

Customer : _____
(客 戶)

Part No. : _____
(貴公司料號)

SPECIFICATION FOR APPROVAL

承 認 書

Description : V-CHIP ALUMINUM ELECTROLYTIC CAPACITORS
(零 件 名 稱)

Lelon Series : VES Series
(立 隆 系 列)

Lelon Part No.: VES470M1VTR-0605
(立 隆 料 號)

LELON ELECTRONICS CORP.

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Approval Signatures

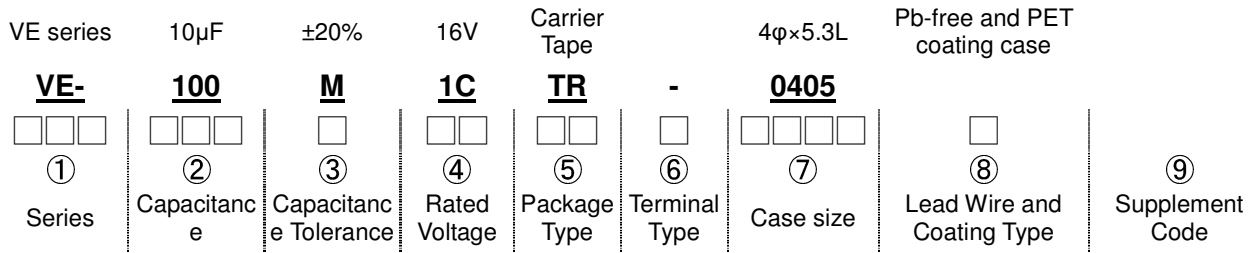
貴公司承認印

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 – SMD Type



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.

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	0.1	0.47	1	4.7	10	47	100	470	1,000	4,700	10,000
Part number	0R1	R47	010	4R7	100	470	101	471	102	472	103

③ Tolerance:

J = -5% ~ +5%	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	40	50	63	80	100
Code	0E	0G	0J	1A	1C	1D	1E	1V	1G	1H	1J	1K	2A
Voltage (WV)	160	200	250	350	400	450							
Code	2C	2D	2E	2V	2G	2W							

⑤ Package:

TR = Reel package	T = Tray package for case diameter 12.5 ~ 18mm
-------------------	--

⑥ Terminal:

- = No dummy terminal	K = Anti-vibration structure (30G)
A = For automotive application (10G)	G = Anti-vibration structure (50G)

⑦ Case size:

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

φD×L	3×5.3	4×4.5	4×5.3	4×5.7	5×4.5	5×5.3	5×5.7 5×5.8	6.3×4.5	6.3×5.3	6.3×5.7 6.3×5.8
Code	0305	0404	0405	0406	0504	0505	0506	0604	0605	0606
φD×L	6.3×7.7	8×6.5	8×10	10×7.7	10×10(9.9)	12.5×13.5	12.5×16	16×16.5	16×21.5	
Code	0607	0806	0810	1008	1010	1313	1316	1616	1621	
φD×L	18×16.5	18×21.5								
Code	1816	1821								

Note 1: When a case size is required and not shown in the table, please contact with us for further discussion.

Note 2: The case size “5×5.8, 6.3×5.8” is for VZS series only.

⑧ Lead Wire and Coating Type:

None = Pb free wire + PET coating case (Standard design)	E = Sn-Bi wire + PET coating case
B = Sn-Bi wire + Coating case	K / L = Automotive control code

* When a supplement code following a blank digit code of lead wire and case coating 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.

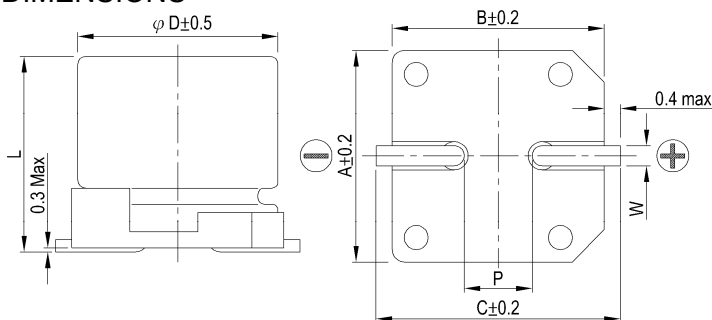
⑨ Supplement code (Optional):

For special control purpose

CUSTOMER :

CUSTOMER P/N:

