Aluminum Capacitor Guide Line

SAMWHA ELECTRIC

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1	POLARITY	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.
2	OVERVOLTAGE	Do not apply overvoltage. When overvoltage is applied to the capacitor, leakage current increase drastically, causing heat generation, short-circuit or breakage
3	RIPPLE LOAD	The rated ripple current given for certain conditions(Temperature, Frequency) shall not be exceeded. If so, early failure may result. The sum of DC-bias and maximum amplitude of ripple voltage shall be within rated voltage and 0V. Electrolytic capacitors are not normally designed for AC application
4	TEMPERATURE RANGE	Use the electrolytic capacitors according to the specified operating temperature range. Applying capacitors surpassing guananteed conditions may cause destruction due to rappid characteristic deterioration. Usage at room temperature will ensure longer life.(when using the capacitors under -45°C, it's life equals that using capacitors at -45℃)
5	CHARGE - DISCHARGE	If used in circuits in which charge and discharge are frequently repeated, the capacitance value may drop, or the capacitor may be damaged. Please consult our technical department for assistance in these applications
6	FOR SERIES CONNECTION	Aluminum electrolytic capacitors may be connected in series, but when doing so it should be noted that the voltage distribution will be according to their leakage currents. This phenomenon may induce irregularities in voltage load and cause maximum ratings to be exceeded, this could have drastic consequences especially with high voltage capacitors. Series connected electrolytic capacitors should therefore be supplied the voltages shall be proportionally distributed by balancing resistors
7	FOR PARALLEL CONNECTION	When you install more than 2 capacitors in parallel, consider the balance of current flowing into the capacitors

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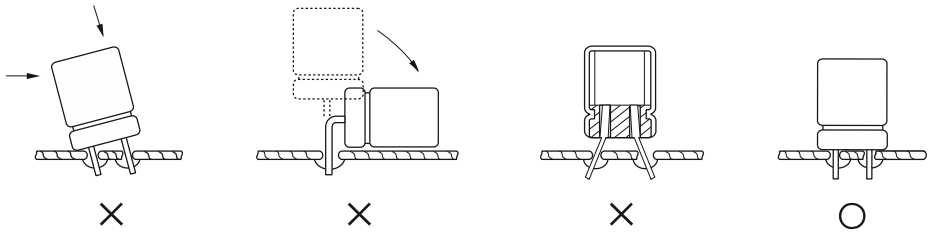
<table>
<tr>
<td>8</td>
<td>MOUNTING</td>
<td>
The distance between the terminal holes on the circuit board should be the same as that between the lead wires or terminals of the capacitor. Excessive force in mounting on circuit boards should be avoided.
Improper insertion of the lead wires in circuit board may cause electrolyte leakage, 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.

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The main chemical solution of the electrolyte and the separator paper used in the capacitors are combustible. The electrolyte is conductive. When it comes in contact with the PC board, there is a possibility of pattern corrosion or short circuit between the circuit pattern which could in result smoking or catching fire. Do not locate any circuit pattern beneath the capacitor end seal. 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 Ø18 or 30mmL</td></tr>
<tr><td>SNAP-IN TYPE</td><td>over Ø22 or 40mmL</td></tr>
</table>
There should not be any circuit pattern or circuit wire above the capacitor safety vent.
Unless otherwise specified, following space should be made above the capacitor safety vent.
<table>
<tr><td>Case diameter</td><td>Ø6.3~Ø16</td><td>Ø18~Ø35</td><td>Ø40~</td></tr>
<tr><td>Space</td><td>2mm min.</td><td>3mm min.</td><td>5mm min.</td></tr>
</table>
If the capacitor safety vent is placed toward circuit board, the hole should be made to match the capacitor vent position.
</td>
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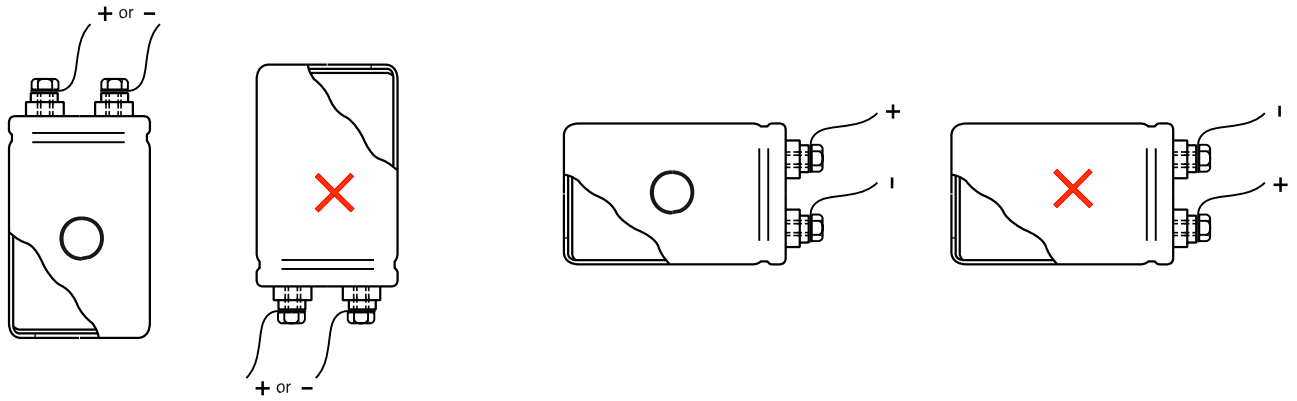
8	MOUNTING	Do not install screw terminal capacitor with end seal side down. When you install a screw terminal capacitor in a horizontal mount, the positive terminal must be in the upper position. 
9	LEAD STRESS	Do not apply excessive force to the lead wires or terminals. If excessive force is applied to the lead wires and/or terminals, they may break and cause an open circuit. After mounting, avoid holding or applying force to the capacitor. Do not twist or carry the PC board by grasping the capacitor body after the capacitor are soldered to the PC board.
10	SOLDERING	In the dip soldering process of PC board with aluminum electrolytic capacitors mounted, secondary shrinking or crack of the sleeve may be observed when solder temperature is too high and/or dipping time is too long. If the lead wire of other components or pattern of bothsided PC board is close to the capacitor terminal the similar failure may be also originated. Please avoid having flux adhere to any portion except the terminal. Solder iron does not touch any portion of capacitor body.

