This product is completed the lead-free & RoHS& halogen-free

* MSL Level 1.

Date 2025. 07. 07.

Messrs. alfatec

Drawing No. SC-ARN2798

Approval Sheet

Conductive Polymer Hybrid Aluminum Electrolytic Capacitor

PRODUCTION PART APPROVAL PROCESS

I t e m

YK 35V 270㎌ 10*10

Approved by *E. K. Joo* e.k.Joo

Technical team manager

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SAMWHA ELECTRIC CO., LTD.

1. Scope

This specification is for Chip type conductive polymer hybrid aluminum electrolytic capacitors.

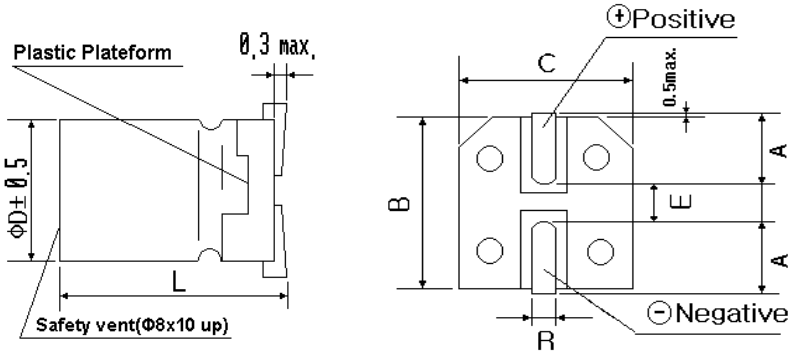
2. Applicable standards

KS C IEC 60384-4, AEC-Q200

3. Operating temperature range

-55 ~ +135℃

4. Dimensions



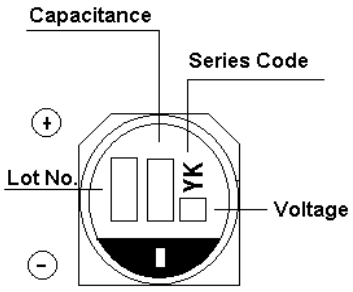
Unit : mm

ΦD	L	B±0.2	C±0.2	E±0.2	A±0.2	R
6.3	5.8±0.5	6.6	6.6	2.2	2.4	0.5 ~ 0.8
6.3	7.7±0.5	6.6	6.6	2.2	2.4	0.5 ~ 0.8
8	10±0.5	8.3	8.3	3.1	2.9	0.8 ~ 1.1
10	10±0.5	10.3	10.3	4.5	3.2	0.8 ~ 1.1
10	12.5±0.5	10.3	10.3	4.5	3.2	0.8 ~ 1.1

For dimensions of ΦD & L, refer to the table 1.

5. Marking

Φ 6.3



Φ8 , Φ10

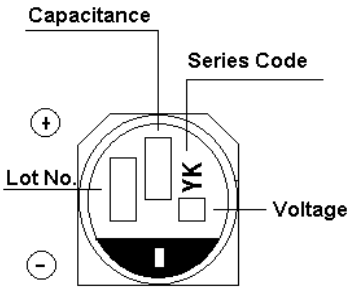


Table 1.

6.1 Rated Voltage (VDC)	6.2 Cap. (μF)	4. ΦD (mm)	4. L (mm)	6.3 tanδ	6.4 ESR 100㎑ (mΩ)	6.5 Leakage Current (μA)	6.6 Ripple Current 100㎑ (mArms)	7.27 Surge Voltage (VDC)	SAMWHA PART No.
35	270	10	10	0.12	16	94.5	2200	44	YK 1V 277 M 10010 VR

6. Measuring condition

Test environmental conditions

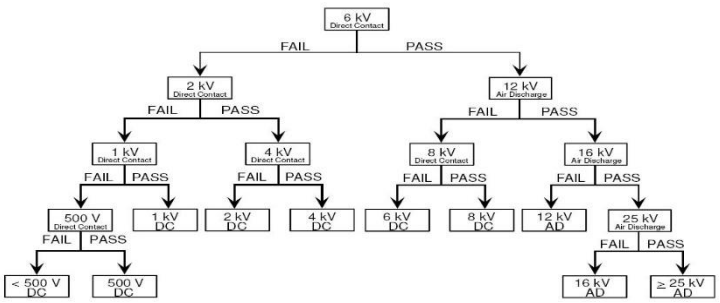
- Ambient temperature : 25±2℃ / Relative humidity : 60～70% / Air pressure : 86～106kPa