DIAGRAM OF DIMENSIONS



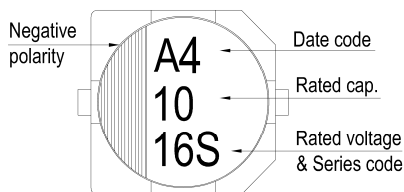
Unit: mm

ϕ D	6.3
L	5.3 ± 0.2
A	6.6
B	6.6
C	7.2
W	0.5 ~ 0.8
P	2.0 ± 0.2

Items	Performance										
Category Temperature Range	-55°C ~ +105°C										
Capacitance Tolerance	-20 % ~ +20 % (120 Hz, 20°C)										
Surge Voltage	40.3 VDC										
Leakage Current	$I \leq 16.5 \mu$ A After 2 minutes										
Dissipation Factor (Tan δ)	≤ 0.13 (120 Hz, 20°C)										
Ripple Current (rms)	65 mA (120 Hz, 105°C)										
Low Temperature Characteristics(120 Hz)	<table border="1"> <tr> <td>Z(-25°C)/Z(+20°C)</td> <td>2</td> </tr> <tr> <td>Z(-55°C)/Z(+20°C)</td> <td>3</td> </tr> </table>	Z(-25°C)/Z(+20°C)	2	Z(-55°C)/Z(+20°C)	3						
Z(-25°C)/Z(+20°C)	2										
Z(-55°C)/Z(+20°C)	3										
Ripple Current & Frequency Multipliers	<table border="1"> <tr> <td>Frequency (Hz)</td> <td>50</td> <td>120</td> <td>1k</td> <td>10k up</td> </tr> <tr> <td>Multiplier</td> <td>0.70</td> <td>1.00</td> <td>1.30</td> <td>1.40</td> </tr> </table>	Frequency (Hz)	50	120	1k	10k up	Multiplier	0.70	1.00	1.30	1.40
Frequency (Hz)	50	120	1k	10k up							
Multiplier	0.70	1.00	1.30	1.40							
Life Test: Endurance: After 1000 Hrs at 105°C Shelf Life Test: After 1000 Hrs at 105°C	<table border="1"> <tr> <td>Capacitance Change</td> <td>Within ±20 % of initial value</td> </tr> <tr> <td>Dissipation factor</td> <td>Less than 200% of specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> </table>	Capacitance Change	Within ±20 % of initial value	Dissipation factor	Less than 200% of specified value	Leakage Current	Within specified value				
Capacitance Change	Within ±20 % of initial value										
Dissipation factor	Less than 200% of specified value										
Leakage Current	Within specified value										
Standards	JIS C 5101-1, -18										
Remarks	RoHS Compliance & Halogen-free										

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

A 4 → January, 2014



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

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

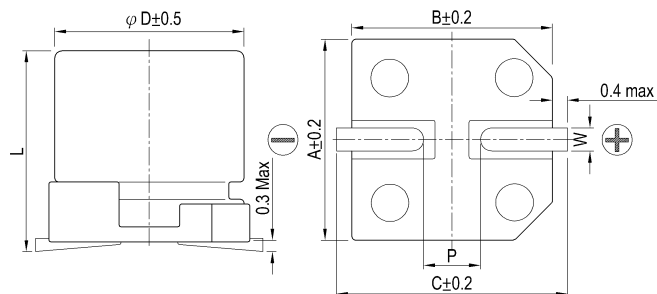
Marking color: Black

* Please refer to "Precautions and Guidelines for Aluminum Electrolytic Capacitors" of Lelon's catalog.

Publish Date	March 4, 2014	Approval Signatures:	Approved	Checked	Designed
Revise Date			研發部 MAR. 4. 2014 林水淵	研發部 MAR. 4. 2014 黃建智	研發部 MAR. 4. 2014 熊金華
Edition No.	1		Please return one copy with your approval		

Diagram of Dimensions:

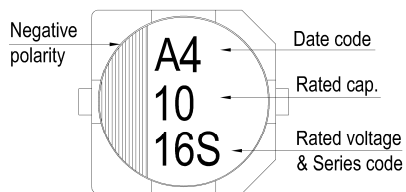
Unit: mm



φD	L	A	B	C	W	P ± 0.2
4	5.3 ± 0.2	4.3	4.3	5.1	0.5 ~ 0.8	1.0
5	5.3 ± 0.2	5.3	5.3	5.9	0.5 ~ 0.8	1.5
6.3	5.3 ± 0.2	6.6	6.6	7.2	0.5 ~ 0.8	2.0

Marking:

Each capacitor shall be marked with the following information.



