

PRECAUTIONS AND GUIDELINES OF ALUMINUM ELECTROLYTIC CAPACITOR (NON-CONDUCTIVE POLYMER)

A. Designing Device Circuits

1. Selecting

Select the capacitors to suit installation of circuit and operating conditions, and use the capacitors to meet the performance limits prescribed in this catalog or the product specifications.

2. Electrical Characteristic

- a. Aluminum Electrolytic Capacitors are polarized. Please do not apply either reverse voltage or AC voltage to polarized capacitors. Using reversed polarity causes a short circuit or venting. Before use, please refer to this catalog, product specifications or capacitor body to identify the polarity marking. Use a bi-polar for a type of non-conductive polymer aluminum electrolytic capacitor for a circuit where the polarity is occasionally reversed. However, note that even a bi-polar aluminum electrolytic capacitor must not be used for AC voltage applications.
- b. Do not apply a DC voltage which exceeds the specified rated voltage.
DC voltage + peak voltage of a superimposed ripple voltage \leq specified rated voltage. A surge voltage value, is prescribed in this catalog, but it is a restricted for especially short periods of time.
- c. Do not apply over-current which exceeds the specified rated ripple current. An exceed ripple current can increase the rate of heating within the capacitor, which may occur failure mode as shorten lifetime, open vent, short circuit etc. The rated ripple current has been specified at a certain frequency. The rated ripple current at several frequencies must be calculated by multiplying the rated ripple current at the original frequency using the frequency multipliers for each product series
- d. For general purpose used capacitor, do not use capacitors in circuits where heavy charge and discharge cycles are frequently repeated. Frequent and sharp heavy discharging cycles will result in decreasing capacitance and damage to the capacitors due to generated heat. Specified capacitors can be designed to meet the requirements of charging-discharging cycles, frequency, operating temperature, etc. Please contact us if you need to install our product in this frequently repeated charge and discharge circuit.

3. Ambient Temperature

Do not apply over temperature which exceeds the maximum operating temperature. Applied under an ambient temperature which exceeds the maximum operating temperature, can considerably shorten the life or cause the capacitor to vent.

4. The life of Capacitor

Select the capacitors to meet the service life of a device. Please be reminded that, the result using the life calculating formula is not guaranteed. During your design stage, please select capacitor which is higher than your actual required life value. Apart from this, if your life calculation is exceeds 15 years, please consider 15 years as the maximum life level.

5. Failure mode of capacitors

Non-solid aluminum electrolytic capacitors, in general, have a lifetime which ends in an open circuit, but depending on conditions of usage or products type, failure mode of capacitors will be venting.

6. Insulating between positive and negative polar

Electrically isolate the following parts of a capacitor from the negative terminal, the positive terminal and the outer casing. The dummy terminal of a non-conductive polymer aluminum capacitor, which is designed for mounting stability, so is isolated with positive and negative terminal too.

7. The sleeve cover

The outer sleeve of a non conductive polymer capacitor is not assured as an insulator (Except for screw type), so please don't use it as an insulator. Please contact our sales representative if you need any more details in this area.

8. Condition of application

Do not use / expose capacitors to the following conditions.

- a. Spay directly by water, salty water, Oil, or storage in damp location.
- b. Direct sunlight.
- c. Storage in location with toxic gases, such as hydrogen sulfide , sulfurous acid , nitrous acid , chlorine or its compounds , and ammonium.
- d. Ozone , ultraviolet rays or radiation condition.
- e. Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

9. Mounting

a. Non conductive polymer capacitor

The paper separators and the electrolytic-conductive electrolytes in a non conductive polymer aluminum electrolytic capacitor are flammable. Leaking electrolyte on a printed circuit board can gradually erode the circuit on PC board, possibly causing smoke or burning.

Verify the following points when designing a PC board.

- Provide the appropriate holes spacing on the PC board to match with the terminal pitch of the capacitor.
- Make the following open space over the vent so that the vent can operate correctly.