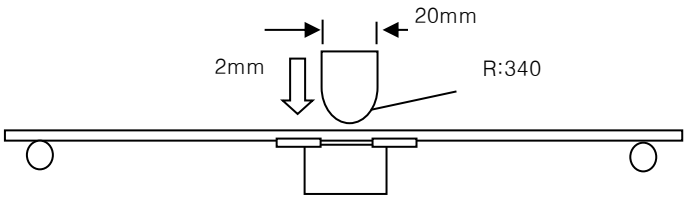
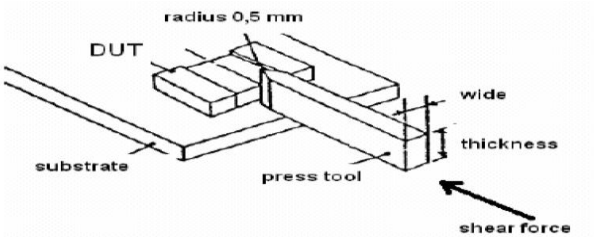
No.	Item	Test condition	Specification
1	Rated voltage		**See table 1**
2	Capacitance (Tolerance)	. Measuring frequency : 120Hz±20% . Measuring voltage : 0.5Vrms or less . DC bias voltage : +1.5~2.0VDC . Measurement circuit : Equivalent series circuit	**See table 1** (M :±20%)
3	tanδ	. Measurement shall be made under the same conditions as those given for the measurement of capacitance. . Measuring frequency : 120Hz±20% . Measuring voltage : 0.5Vrms or less	**See table 1**
4	ESR	. At 20℃, 100kHz	**See table 1**
5	Leakage Current	The rated voltage shall be applied across the capacitor through a 1000±10Ω protective resistor. The leakage current shall be measured after an electrification period of 2minutes.	**See table 1**
6	Maximum Permissible Ripple current	. Temperature : 135℃ . Ripple : rms value of 100kHz sine wave AC (The sum of DC voltage and peak voltage shall not exceed the rated voltage.)	**See table 1**

7. Qualification Test

<table>
<tr><th>Stress</th><th>No.</th><th>Test Condition</th><th>Specification</th></tr>
<tr><td>High
Temperature
Exposure
(Storage)</td><td>3</td><td>. Temperature : 135℃ ±2℃
. Duration : 1000 +72/-0 hours
※ Measurement at 24±4 hours after test conclusion.</td><td>. No visible damage
. Leakage current
≤initial specified value
. Capacitance change
within ±30% of initial value
. tanδ ≤ 200% of specified value</td></tr>
<tr><td>Temperature
Cycling</td><td>4</td><td>. Temperature : -55 ~ 135℃
. Duration : 1000 Cycles
▶ Temperature step.
<table>
<tr><td>Step</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Temp(℃)</td><td>-55 +0/-3</td><td>Room Temp.</td><td>135+3/-0</td><td>Room Temp.</td></tr>
<tr><td>Time(min)</td><td>30±3</td><td>1</td><td>30±3</td><td>1</td></tr>
</table>
※ Measurement at 24±4 hours after test conclusion.
. Duration : 1000 +72/-0 hours</td><td>. No visible damage
. Leakage current
≤initial specified value
. Capacitance change
within ±30% of initial value
. tanδ ≤ 200% of specified value

≤initial specified value
within ±30% of initial value
. tanδ ≤ 200% of specified value</td></tr>
<tr><td>Operational Life</td><td>8</td><td>. Temperature : 135℃±2℃
. Applied voltage : Rated voltage
. Duration :
<table>
<tr><td>ΦD</td><td>ΦD = 6.3</td><td>ΦD ≥ 8</td></tr>
<tr><td>Life time</td><td>2000 hours</td><td>4000 hours</td></tr>
</table>
※ Measurement at 24±4 hours after test conclusion.</td><td>. No visible damage
. Leakage current
≤initial specified value
. Capacitance change
within ±30% of initial value
. tanδ ≤ 200% of specified value</td></tr>
<tr><td>External Visual</td><td>9</td><td>Inspect device construction marking and workmanship
Electrical test not required</td><td>. No visible damage</td></tr>
<tr><td>Physical
Dimension</td><td>10</td><td>Verify physical dimensions to the applicable device
spec. Electrical Test not required.
See 4. Dimensions</td><td>. Satisfy in standard</td></tr>
</table>