Description of Date Code:

A 4 → January, 2014

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

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

Origin code:

Huizhou: A4 , B4 , ... , K4 , L4
 Suzhou: 4A , 4B , ... , 4K , 4L

Marking Color: Black

Taping Specification for SMD Type

1. Carrier Tape

Fig. 1-1

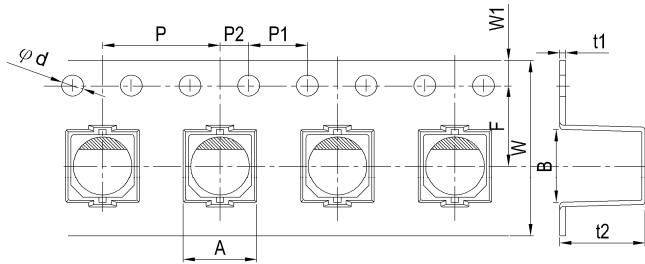


Fig. 1-2

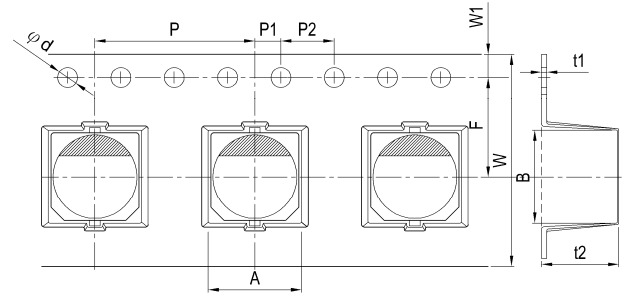
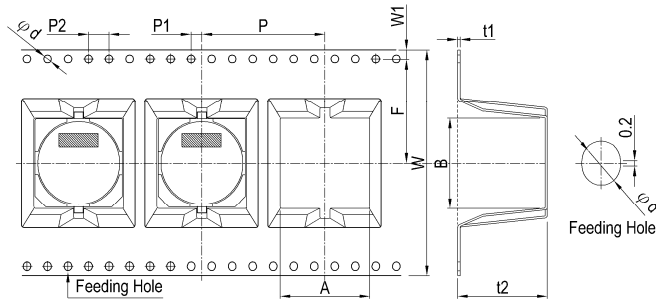


Fig. 1-3



Unit: mm

$\phi D \times L$	A	B	ϕd	F	P	P1	P2	t1	t2	W	W1	Fig. No.
3~4 x 4.5~5.3	5.0	5.0	1.5	5.5	8	2.0	4.0	0.4	5.8	12.0	1.75	1-1
4 x 5.7	5.0	5.0		5.5	8				6.2			
5 x 4.5~5.3	6.0	6.0		5.5	12				5.8			
5 x 5.7 (5.9*)	6.0	6.0		5.5	12				6.2			
6.3 x 4.5~5.3	7.0	7.0	1.5	7.5	12	2.0	4.0	0.4	5.8	16.0	1.75	1-2
6.3 x 5.7 / 5.8	7.0	7.0							6.2			
6.3 x 5.9*	7.0	7.0							6.2			
6.3 x 7.0*	7.0	7.0							6.8			
6.3 x 7.7	7.0	7.0							8.3			
8 x 6.5	8.7	8.7							6.8			
8 x 6.7*	8.7	8.7							6.8			
8 x 10	8.7	8.7							11.0			
8 x 11.2 / 12*	8.7	8.7							13.0			
10 x 7.7*	10.7	10.7							10.0			
10 x 10 (9.9*)	10.7	10.7	11.0									
10 x 12.6*	10.7	10.7	14.0									
12.5 x 13.5	13.4	13.4	1.5	14.2	24	2.0	4.0	0.5	15.0	32.0	1.75	1-3
12.5 x 13.5(G)	13.7	13.7							15.0			
12.5 x 16	13.4	13.4							17.5			
12.5 x 16(G)	13.7	13.7							17.5			
16 x 16.5	17.5	17.5							17.5			
16 x 16.5(G)	17.5	17.5							17.5			
16 x 21.5	17.5	17.5							22.5			
18 x 16.5	19.5	19.5							17.5			
18 x 21.5	19.5	19.5							22.5			
Tol.	± 0.2	± 0.2							$+0.1/-0$			

Note: Case size in mark of "*" are for OP-CAP ; case size in mark of "G" are for "Anti-vibration"

2. Reel Package

Fig. 2-1

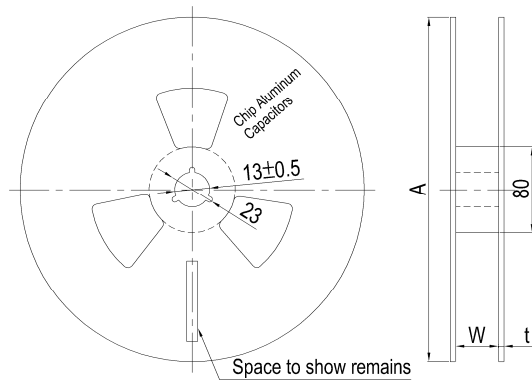
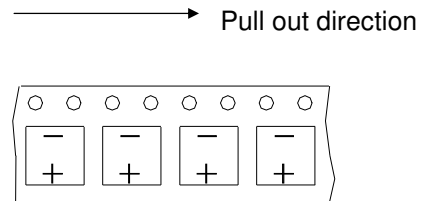