$\leq \phi 16\text{mm}$: 2mm and above

$\phi 18 \sim \phi 35\text{mm}$: 3mm and above

$\geq \phi 40\text{mm}$: 5mm and above

- Do not place any wires or circuit traces over the vent of the capacitor.
- If Install a capacitor with the vent touching the PC board, needs an appropriate ventilation hole in PC board for vent open.
- Do not pass any circuit traces under the seal side of a capacitor. The trace must pass 1 or 2mm to the side of the capacitor.
- Avoid placing any heat-generating object adjacent to a capacitor or even on the reverse side of the PC board.
- Do not pass any via holes underneath a capacitor on double sided PC board.
- In designing double sided PC board do not locate any copper trace under the seal side of a capacitor.

b. Screw type capacitor

Do not tighten the screw of the terminals and mounting clamps over the specified torque prescribed in the catalog or the production specification. Do not mount the terminal side of a screw mount capacitor downwards

c. Chip type capacitor

For a surface mount capacitor design the solder point, please follow the dimension prescribed in the catalogs or the product specification.

10. Others in safety application

Using capacitor for applications which always consider safety. Consult with our company sales representative before use in applications which can affect human life. (Space equipment, aerial equipment, nuclear equipment, medical equipment, vehicle control equipment, etc)

11. Others

- a. The electrical characteristic of capacitors vary in respect to temperature and frequency, design the device circuit by taking these changes into consideration.
- b. Capacitors mounted in parallel need the current to flow equally through the individual capacitors.
- c. Capacitors mounted in series require resistors in parallel with the individual capacitors to balance the voltage, or can install parallel protect resistor with it.

B. Notice of Installing Capacitors

1. Installing

- a. Used capacitors are not reusable, except in the case that the capacitor are detached from a device for periodic inspection to measure their electrical characteristics.
- b. If the capacitors have self charged, discharge in the capacitors through a resistor of approximately $1k\Omega$ before use.
- c. If the capacitors are stored at a temperature of 35°C or more and more than 75%RH, over the storage limit prescribed in the catalogs or the product specification, the leakage current may increase. In this case, they can be reformed by applying the rated voltage through a resistor of approximately $1k\Omega$.
- d. Verify the specification of the capacitor before installing (rated capacitance and voltage)
- e. Verify the polarity of the capacitors.
- f. Do not use the capacitors if they have been dropped on the floor.
- g. Do not deform the cases of capacitors.
- h. Verify that the lead pitch of the capacitor fits the holes spacing in the PC board before installing the capacitors. Some standard pre-formed leads are available for this fitting.
- i. For radial or snap in terminals, insert the terminals into PC board and press the capacitor downward until the bottom of the capacitor body reaches PC board surface.
- j. Do not apply any mechanical force in excess of the limits prescribed in the catalogs or the product specifications of the capacitors. Please notice that, the capacitors may be damaged by mechanical shocks caused by the vacuum / insertion head, component checker or centering operation of an automatic mounting or insertion machine.

2. Soldering heat and Solderability

- a. When soldering with a soldering iron
 - Soldering conditions (temperature and time) should be within the limits prescribed in the catalogs or the product specifications.
 - If the terminal pitch of a capacitor does not fit the terminal hole spacing of the PC board, can reform the terminals in a manner to minimize a mechanical stress into the body of the capacitor.
 - Do not touch the capacitor body with the hot tip of the soldering iron.
- b. Flow soldering
 - Do not dips the body of a capacitor into the solder bath only dip the terminals in. The soldering must be done on the reverse side of PC board.
 - Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs or the product specifications.
 - Do not apply flux to any part of capacitors other than their terminals.
 - Make sure the capacitors do not come into contact with any other components while soldering.
- c. Reflow soldering
 - Soldering conditions (preheat, solder temperature and soldering time) should be within the limits prescribed in the catalogs or the product specifications.
 - When setting the temperature infrared heaters, consider that the infrared absorption causes material to be discolored and change in appearance.
 - The limit of reflow time is prescribed in the catalogs or the product specifications.
 - Make sure capacitors do not come into contact with copper traces.
 - Vapor phase soldering (VPS) is not used.
- d. Do not re-use surface mount capacitors which have already been soldered.
- e. Reflow soldering only for chip type capacitor, others types are not allowed.

3. Handling after soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.

- a. Do not lean or twist the body of the capacitor after soldering the capacitors onto the PC board.
- b. Do not use the capacitor for lifting or carrying the assembly board.
- c. Do not hit or poke the capacitor after soldering to PC board. When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.
- d. Do not drop the assembly PC board.