<table>
<tr><th>Stress</th><th>No.</th><th>Test Condition</th><th>Specification</th></tr>
<tr><td>Resistance to Solvent</td><td>12</td><td>. Solvent : 1 part(by Volume) of isopropyl alcohol ACS reagent grade or TT-I-735, and 3 parts(by Volume) of mineral spirits per TT-T-291.
▶ Test Condition
<table>
<tr><th>Step</th><th>Method</th></tr>
<tr><td>1</td><td>immersion 3 +0.5/-0 min , 25 ±5℃</td></tr>
<tr><td>2</td><td>Brush 10 strokes (wet bristle) 2 to 3 oz.</td></tr>
<tr><td>3</td><td>immersion 3 +0.5/-0 min , 25 ±5℃</td></tr>
<tr><td>4</td><td>Brush 10 strokes (wet bristle) 2 to 3 oz.</td></tr>
<tr><td>5</td><td>immersion 3 +0.5/-0 min , 25 ±5℃</td></tr>
<tr><td>6</td><td>Brush 10 strokes (wet bristle) 2 to 3 oz.</td></tr>
<tr><td>7</td><td>Air blow dry.</td></tr>
</table></td><td>. No visible damage
. Marking visible damage</td></tr>
<tr><td>Mechanical shock</td><td>13</td><td>▶ Test Condition
<table>
<tr><th>Condition</th><th>Peak Value (g's)</th><th>Duration (D)(ms)</th><th>Waveform</th><th>Velocity change (ft/sec)</th></tr>
<tr><td>C</td><td>100</td><td>6</td><td>Half-sine</td><td>12.3</td></tr>
</table></td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±10% of initial value
. tanδ ≤ initial specified value</td></tr>
<tr><td>Vibration</td><td>14</td><td>. Frequency range : 10 ~ 2000Hz
. Amplitude : 5 g
. Duration : 4hour 12 Cycles each 3 orientations.
※ Use 8"x5"PCB 0.031" thick with 7 secure point on one corners of opposite sides. Parts mounted within 2" from any secure.</td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±10% of initial value
. tanδ ≤ initial specified value</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>15</td><td>. Solder : HSE-02 SR-34
. Flux : 25% by weight of rosin in ethanol
. Cycle : 1 time
▶ Test Condition
<table>
<tr><th>Condition</th><th>Temperature</th><th>Time(sec)</th><th>immersion and emersion rate</th></tr>
<tr><td>B</td><td>260±5℃</td><td>10±1</td><td>25 ± 6 mm/s</td></tr>
</table></td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±10% of initial value
. tanδ ≤ initial specified value</td></tr>
<tr><td>ESD</td><td>17</td><td>▶ Test Condition
<table>
<tr><th>impressed voltage</th><th>Discharge connection</th><th>Test number</th><th>result</th></tr>
<tr><td rowspan="2">Apply Voltage</td><td>(+)</td><td>15</td><td rowspan="2">when passing or fail, go to Next step</td></tr>
<tr><td>(-)</td><td>15</td></tr>
</table>

</td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±10% of initial value
. tanδ ≤ initial specified value
. satisfy more than level 2</td></tr>
</table>

<table>
<tr><th>Stress</th><th>No.</th><th>Test Condition</th><th>Specification</th></tr>
<tr><td>Solderability</td><td>18</td><td>. Solder : HSE-02 SR-34
. Flux : 25% by weight of rosin in ethanol
. Cycle : 1 time
▶ Test Condition
<table>
<tr><th>Condition</th><th>Temperature</th><th>Time(sec)</th><th>immersion and emersion rate</th></tr>
<tr><td>B</td><td>260±5℃</td><td>10±1</td><td>25 ± 6 mm/s</td></tr>
</table></td><td>. 95% of the circumference of the surface up to the immersed shall be covered with new solder</td></tr>
<tr><td>Electrical Characterization</td><td>19</td><td>
<table>
<tr><th>Step</th><th>Temperature(℃)</th></tr>
<tr><td>1</td><td>20±2</td></tr>
<tr><td>2</td><td>-25±3, -55±3</td></tr>
</table>
Step-1 : Impedance shall be measured
Step-2 : Impedance ratio at -25℃, -55℃ refer to 20℃ shall be less than the value below
Table 7.19
<table>
<tr><td>Z (-25℃) / Z (+20℃) ≤ 1.5</td></tr>
<tr><td>Z (-55℃) / Z (+20℃) ≤ 2.0</td></tr>
</table></td><td>. Impedance ratio : Table 7.19</td></tr>
<tr><td>Board Flex</td><td>21</td><td>- giving the weight to the middle part in condition that overturned pcb after mounting the reflow on the pcb
- Pcb size : 100mm X 40mm, T=1.6mm, layer t= 35㎛±10㎛
- quality of the material :FR4
- Spec: 2mm /1MIN
 
