed capacitors for use in electronic equipment – Part 4: Sectional specification – Aluminium electrolytic capacitors with solid (MnO<sub>2</sub>) and non-solid electrolyte (Established in January 1995, Revised in March 2007), and

EIAJ RCR-2367B- Guideline of notabilia for fixed aluminium electrolytic capacitors for use in electronic equipment [Technical Standardization Committee on Passive Components (Established in March 1995, Revised in March 2002)].

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