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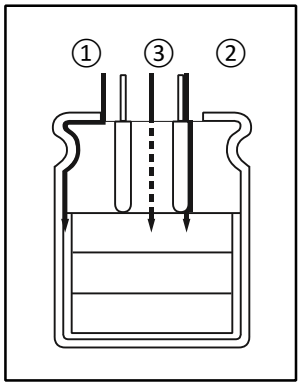
11 — Cleaning, Mounting of the PCB after soldering

1)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.
2)5minutes either by ultrasonic, vapor or immersion cleaning method.(chip type: 2minutes) Becareful not to apply mechanical stress to the terminals or lead wires.
3)Common type of halogenated cleaning agents are listed below.

Chemical Name	Structural Formula	Representatice Brand Name
Trichlorotrifluoroethane	$C_2Cl_3F_3$	Freon TF, Daiflon S-3
Fluorotrichloromethane	CCl_3F	Freon-11, Daiflon S-1
1,1,1-Trichloroethane	$C_2H_3Cl_3$	Cholroethene
Trichloroethylene	C_2HCl_3	Trichlene
Methyl Chloride	CH_3Cl	MC

Don't use the solvents listed above as clearning solvent agents even for solvents proof capacitors, because it has strong chemical reaction.
4)When using a latex-based adhesive on the capacitor's rubber end seal for adhesion to a PCB, corrosion may occur depending on the kind of solvent in the adhesive. Select an adhesive as an organic solvent with dissolved polymer that is not halogenated hydrocarbon.
5)Penetration Channel of Solvent and Corrosion Mechanism
①Penetration between the rubber and the aluminum case
②Penetration between the rubber and the lead wires
③Penetration through the rubber
Cl-gotten inside a capacitor reacts with aluminum.
$Al + 3Cl^- \rightarrow AlCl_3 + 3e^-$ Then, AlCl3 resolves in water
$AlCl_3 + 3H_2O \rightarrow Al(OH)_3 + 3H^+ + 3Cl^-$
Thus, the Cl- ion is freed again and repeats the corrosion of Aluminum.



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12	Adhesive and Coating Materials	Do not use halogenated adhesives and coating materials to fix Aluminum Electrolytic Capacitors. Flux between the surface of capacitors should be cleaned before using adhesives or coating materials. Solvents should be dried up before using adhesives or coating materials. Do not cover up all the sealing area of capacitors with adhesives or coating materials. Make coverag only partial.(The sealing area 30%.)
13	INSULATION MATERIAL	Sleeve material The standard sleeve material is P.V.C or P.E.T if exposed to xylene, toluene, etc. and then subjected to high heat, the sleeve may crack. Case and cathode terminal The case of capacitor is not insulated from the cathode terminal. Dummy terminals for snap-in type Dummy terminals are not insulated from the element. Dummy terminals are for added stability only, and should never be electrically connected to either the positive or negative terminal
14	STORAGE	Do not store the capacitors in high temperature and high humidity conditions. Avoid direct sunlight. Recommendable conditions : 5 to 35°C,75% or below RH) Store the capacitors in the package. Capacitors should not be direct contact with water, brine or oil. Capacitors must not be exposed to toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, or ammonium. 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 at one time. If not, then the remaining parts should be places in a bag and sealed with tape. In order to maintain a good solderability of the parts, shelf life of parts should not exceed 1 year. When the capacitor is stored for a long time without applying voltage, leakage current tends to increase, due to deterioration of aluminum oxide film. This returns to normal by applying voltage. Apply voltage(Aging) before use if the capacitor is stored long time. It is recommended to apply DC working voltage to the capacitor for 30 minutes through 1kΩof protective series resistor.

15	EMERGENCY ACTION	When the safety vent is Open and some gas blows out from the capacitor, please turn the main swich of the equipment off or pull out the plug the power outlet immediately. During vent operation, extremly hot gas(over 100℃) and electrolyte may blow out from the capacitors. Do not stand close to the capacitors. In case of eye contact, flush the poen eyes with large amout or clean water immediately, do not swallow. do not touch electrlyte but wash skin with soap and water in case of skin contact
16	DESTRUCTING CAPACITORS & OTHERS	In case of destructing our capacitors, Burn capacitors up after making holeson them or scrapping. When you try to destrory them by fire, you may expect explosion in the capacitors. In order to prevent hazardous gas like chlorine gas, burn our capacitors on high temperature range. Burning sleeve on low temperature may cause producting chlorine gas. When you do not have burning facilities, please contact special industrial wastes processing companies. Capacitors may accumulate charge maturally during long storage time. In this case, the capacitors should be subject to voltage treatment through about 1kΩ resistor before use. since it has possibilities for electric shock or burns, kindly, discharge it at the level of 1kΩin advance.(sufficient and safe resistance values should be considered before applying) For methods of testing, refer to KS C IEC 60384-4 (JIS C 5101-1, JIS C 5101-4) Capacitors case size and other product standards specified in this catalog may be changed or modified without notice for improvement of quality.