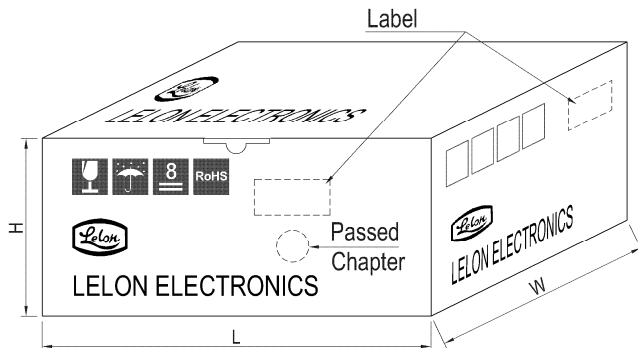
Fig. 2-2 Reel Polarity



Case size	3 ~ 4φ	5φ	6.3φ	8φ×6.5 ~ 7L	8φ×10 ~ 11.8L	10φ	12.5φ	16 ~ 18φ
W	14	14	18	18	26	26	34	46
A	380	380	380	380	380	380	380	380
t	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0

3. Packing specification

Fig. 3-1 Carrier Tape



Unit: pcs

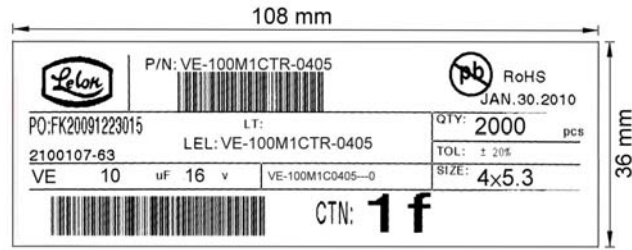
Case size	Q'ty / Reel	Q'ty / Box
3φ	2,000	20,000
4φ	2,000	20,000
5φ	1,000	10,000
6.3φ	1,000	10,000
8φ×6.5~7L	1,000	10,000
8φ×10L	500	5,000
8φ×11.8L*	400	2,000
10φ×8~10L	500	5,000
10φ×12.7L*	400	2,000
12.5φ×13.5L	200	1,600
12.5φ×16L	200	1,600
16φ×16.5L	200	1,600
16φ×21.5L	150	1,200
18φ×16.5L	150	1,200
18φ×21.5L	100	800

* Case size with "*" mark are for OP-CAP only.

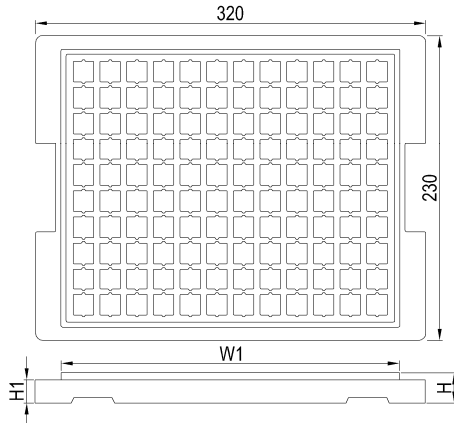
Unit: mm

Case size	3 ~ 4φ	5φ	6.3φ	8φ× 6.5 ~ 7L	8φ× 10 ~ 11.8L	10φ	12.5φ	16 ~ 18φ
H	180	220	220	220	310	310	315	390
W, L	385	385	385	385	385	385	385	385

Fig. 3-2 Label



4. Chip Tray



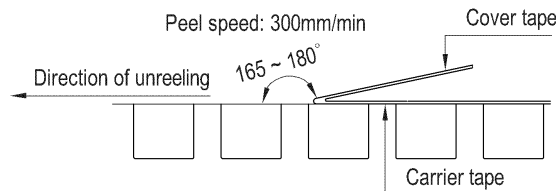
Dimension and package quantity

Unit: mm

Case size	W1	H	H1	Q'ty / Tray	Q'ty / Box
12.5φ×13.5L	284	21	18.5	120	600
12.5φ×16L	284	21	18.5	120	600
16φ×16.5L	284	28	24.0	80	400
16φ×21.5L	284	28	24.0	80	400
18φ×16.5L	284	28	24.0	60	300
18φ×21.5L	284	28	24.0	60	300