4. Cleaning PC boards

- a. Do not wash capacitors by using the following cleaning agents.
 - Halogenated solvents; cause capacitors to fail due to corrosion.
 - Alkali system solvents; corrode (dissolve) an aluminum case.
 - Petroleum and terpene system solvents; cause the rubber seal material to deteriorate.
 - Xylene; causes the rubber seal material to dereriorate.
 - Acetone; erases the marking.
 - Ultrasound cleaning will accelerate damaging capacitors.
- b. Wash capacitors by using the following agents if need.
 - Ethyl alcohol
 - Buthyl alcohol
 - Methyl alcohol
 - Propyl alcohol
 - Be sure not to expose the capacitor under solvent rich conditions or keep capacitor with an air dryer (temperature should be less than the maximum rate category temperature of the capacitor) over 10 minutes, and be sure the PC board is dried.

5. Fumigation treatment

In many cases when exporting or importing electronic devices, wooden pallet packaging is used. Fumigation treatment is using halogenated chemical, if capacitor body touch with the chemicals, such status is same as cleaning PC board, halogen ion can cause capacitors to fail due to corrosion.

Our company is all using non-fumigation packaging to do exporting or importing.

Customer if need do any exporting or importing electronic devices, semi-product and aluminum electrolytic capacitor, please notice whether with or without fumigation treatment.

Final outer packaging, even using chipboard pallet with plastic bag cover, inner product still have a possible be polluted by halogen gas. Please notice.

C. The Operation notice of Devices

1. Do not touch terminals of capacitor directly with bare hands.
2. Do not short-circuit the terminal of a capacitor by letting it come into contact with any conductive object. Also, do not spill electri-conductive liquid such as acid or alkaline solution over the capacitor.
3. Do not use capacitor in circumstance where they would be subject to exposure to the following materials exist or expose.
 - a. Spay directly by water, salty water, Oil, or storage in damp location.
 - b. Direct sunlight.
 - c. Storage in location with toxic gases, such as hydrogen sulfide , sulfurous acid , nitrous acid , chlorine or its compounds , and ammonium.
 - d. Ozone , ultraviolet rays or radiation condition.
 - e. Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

D. Maintenance Inspection Notice

1. Make periodic inspections of capacitors that have been used in industrial applications. Before inspection, turn off the power supply and carefully discharge the electricity in the capacitors. When measuring the capacitors with a meter, do not apply any mechanical stress to the terminals of the capacitors.

2. The following item should be checked during the periodic inspections.

- Visual appearance : venting and electrolyte leakage.
- Electrical characteristics : leakage current(LC), capacitance(CAP), DF and other characteristics prescribed in our catalogs or product specifications.

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

E. In Case of Emergency

- a. For reducing the effect of inner gas pressure exploded, a higher capacitor is with vent mark on top. When venting, it will discharge odors or smoke, please immediately turn off or unplug the main power supply of the device. If we do not switch off the power, PC board may be damaged by the capacitor short-circuit failure, the worst is burn out the device. The gas which comes out from the pressure vent of a capacitor, it is not smoke by flammable, this is the vaporized electrolyte.
- b. When venting, inner capacitor blows out gas with a temperature of over 100°C, never expose the face close to a venting capacitor. If yours eyes should inadvertently become exposed to the spouting gas or you inhale It, immediately flush the open eyes with large amounts of water and gargle with water respectively. If electrolyte is on the skin, wash the electrolyte away from the skin with soap and plenty of water.

F. Storage

We recommend the following condition for storage.

1. Store the capacitor indoors at a temperature of 5 ~35°C and a relative humidity ≤75%.
The storage period is 1 years after production, and 2 years for Chip Type.
2. Please keep capacitor in the original package.
3. Please do not keep the capacitors in places,
 - a. Spray directly by water, high temperature high humidity, or storage in damp location.
 - b. Spray directly by oil, or with oily gas location.
 - c. Spray directly by salt water, or salty location.
 - d. Storage in location with toxic gases, such as hydrogen sulfide , sulfurous acid , nitrous acid , chlorine or its compounds , and ammonium.
 - e. Full with ammonium gas, alkaline toxic gas location.
 - f. With acidic and alkaline solvent location.
 - g. Directly sunlight, ozone , ultraviolet rays or radiation condition.
 - e. Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

G. Disposal

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

Electrolytic capacitors. If burning, please burn it with high temperature (more than 800C).

Low temperature burning, can generate halogen gas which can affect human healthy. Besides that, in order to reduce exploding, please make a hole at the vent or damage it before burning.

H. Catalogs

The ESR value in the catalogs, measure area is the closet area to the capacitor body.

Specifications in catalogs may be subject to change without notice. Catalog data are typical.

This value does not guarantee the performance.