</td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±10% of initial value
. tanδ ≤ initial specified value</td></tr>
<tr><td>Terminal Strength</td><td>22</td><td>
<table>
<tr><th>Condition</th><th>Forec</th><th>Time</th></tr>
<tr><td>A</td><td>1.8Kg</td><td>60±1 sec</td></tr>
</table>
- PCB size : 0.062inch (quality of the material :FR4)
 
</td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±10% of initial value
. tanδ ≤ initial specified value</td></tr>
<tr><td>Surge Voltage</td><td>27</td><td>. Applied voltage : See table 1.
. Temperature : 15 ~ 35℃
. Duration of charge : 30 ± 5 seconds
. Duration of discharge : 5 minutes 30 seconds
. Cycles : 1000 times</td><td>. No visible damage
. Leakage current ≤initial specified value
. Capacitance change within ±15% of initial value
. tanδ ≤initial specified value</td></tr>
</table>

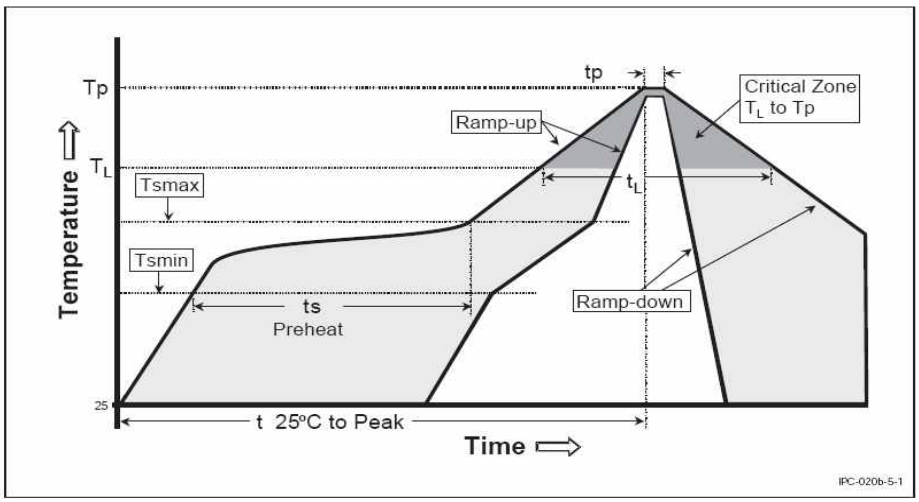
Reflow soldering method for the chip aluminum electrolytic capacitor