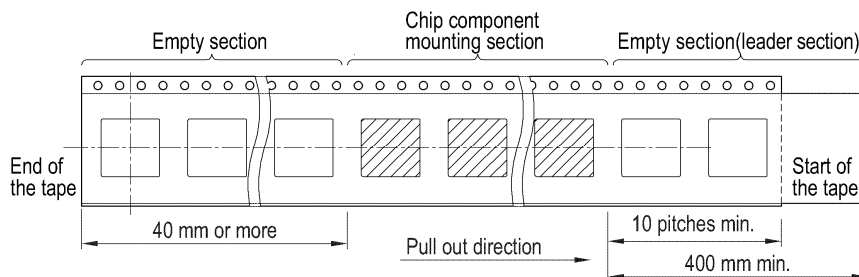
5. Sealing Tape Reel Strength

- 5.1 Peel angle: 165 to 180° referred to the surface on which the tape is glued.
- 5.2 Peel speed: 300mm per minutes
- 5.3 The peel strength must be 0.1 to 0.7N under these conditions.



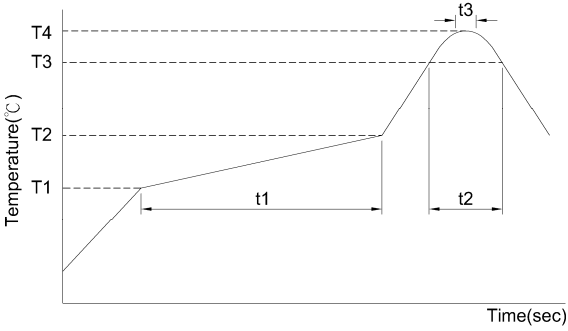
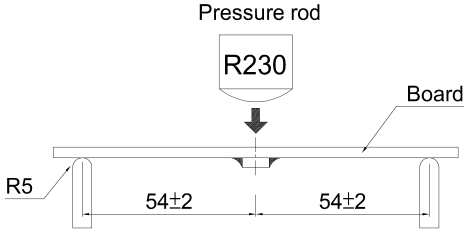
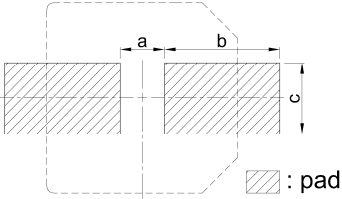
6. Packing Method

- 6.1 Polarity: Anode on the opposite side of the feed hole
- 6.2 The leader length of the tape shall not be less than 400mm including 10 or more embossed sections in which no parts are contained.
- 6.3 The winding core is provided with an over 40mm long empty section.



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 (3 min.) → +105°C (30 min.) → +25°C (3 min.)", and it is called a cycle. The test totals 50 cycles. And then the capacitor shall be subjected to standard atmospheric conditions for 4 hours, after which measurements shall be made.	Capacitance change	Within ± 10% of 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 1000 +48 / -0 hours at 105°C. 2. Then the capacitor shall be subjected to standard atmospheric conditions for 4 hours, after which measurements shall be made.	Capacitance change	Within ± 20% of initial value																
			Tanδ	Less than 200% of specified value																
			Leakage Current	Within specified value																
			Physical	No broken and undamaged																
3	High Temperature Unload Life Test	After 1000 +48 / -0 hours test at 105°C without rated working voltage. 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 initial value																
			Tanδ	Less than 200% of specified value																
			Leakage Current	Within specified value																
			Physical	No broken and undamaged																
4	Humidity Test	Capacitors shall be exposed for 1000 +48 / -0 hours 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 ± 10% of initial value																
			Tanδ	Less than 120% of specified value																
			Leakage Current	Within specified value																
			Physical	No broken and undamaged																
5	Low Temperature Test	Capacitors are placed at -55 ± 3°C for 96 ± 4 hours. And then the capacitor shall be subjected to standard atmospheric conditions for 4 hours, after which measurements shall be made.	Capacitance change	Within ± 10% of initial value																
			Tanδ	Within specified value																
			Leakage Current	Within specified value																
			Physical	No broken and undamaged																
6	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 hours (total of 6 hours). 3. Frequency: 10 to 55 Hz reciprocation for 1min. 4. Total amplitude: 1.5 mm	Capacitance change	Within ± 10% of initial value																
			Tanδ	Within specified value																
			Leakage Current	Within specified value																
			Physical	No broken and undamaged																
7	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:	Capacitance change	Within ± 20% of initial value																
			Tanδ	Less than 175% of specified value																
			Leakage Current	Within specified value																
			Physical	No broken and undamaged																
		<table border="1"> <tbody> <tr> <td>Rated Voltage(V)</td> <td>6.3</td> <td>10</td> <td>16</td> <td>25</td> <td>35</td> <td>50</td> </tr> <tr> <td>Surge Voltage(V)</td> <td>7.2</td> <td>11.5</td> <td>18.4</td> <td>28.8</td> <td>40.3</td> <td>57.5</td> </tr> </tbody> </table>					Rated Voltage(V)	6.3	10	16	25	35	50	Surge Voltage(V)	7.2	11.5	18.4	28.8	40.3	57.5
Rated Voltage(V)	6.3	10	16	25	35	50														
Surge Voltage(V)	7.2	11.5	18.4	28.8	40.3	57.5														