PRECAUTIONS AND GUIDELINES OF ALUMINUM ELECTROLYTIC CAPACITOR (CONDUCTIVE POLYMER)

A. Designing Device Circuits

1. Cannot be used in the following circuits

The leakage current in conductive polymer solid aluminum capacitor (hereafter called Capacitors), may vary depending on thermal stresses during soldering. Avoid the use of capacitors in the following types of circuits:

- a. High-impedance circuits that are to sustain voltages.
- b. Coupling circuits
- c. Time constant circuits

Because the capacitance varies depending on the environment the capacitors are used in, there is possibility that the capacitor can affect a time constant circuit where sensitivity to variation in capacitance is required.

- d. Other circuits that are significantly affected by leakage current.

2. Electrical characteristic

Verify the following before designing the circuit:

- a. Aluminum Electrolytic Capacitors are polarized. Please do not apply either reverse voltage or AC voltage to polarized capacitors. Using reversed polarity causes a short circuit or venting. Before use, please refer to this catalog, product specifications or capacitor body to identify the polarity marking. Use a bi-polar for a type of non-conductive polymer aluminum electrolytic capacitor for a circuit where the polarity is occasionally reversed. However, note that even a bi-polar aluminum electrolytic capacitor must not be used for AC voltage applications.
- b. Do not apply a DC voltage which exceeds the specified rated volt age.
DC voltage + peak voltage of a superimposed ripple voltage \leq specified rated voltage. A surge voltage value, is prescribed in this catalog, but it is a restricted for especially short periods of time.
- c. Do not apply over-current which exceeds the specified rated ripple current. An exceed ripple current can increases the rate of heating within the capacitor, which may occur failure mode as shorten lifetime, open vent, short circuit etc.
- d. Leakage current will increase, but can be recovered and reduce after be applying voltage. The leakage current recovered speed is depending on ambient temperature and working voltage. The reasons of leakage current increase is due to:
 1. Soldering
 2. Do testing of high temperature without voltage loading, high temperature high humidity or temperature cycle etc.
- e. Do not use capacitors in circuits where heavy charge and discharge cycles are frequently repeated. Frequent and sharp heavy discharging cycles will result in decreasing capacitance and damage to the capacitors due to generated heat. Please use protect resistor in a circuit with peak current may over 20A.

3. Ambient Temperature

Do not apply over temperature which exceeds the maximum operating temperature. Applied under an ambient temperature which exceeds the maximum operating temperature, can considerably shorten the life or cause the capacitor to vent.

4. Failures and Service Life

Based on the JIS C 5003 Standard, the failure rate of capacitors is 60%, more detail as follows:

0.5% / 1,000 hours (applied the rate voltage at the upper limit of the Category temperature range)

a. Failures Modes

- (1) The principal failure mode is wear-out failure, that is, capacitance decrease and ESR increase,

and eventually the capacitor become open circuit failure. In addition, short circuit failure may happen with over-voltage and excessive current applied to the capacitor.

- (2) The failure rate would be reduced by reducing ambient temperatures, ripple current and applying voltage.
- (3) If the short-circuited capacitor, which may be caused by over-voltages higher than the rated voltage or other conditions, has a large amount of current pass through, the aluminum can of the capacitor bulges and might be expelled with odor gas emitted.
- (4) The product contains flammable materials. If the short causes spark it may ignite.

Please be careful when installing the product, its position and the layout design.

- Increase safety by using in conjunction with a protective circuit or protective equipment.
- Install measures such as redundant circuits so that the failure of a part of the equipment will not cause unstable operation.

b. Service Life

We use rubber as the sealing material, so the service life depends on the thermal Integrity of this rubber. Consequently, it is recommended to use the capacitor at lower temperature than the maximum temperature for the capacitor category.

Select the capacitors to suit installation of circuit and operating conditions, and use the capacitors to meet the performance limits prescribed in this catalog or the product specifications.

5. Capacitor Insulation

Insulation of the capacitor's case is not guaranteed. Ensure electrical insulation between the capacitor case, negative electrode, positive electrode and circuit pattern.

6. Capacitor Usage Environment

Do not use capacitor in circumstance where they would be subject to exposure to the following materials exist or expose.

- a. Spay directly by water, salty water, Oil, or storage in damp location.
- b. Direct sunlight.
- c. Storage in location with toxic gases, such as hydrogen sulfide , sulfurous acid , nitrous acid , chlorine or its compounds , and ammonium.
- d. Ozone , ultraviolet rays or radiation condition.
- e. Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

7. Installation

- a. For a surface mount capacitor design the solder point, please follow the dimension prescribed in the catalogs or the product specification.
- b. For a radial capacitors, design the terminal holes on the PC board to fit the terminal holes on the PC board to fit the terminal dimension of the capacitor.