1. Recommended conditions for reflow soldering

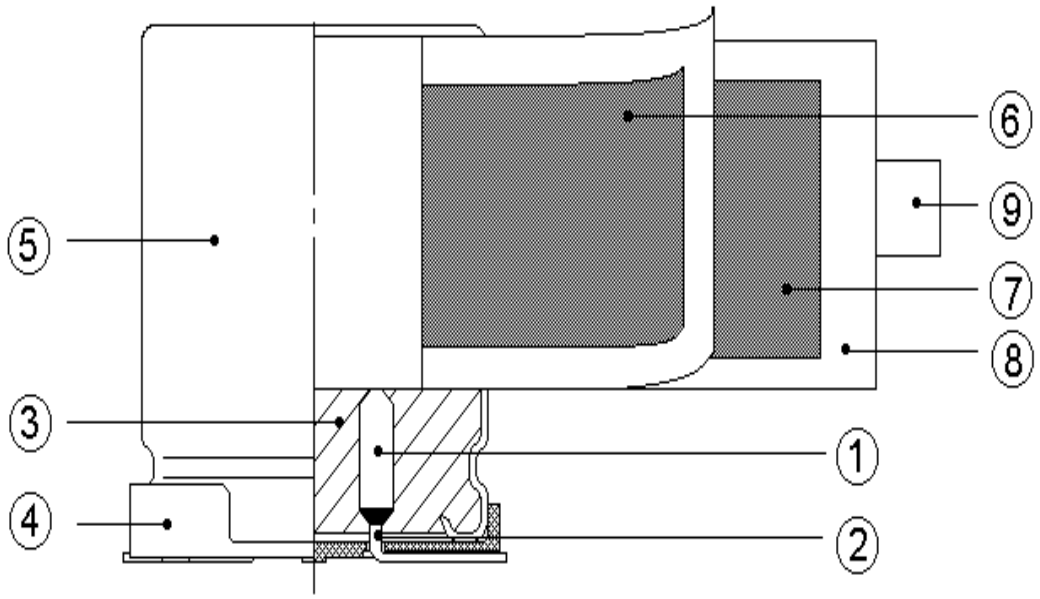
The chip aluminum electrolytic capacitor is subjected to soldering by reflow method.
Temperature and time conditions of reflow soldering shall ve set as per each temperature profile shown below as a standard. The following are recommended conditions in the case of reflow soldering method for the chip aluminum electrolytoc capacitor.

(1) The capacitor shall not be subjected to either flow or dip soldering merhod.
(2) Avoid soldering twice by reflow. The number of reflow time for chip aluminum electrolytic capacitor shall be once basically. If this type of capacitor has to ve unevutably subjected to the reflow twice, enough cooling time between the first and the second reflow (at least more than 30 minutes) shall be taken to avoid the consecutive reflows by all means.
(3) The touch up work with a soldering iron is allowed after the reflow soldering (Temperature of solering iron : MAX 400℃ Time : 5sec.), provided that carefully attention shall be paid lest a soldering iron should directly touch the capacitor body or its resin bottom base.

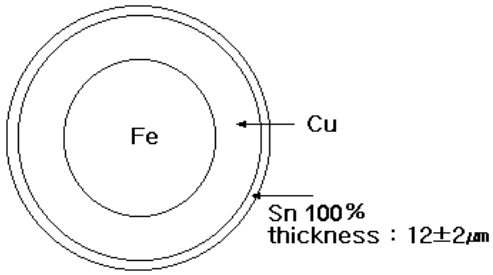
2. RECOMMENDED REFLOW SOLDERING CONDITIONS



Profile Feature	Soldering condition
	φ6.3 ~ φ10
Average Ramp-up Rate (T_L to Tp)	3℃/second max.
Preheat - Temperature Min. ($T_{s\ min}$) - Temperature Max. ($T_{s\ max}$) - Time ($t_{s\ min.}$ to $t_{s\ max.}$)	 150℃ 200℃ 60 ~ 150 seconds
$T_{s\ max.}$ to T_L - Ramp-up Rate	3℃/second max.
Time maintained above - Temperature(T_L) - Time(t_L)	 217℃ 60 ~ 90 seconds
Peak/classification Temperatrue (T_p)	260℃
Time within 5℃ of actual peak temperature(t_p)	10 seconds max.
Ramp-Down rate	3℃/second max.
Time 25℃ to peak temperature	8 mimute max.

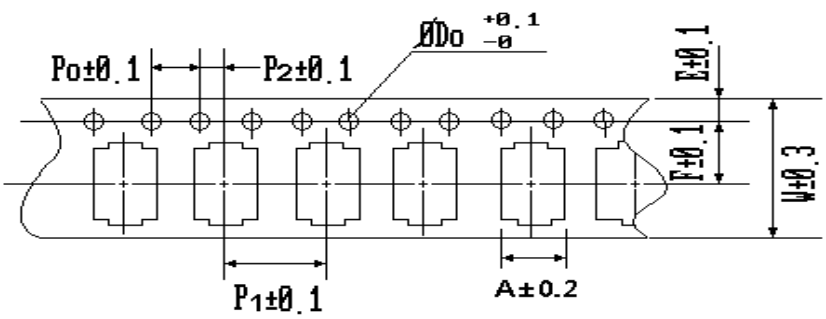


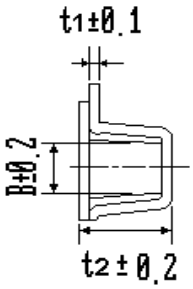
LEAD WIRE
(material specification)