No.	Item	Conditions	Specification																																
8	Solder Heat-Resistance Test	<p>1. IR Reflow</p>  <table border="1" data-bbox="443 622 885 981"> <tr> <td colspan="2">W.V. (V)</td> <td>6.3 ~ 50</td> </tr> <tr> <td colspan="2">Case size (φ)</td> <td>3 ~ 6.3</td> </tr> <tr> <td rowspan="2">Preheat</td> <td>Temp. (T1~T2, °C)</td> <td>150 ~ 180</td> </tr> <tr> <td>Time(t1) (Max,secs)</td> <td>120</td> </tr> <tr> <td rowspan="2">Duration</td> <td>Temp.(T3, °C)</td> <td>230</td> </tr> <tr> <td>Time(t2) (Max,secs)</td> <td>30</td> </tr> <tr> <td rowspan="2">Peak</td> <td>Temp.(T4, °C)</td> <td>250</td> </tr> <tr> <td>Time (t3,secs)</td> <td>5</td> </tr> <tr> <td colspan="2">Reflow cycles</td> <td>1</td> </tr> </table> <p>2. Solder iron method: Bit temperature: 350 ± 5°C Application time of soldering Iron: 3 +1/-0 sec * Please contact our representative if your condition is higher. * Please ensure that the capacitor became cold enough to the room temperature (5°C ~ 35°C) before the second reflow. * Consult with us when performing reflow profile in IPC / JEDEC (J-STD-020)</p>	W.V. (V)		6.3 ~ 50	Case size (φ)		3 ~ 6.3	Preheat	Temp. (T1~T2, °C)	150 ~ 180	Time(t1) (Max,secs)	120	Duration	Temp.(T3, °C)	230	Time(t2) (Max,secs)	30	Peak	Temp.(T4, °C)	250	Time (t3,secs)	5	Reflow cycles		1	<table border="1" data-bbox="1015 248 1500 427"> <tr> <td>Capacitance change</td> <td>Within ± 10% of initial value</td> </tr> <tr> <td>Tanδ</td> <td>Within specified value</td> </tr> <tr> <td>Leakage Current</td> <td>Within specified value</td> </tr> <tr> <td>Physical</td> <td>No broken and undamaged</td> </tr> </table>	Capacitance change	Within ± 10% of initial value	Tanδ	Within specified value	Leakage Current	Within specified value	Physical	No broken and undamaged
W.V. (V)		6.3 ~ 50																																	
Case size (φ)		3 ~ 6.3																																	
Preheat	Temp. (T1~T2, °C)	150 ~ 180																																	
	Time(t1) (Max,secs)	120																																	
Duration	Temp.(T3, °C)	230																																	
	Time(t2) (Max,secs)	30																																	
Peak	Temp.(T4, °C)	250																																	
	Time (t3,secs)	5																																	
Reflow cycles		1																																	
Capacitance change	Within ± 10% of initial value																																		
Tanδ	Within specified value																																		
Leakage Current	Within specified value																																		
Physical	No broken and undamaged																																		
9	Mechanical Characteristics Test	<p>Bending Test: Apply pressure in the direction of the arrow at a rate of about 0.5 mm / s until bent width reaches 2 mm and hold for 60s. The board shall be the test board "B" as specified in JIS C 0051 : 2002. If the land area differs, it shall be specified clearly in the next item.</p> 	Without mechanical damage such as breaks. Electrical characteristics shall be satisfied. If there are electrodes on both surfaces, above requirements shall be satisfied on whichever surface it may be fixated on.																																
10	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 the solder coating must be more than 95%.																																	
11	Land Pattern	<p>Recommended pad pattern and size</p>  <table border="1" data-bbox="999 1776 1318 1924"> <thead> <tr> <th rowspan="2">Case size</th> <th colspan="3">Land size</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>4φ</td> <td>1.0</td> <td>2.6</td> <td>1.6</td> </tr> <tr> <td>5φ</td> <td>1.4</td> <td>3.0</td> <td>1.6</td> </tr> <tr> <td>6.3φ</td> <td>1.9</td> <td>3.5</td> <td>1.6</td> </tr> </tbody> </table> <p>▨ : pad</p>	Case size	Land size			a	b	c	4φ	1.0	2.6	1.6	5φ	1.4	3.0	1.6	6.3φ	1.9	3.5	1.6														
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Precautions and Guidelines for Aluminum Electrolytic Capacitors