8. Safety application

Using capacitor for applications which always consider safety. (Space equipment, aerial equipment, nuclear equipment, medical equipment, vehicle control equipment, etc)

Consult with our company sales representative before use in applications which can affect human life.

9. Others

- a. The electrical characteristic of capacitors vary in respect to temperature and frequency, design the device circuit by taking these changes into consideration.
- b. Capacitors mounted in parallel need the current to flow equally through the individual capacitors.
- c. Capacitors mounted in series require resistors in parallel with the individual capacitors to balance the voltage, or can install parallel protect resistor with it.
- d. Do not install any heat generate device nearby the capacitor or behind the PC board of it.

B. Notice of Installing Capacitors

1. Installing

- a. Do not reuse capacitors already assembled in equipment that have been exposed to power.
- b. The capacitor may have self charge. If this happens, discharge the capacitor through a resistor of approximately 1kΩ before use.
- c. If capacitors are stored at a temperature of 35°C or more and more than 75%RH, the leakage current may increase. This may also occur if the capacitors are stored for a longer period than the period which is specified in the catalog or the product specification. In this case, they can be reformed by the voltage treatment through a resistor of approximately 1kΩ.
- d. Verify the rated capacitance and voltage of the capacitors when installing.
- e. Verify the polarity of the capacitors.
- f. Do not use the capacitor if they have been dropped on the floor.
- g. Do not deform the case of the capacitors.
- h. Verify that the lead spacing of the capacitor fits the hole spacing in the PC board before installing the capacitor. Some standard pre-formed leads are available for this fitting.
- i. Do not apply any mechanical force in excess of the limits prescribed in the catalog or the product specification of the capacitors. Avoid subjecting the capacitor to strong forces, as this may break the electrode terminals, bend or deform the capacitor, or damage the packaging, and may also cause short / open circuits, increased leakage current, or damage the appearance. Also, note the capacitors may be damaged by mechanical shocks caused by cut the lead wire, the vacuum / insertion head, component checker or centering operation of an automatic mounting or insertion machine.

2. Heat Resistance during Soldering

Ensure that the soldering conditions meet the specifications recommended. Note that the leakage current may increase or capacitances may decrease due to thermal stresses that occur during soldering, etc. Furthermore, the leakage current which rose gradually decreases, when voltage is applied at below the category's upper limit temperature.

Additional the self repairing action is faster when voltage is applied at below the category's Upper temperature limit.

- a. Verify the following before using a soldering iron:
 - That the soldering conditions (temperature and time) are within the ranges specified in the catalog or product specifications.
 - That the tip of the soldering iron does not come into contact with the capacitor itself.
- b. Verify the following when flow soldering:
 - Do not dip the body of a capacitor into the solder bath only dip the terminal in. The soldering must be done on the reverse side of PC board.
 - Soldering conditions (preheat, solder temperature and soldering time) should be within the limits prescribed in the catalogs or the product specifications.
 - Do not apply flux to any part of the capacitors other than their terminals.
 - Make sure the capacitors do not come into contact with any other components while soldering.
- c. Verify the following when reflow soldering:
 - Soldering conditions (preheat, solder temperature and soldering time) should be within the limits prescribed in the catalogs or the product specification.
 - The heat level should be appropriate. (Note that the thermal stress on the capacitor varies depending on the type and position of the heater in the reflow oven, and the color and material of the capacitor.)
 - Vapor phase soldering (VPS) is not used. Except for the surface mount type, reflow soldering must not be used for the capacitors.
- d. Do not reuse a capacitor that has already been soldered to PC board and then removed.

When using a new capacitor in the same location, remove the flux , etc. First, and then Use a soldering iron to solder on the new capacitor in accordance with the specifications.

- e. Confirm before running into soldering that the capacitors are SMD for reflow soldering.

3. Handling After Soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.

- a. Do not lean or twist the body of the capacitor after soldering the capacitor onto the PC board.
- b. Do not use the capacitors for lifting or carrying the assembly board.
- c. Do not hit or poke the capacitor after soldering to PC board. When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.
- d. Do not drop the assembled board.

4. Cleaning PC boards

- a. Do not wash capacitors by using the following cleaning agents. Solvent resistant capacitors are only suitable for washing using the cleaning conditions prescribed in the the catalog or the product specification.