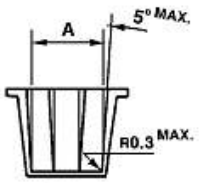


No.	Component	Materials
1	Lead line	Aluminum 99.92%
2	Terminal	Tinned copper-ply wire
3	Sealing pad	I.I.R.
4	Base plate	P.P.A
5	Case	Aluminum 99.5% + PET or Nylon Coating
6	Anode foil	Formed aluminum 99.99% or 99.98%
7	Cathode foil	Etched aluminum 99.7%, 99.4% or 98.0%
8	Separator	Nylon or Cellulose
9	Adhesive tape	Poly Imide film

Carrier tape

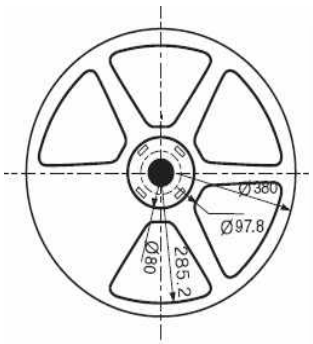


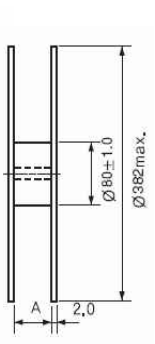




ΦD x L	A	B	ΦDo	E	F	Po	P_1	P_2	t_1	t_2	W
6.3×5.8	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.5	6.4	16.0
6.3×7.7	7.0	7.0	1.5	1.75	7.5	4.0	12.0	2.0	0.5	8.3	16.0
8×10	8.7	8.7	1.5	1.75	11.5	4.0	16.0	2.0	0.5	11.1	24.0
10×10	10.7	10.7	1.5	1.75	11.5	4.0	16.0	2.0	0.5	11.1	24.0
10×12.5	10.7	10.7	1.5	1.75	11.5	4.0	16.0	2.0	0.5	13.1	24.0

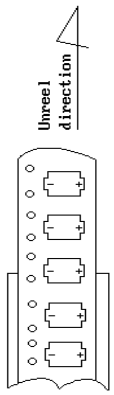
Plastic Reel





Polarity

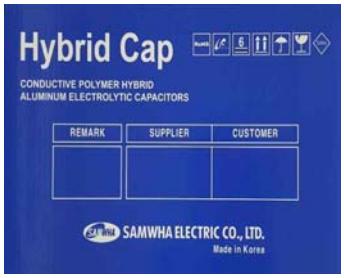
ΦD x L	A
6.3 x 5.8	16
6.3 x 7.7	16
8 x 10	24
10 x 10	24
10 x 12.5	24



Packing Quantity(pcs.)/Box

ΦD × L	REEL	INNER BOX / Size(L×W×H)	
6.3 × 5.8	1,000	10,000	400×400×235
6.3 × 7.7	900	9,000	400×400×235
8 × 10	500	5,000	400×400×315
10 × 10	500	5,000	400×400×315
10 × 12.5	400	4,000	400×400×315

Φ6.3



Φ8, Φ10

WARNING !

Correct application and strict adherence to the important information listed below, will ensure optimum performance of the capacitors over their entire specified useful life.
Please note, that ignoring these rules may reduce the equipment life or even destroy the capacitor, together with parts of the equipment or property involved.