1. Guidelines for Circuit Design

Selecting the capacitors to suit installation and operating conditions, and using the capacitors to meet the performance limits prescribed in this catalogue or the product specifications.

(1) Polarity

Aluminum electrolytic capacitors are polarized. Make sure of the polarity, if used in reverse polarity, the circuit life may be shortened or the capacitor may be damaged. When the polarity in a circuit sometimes can be reversed or unknown, a bi-polar capacitor shall be used. Also, note that DC capacitors cannot be used for AC application. Reverse voltage 1 voltage acceptable within specified temperature and working voltage.

(2) Operating Voltage

Do not apply DC voltage, which exceeds the rated voltage of the capacitor and not be reverse voltage. If a voltage exceeding the capacitor's voltage rating is applied, the capacitor may be damaged as leakage current increase. Using capacitors at recommended working voltage prolongs capacitor life. The surge voltage rating is the maximum DC over-voltage to which the capacitors may be subjected of short periods.

(3) Ripple Current

(a) The combined value of DC voltage and the peak AC voltage shall not exceed the rated voltage. When an excessive ripple current passes, the capacitor may be damaged with the vent operating, etc. Use the electrolytic capacitor within the permissible ripple range current at specified frequency and temperature.

(b) The temperature coefficient shows the limit of ripple current exceeding the rated ripple current that can be applied to the capacitor at the temperature. The expected life of a capacitor is nearly equal to the lifetime at the upper category temperature.

(4) Operating Temperature

Use the capacitors according to the specified operating temperature range. If used the capacitor outside the maximum rated temperature will considerably shorten the life or cause the capacitor to vent. Usage at room ambient will ensure longer life.

(5) Leakage Current

The leakage current shall be within specified levels. When capacitors are applied at a lower voltage, the actual leakage current will be reduced proportionately.

(6) Charge and Discharge

The capacitor is not suitable for a circuit in which charge and discharge are frequently repeated. The capacitance value may drop by forming oxide layer on the cathode foil, or the capacitor may be damaged by generating heat due to continuous rapid charge and discharge.

(7) Condition of Use

- (a) The capacitors shall not be exposed to water, saltwater spray, oil or fumes, high humidity or humidity condensation and direct sunlight.
- (b) Ambient conditions that include hazardous gases / fumes such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or bromine gas, ammonia, etc.
- (c) Exposed to ozone, ultraviolet rays and radiation.
- (d) Severe vibration or physical shock that exceeds the condition in specification sheets.

(8) Consideration to Circuit Design

- (a) Please make sure the application and mounting conditions that the capacitor will be used are within the conditions specified in the catalog. If the conditions are beyond the conditions specified in the catalog, please contact Lelon.
- (b) Do not design a circuit board so that heat-generating components are places near an aluminum electrolytic capacitor or reverse side of PCB. A cooling system is recommended.
- (c) Operating temperature, applied voltage and ripple current shall be within specification. The ambient temperature shall not exceed the operating temperature and applied ripple current shall not exceed the allowable ripple current specified in the specification.
- (d) Performances of electrical characteristics of aluminum electrolytic capacitors are affected by variation of operating

temperature and frequency. Consider this variation designing the circuit.

- (e) When two or more aluminum capacitors are connected in parallel, consider the current balance that flow through the capacitors.
- (f) If more than two capacitors are connected in series, make sure the applied voltage will be lower than the rated voltage and that voltage will be applied to each equally using a balancing resistor in parallel with each capacitor.
- (g) For appropriate choice of capacitors for circuit that repeat rapid charge and discharge, please consult Lelon.
- (h) Outer sleeve of the capacitor is not guaranteed as an electrical insulator. Do not use a standard sleeve on a capacitor that requires the electrical insulation. When the application requires special electrical insulation, please contact Lelon.
- (i) Do not tilt lay down or twist the capacitor's body after the capacitor is soldered to the PCB.