Halogenated solvent; cause capacitors to fail due to corrosion.

- Alkali system solvents; corrode (dissolve) an aluminum case.
- Petroleum system solvents; cause the rubber seal material to deteriorate.
- Xylene; causes the rubber seal material to deteriorate.
- Acetone; erases the markings.
- Ultrasonic cleaning will accelerate damage to capacitors.

- b. Wash capacitors by using the following agents if need.

- Ethyl alcohol
- Buthyl alcohol
- Methyl alcohol
- Propyl alcohol
- Isopropyl Alcohol ($\leq 2\text{wt}\%$)
- Be sure not to expose the capacitor under solvent rich conditions or keep capacitor with an air dryer (temperature should be less than the maximum rate category temperature of the capacitor) over 10 minutes, and be sure the PC board is dried

5. Fumigation

In many cases when exporting or importing electronic devices, wooden pallet packaging is used. Fumigation treatment is using halogenated chemical, if capacitor body touch with the chemicals, such status is same as cleaning PC board, halogen ion can cause capacitors to fail due to corrosion.

Our company is all using non-fumigation packaging to do exporting or importing.

Customer if need do any exporting or importing electronic devices, semi-product and aluminum electrolytic capacitor, please notice whether with or without fumigation treatment.

Final outer packaging, even using chipboard pallet with plastic bag cover, inner product still have a possible be polluted by halogen gas. Please notice.

C. The Operation notice of Devices

1. Do not touch terminals of capacitor directly with bare hands.
2. Do not short-circuit the terminal of a capacitor by letting it come into contact with any conductive object. Also, do not spill electri-conductive liquid such as acid or alkaline solution over the capacitor.
3. Do not use capacitor in circumstance where they would be subject to exposure to the following materials exist or expose.
 - a. Spay directly by water, salty water, Oil, or storage in damp location.
 - b. Direct sunlight.
 - c. Storage in location with toxic gases, such as hydrogen sulfide , sulfurous acid , nitrous acid , chlorine or its compounds , and ammonium.

- d. Ozone , ultraviolet rays or radiation condition.
- e. Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

D. Maintenance Inspection Notice

1. Make periodic inspections of capacitors that have been used in industrial applications. Before inspection, turn off the power supply and carefully discharge the electricity in the capacitors. When measuring the capacitors with a meter, do not apply any mechanical stress to the terminals of the capacitors.
2. The following item should be checked during the periodic inspections.
 - Visual appearance : venting and electrolyte leakage.
 - Electrical characteristics : leakage current(LC), capacitance(CAP), DF and other characteristics prescribed in our catalogs or product specifications.

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

E. In Case of Emergency

- a. For reducing the effect of inner gas pressure exploded, a higher capacitor is with vent mark on top. When venting, it will discharge odors or smoke, please immediately turn off or unplug the main power supply of the device. If we do not switch off the power, PC board may be damaged by the capacitor short-circuit failure, the worst is burn out the device. The gas which comes out from the pressure vent of a capacitor, it is not smoke by flammable, this is the vaporized electrolyte.
- b. When venting, inner capacitor blows out gas with a temperature of over 100°C, never expose the face close to a venting capacitor. If yours eyes should inadvertently become exposed to the spouting gas or you inhale It, immediately flush the open eyes with large amounts of water and gargle with water respectively. If electrolyte is on the skin, wash the electrolyte away from the skin with soap and plenty of water.

F. Storage

We recommend the following condition for storage.

1. Store the capacitor indoors at a temperature of 5 ~35°C and a relative humidity ≤75%.
The storage period is 3 years after production. 6 months after dismantle of the packing(Chip type only)
2. Please keep capacitor in the original package.
3. Please do not keep the capacitors in places,
 - a. Spray directly by water, high temperature high humidity, or storage in damp location.
 - b. Spray directly by oil, or with oily gas location.
 - c. Spray directly by salt water, or salty location.
 - d. Storage in location with toxic gases, such as hydrogen sulfide , sulfurous acid , nitrous acid , chlorine or its compounds , and ammonium.
 - e. Full with ammonium gas, alkaline toxic gas location.
 - f. With acidic and alkaline solvent location.
 - g. Directly sunlight, ozone , ultraviolet rays or radiation condition.
 - h. Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

G. Disposal

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

H. Catalogs

The ESR value in the catalogs, measure area is the closet area to the capacitor body.
Specifications in catalogs may be subject to change without notice. Catalog data are typical.
This value does not guarantee the performance.