PARAMETER	IMPORTANT INFORMATION - PRODUCT SAFETY
POLARITY, REVERSE VOLTAGE	**Electrolytic capacitors for DC applications require polarization** - Check the polarity of each capacitor : both in circuit design and in mounting - It is advisable to use non-polar capacitors for a DC circuit where the polarity is to be reversed.
VOLTAGE	**Do not apply a voltage exceeding the capacitor's voltage rating.** - Check the maximum voltage across the capacitor which can occur over the whole equipment life. - In normal operation the rated voltage of the capacitor shall not exceeded; if so early failures may occur.
RIPPLE LOAD	**Do not allow excessive ripple current to pass** - The rated ripple current given for certain conditions (temperature, frequency, and useful life) shall not be exceeded. If so, early failure may result. **Keep ripple voltage within ratings.** - The sum of DC-bias and maximum amplitude of ripple voltage shall be within rated voltage. Electrolytic capacitors are not normally designed for AC application.
TEMPERATURE RANGE	**Use capacitors within specified temperature** - A general principle is that lower ambient temperature means longer life; therefore, electrolytic capacitors should be placed at the coolest positions on the board, wherever possible. - Exceeding the permitted temperature range may cause early failure.
CHARGE - DISCHARGE	**Observe charge - discharge limitations.** - Frequent charge - discharge load via low resistance may cause capacitance drop or destroy the capacitor.
STORAGE	**A aluminum electrolytic capacitor which has been stored for a long period tends to give increased leakage current.** - Whenever you use a capacitor that has been long stored, make sure to gradually increase the voltage to the rated value. - The leakage current tends to be higher with higher storage atmosphere temperature, store the units at a location with storage temperature of 5℃ to 35℃,75% or below RH which is not exposed to direct sunlight. - Capacitors should be stored sealed in bag until they are actually used. Once the sealed bag is cut open, all the parts should be used al one time. If not, then the remaining parts should be places in a bag and sealed with tape.

<table>
<tr><th>PARAMETER</th><th>IMPORTANT INFORMATION - PRODUCT SAFETY</th></tr>
<tr><td>HIGH AIR PRESSURE</td><td>Do not expose capacitors to overpressure.
Maximum operating pressure is 150kPa. High pressure may cause a short circuit.</td></tr>
<tr><td>LOW AIR PRESSURE</td><td>The capacitors may be used at an altitude of ≤12,000 m.
Minimum air pressure : 8.5kPa for short periods.</td></tr>
<tr><td>MOUNTING</td><td>Avoid excessive stress to the lead wires or terminals.
- The distance between the terminal holes on the circuit board should be the same as that between the lead wires or terminals of the capacitor. Excessive force in mounting on circuit boards should be avoided.
- Improper insertion of the lead wires in circuit boards may cause electrolyte leakage or break the lead wires or impair their connection with the internal elements.
When the distance between the two terminal holes on the circuit board cannot be reduced to that between the lead wires, lead formed capacitors are recommended.
- In order to prevent possible damage by vibration on the circuit board, kindly bond our capacitors on the circuit board or use any fastening devices.
<table>
<tr><td>RADIAL TYPE</td><td>over Φ18 or 25㎜L</td></tr>
<tr><td>SNAP-IN TYPE</td><td>over Φ22 or 40㎜L</td></tr>
</table></td></tr>
<tr><td>BOARD CLEANING</td><td>Aluminum electrolytic capacitors may be damaged when used with certain types of flux cleaning solvents commonly used to clean printed circuit board.
- When you clean a PCB, halogen cleaning agents can cause corrosion of aluminum foil and lead tab. If you need to clean, please replace Isopropyl Alcohol(IPA), Water as halogenated cleaning atents.
- 5minutes either by ultrasonic, vapor or immersion cleaning method. (chip type:2minutes)
Be careful not to apply mechanical stress to the terminals or lead wires
- Common type of halogenated cleaning agents are listed below
<table>
<tr><th>Chemical Name</th><th>Structural Formula</th><th>Representatice Brand Name</th></tr>
<tr><td>Trichlorotrifluoroethane</td><td>$C_2Cl_3F_3$</td><td>Freon TF, Daiflon S-3</td></tr>
<tr><td>Fluorotrichloromethane</td><td>CCl_3F</td><td>Freon-11, Daiflon S-1</td></tr>
<tr><td>1,1,1-Trichloroethane</td><td>$C_2H_3Cl_3$</td><td>Cholroethene</td></tr>
<tr><td>Trichloroethylene</td><td>C_2HCl_3</td><td>Trichlene</td></tr>
<tr><td>Methyl Chloride</td><td>CH_3Cl</td><td>MC</td></tr>
</table>
Don't use the solvents listed above as clearning solvent agents even for solvents proof capacitors, because it has strong chemical reaction.
- When using a latex-based adhesive on the capacitor's rubber end seal for adhesion to a PCB,corrosion may occurdepending on the king of solvent in the adhesive. Select an adhesive as an organic solvent with dissolved polymer that is not halogenated hydrocarbon.</td></tr>
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