2. Caution for Assembling Capacitors

(1) Mounting

- (a) Aluminum electrolytic capacitors cannot be re-used once the capacitor has assembled in the set and power applied.
- (b) Aluminum electrolytic capacitors may have electrical potential between positive and negative terminal, please discharge through a 1KΩ resistor before use.
- (c) Leakage current of Aluminum electrolytic capacitors may be increased after storage a long period of time. When leakage current has increased, please perform a voltage treatment before use.
Voltage treatment:
The capacitors shall be applied with DC rated voltage through a resistor of 1KΩ in series for one hour, and then discharge through a resistor of 1KΩ. When the capacitors have been assembled in the board, use a volt regulator to input voltage gradually to the rated voltage of the board.
- (d) Please confirm the rated voltage before mounting.
- (e) Please confirm the polarity before mounting.
- (f) Do not use the capacitor that once dropped on the hard floor.
- (g) Do not damage the capacitor while mounting.
- (h) Capacitors shall be mounted that hold spacing on PCB matches the lead pitch of the capacitors.
- (i) During the auto-insertion process and parts inspection, capacitors shall avoid the excessive force and shock.
- (j) Do not design to locate any wiring or circuit around the capacitor's pressure relief vent. The following clearance should be made above the pressure relief vent. The pressure relief vent will not open without the appropriate free space.

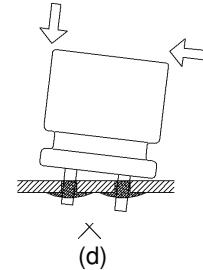
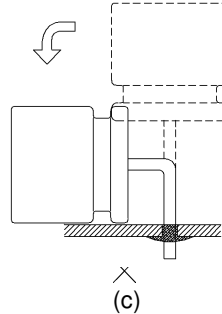
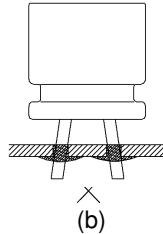
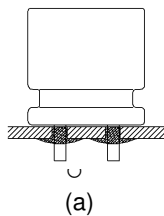
Case Diameter	φ6.3 ~ φ16	φ18 ~ φ35	φ40 or more
Clearance (min)	2 mm	3 mm	5 mm

(2) Soldering

- (a) Be careful of temperature and time when soldering. Dip of flow soldering of the capacitors should be limited at less than 260±5℃ and 10±1 seconds or soldering iron with 350±10℃ for 3+1/-0 seconds . Do not dip capacitor's body into melted solder.
- (b) High humidity will affect the solder ability of lead wire and terminals. High temperature will reduce long-term operating life.
- (c) Except SMD type, reflow soldering can not be used for any types of aluminum electrolytic capacitors. When using SMD type capacitor, please check the reflow profile. The temperature and duration shall not exceed the specified temperature and duration in the specification. If the temperature or duration is higher than the value specified, please consult Lelon before usage.
- (d) Standard aluminum electrolytic capacitors cannot withstand more than one reflow process. Please consult our engineering department when needed.

- (e) Defective mounting on PCB and improper external strength applied on the lead wires or case body after soldering (see below drawings) may damage inside structure of the capacitor and may cause short circuit, high leakage current or leakage problems.

(i) Good soldering.



- (ii) Hole-to-hole space on board differs from the lead space of lead wires.

(iii) Lead wires are bent after soldering.

- (iv) Case body doesn't stand vertical on board after soldering. Do not bend or twist the capacitor's body after soldering.

(3) Cleaning Circuit Boards After Soldering

Halogenated solvent cleaning is not available for aluminum electrolytic capacitors. IPA (Isopropyl Alcohol) is one of the most acceptable cleaning agents; it is necessary to maintain a flux content in the cleaning liquid at a maximum limit of 2 Wt. %. If you use other cleaning agents, please consult Lelon.

3. Maintenance Inspection

Periodical inspection is necessary for using the aluminum capacitors with industrial equipment. The following items should be checked:

- (1) Appearance: Vent operation, leaking electrolyte, etc.
- (2) Electrical characteristic: Capacitance, dissipation factor, leakage current, and other specified items listed in specification.

Lelon recommend replacing the capacitors if the parts are out of specification.

4. Storage

- (1) Aluminum electrolytic capacitor should not be stored in high temperature or high humidity condition. The suitable condition is 5°C ~ 35°C and less than 75% in relative humidity indoor.

- (2) Do not store the capacitors in damp conditions such as water, brine or oil.

- (3) Do not store the capacitors that exposed to hazardous gas such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonium, etc.

- (4) Do not store the capacitors that exposed to ozone, ultraviolet rays or radiation.

- (5) Do not expose the capacitors to acidic or alkaline solutions.

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

5. Disposal

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

6. Environmental Consideration

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

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 (MnO₂) 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)].