

## ■ Cautions for Using Conductive Polymer Hybrid Aluminum Electrolytic Capacitors

Please be sure to read this specification before using this product.

Before placing an order, please inquire about the Specification to check details.

### ■ Cautions for Usage

#### 1. Conductive Polymer Hybrid Aluminum Electrolytic Capacitors are polarized.

- If used with a wrong polarity, it creates an abnormal current resulting in a short circuit or damage to itself.
- Cannot use for the circuit to which the polarity reverses by ripple voltage.

#### 2. Prohibited Circuits

- Since leakage current problem may arise, capacitors cannot be used in the following circuits.
  - ① Coupling circuits
  - ② Circuits greatly affected by leakage current

#### 3. About applied voltage

- Do not apply a voltage that exceeds the rated voltage because the leakage current will increase significantly, causing characteristic deterioration and short-circuit failure.

When applying ripple current, the peak value of the ripple voltage must not exceed the rated voltage.

Surge voltage exceeding the rated voltage is not guaranteed to be used for a long time due to limited conditions.

- Do not apply reverse voltage  
(DC bias + ripple voltage peak sum  $\leq 0V$ ).

#### 4. About use in circuits with rapid charging and discharging

- Please do not use in circuits that repeatedly charge and discharge rapidly. This may result in deterioration of characteristics, short circuits, or destruction. Please consult us separately if you are considering using the capacitor in a circuit that repeatedly charges and discharges.

In addition, we recommend using a protection circuit if the usage method causes a rush current of more than 10A to flow into the capacitor.

#### 5. Use within the rated ripple current.

- If applied ripple current exceeds rated ripple current, the life of the capacitor may be shortened, or in an extreme case it gets destroyed due to its internal heat. Use high ripple type capacitors for such circuits.

#### 6. Changes in characteristics due to operating temperature

- The characteristics of conductive polymer hybrid aluminum electrolytic capacitors vary by temperature as follows. These variations are temporary and recover when the temperature goes back (except for the case of characteristic deterioration because of high temperatures over a long time).

Note that using capacitors over the upper category temperature increases leakage current, resulting in a short and destruction.

Be careful of the capacitor temperature considering not only the ambient temperature where the equipment is placed and the temperature inside the equipment but also radiation heat from the heating element inside the equipment, and self-heat generation by ripple current.

- 1) The rated capacitance is normally shown as the value at 20°C-120Hz. It increases as the temperature raises and decreases as it lowers.
- 2) The tangent of loss angle ( $\tan\delta$ ) is normally shown as the value at 20°C-120Hz. It is temperature independent.
- 3) The equivalent series resistance (ESR) expressed in the value at 20°C, 100 kHz is temperature independent.
- 4) The leakage current increases as the temperature gets high and decreases as it gets low.

#### 7. Changes in characteristics due to frequency

- The characteristics of conductive polymer hybrid aluminum electrolytic capacitors vary by operating frequency as follows.

- 1) The rated capacitance expressed in the value at 20°C, 120 Hz decreases with increased frequency.
- 2) Tangent of loss angle ( $\tan\delta$ ) expressed in the value at 20°C, 120 Hz increases with increased frequency.
- 3) Equivalent series resistance (ESR) expressed in the value at 20°C, 100 kHz increases with decreasing frequency.

#### 8. Capacitor life

- The life of the capacitor terminates when it fails due to the deterioration in its electronic characteristics. Temperature and the ripple current since they especially affect the life on technical note "2. About the Life of an Aluminum Electrolytic Capacitor" of this catalog.

## 9. Operating environments

- Do not use capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation.
- Do not use capacitors in an environment filled with toxic gas such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ammonia, etc.
- Do not use capacitors in a place exposed to ozone, ultraviolet rays, or radiation.
- Do not use the product in harsh environments where the vibration or shock conditions exceed the range specified in the technical specifications.  
Even within the specified range, resonance can add a large load, which may cause changes in characteristics or the product to fall off. Be sure to check for resonance after mounting the product.

## 10. Fumigation Process

- Before transportation of electronic equipment to overseas, fumigation process may be subjected to wooden packing material with a halogen (compound) gas such as methyl bromide. Exercise care that this halogen gas may corrode capacitors. Also, be careful of epidemic preventive agent as corrosive component such as halogen may be contained.

## 11. Insulation between the capacitor and the cathode terminal.

- The case and the cathode terminal are not insulated as being connected through inconstant resistance.

## 12. Double-sided PCB's

- When using capacitors on a double-sided PCB, exercise care that the wiring pattern does not touch the area where the capacitors are mounted. Failure to do so may cause a short to occur to the PCB depending on the mounting conditions.

## 13. Short time leakage current

- The leakage current of the capacitors varies depending on the temperature, applied voltage, and applied time.  
Particularly, Short-term leakage currents of less than the specified time tend to be larger than the specified value.  
For short-term leakage current less than the specified time, please contact us.

## 14. Regarding to connection of capacitors

- When connecting more than one conductive polymer hybrid aluminum electrolytic capacitor in parallel, consider the current balance.

## 15. Use at a high altitude

- The use of capacitors at high altitudes such as on an airplane causes a large difference between the internal pressure of the capacitors and the atmospheric pressure. However, there is no problem in use under atmospheric pressure up to about an altitude of 10,000 meters.  
Please check the operation of electronic equipment at the operating environmental temperature because the temperature lowers with increased altitude. If the condition is severe like space, please contact us.

## 16. Capacitors with pressure valves.

- A part of the capacitor case is made thin to have the function as the pressure valve in order to prevent explosion due to the rise of inside pressure when a reverse or excessive voltage is applied to the capacitor. Once it has worked as a valve, the whole capacitor needs to be replaced since the valve will not restore.
- When you use a capacitor with pressure valve, provide certain space above the pressure valve as below to prevent an interference when it works as a valve.

Diameter of the capacitor (mm)	12.5 or less
Required space above the valve (mm)	2.0 or more

## 17. Other Notes

- Electrical characteristics of capacitors vary by variations in temperature and frequency. Please consider these variations when designing a circuit.

## ■ Cautions for Mounting

### 1. Cautions for Mounting

- Do not reuse capacitors that have been assembled in a set and energized. Capacitors cannot be reused except for those which have been measured on electrical performance during periodic inspection.
- Before mounting, confirm the capacitor ratings (rated capacitance and rated voltage).
- Capacitors may generate transient recovery voltage. In this case, discharge through a resistor of about 1 k $\Omega$ .
- Before mounting, confirm the polarity of capacitor.
- Do not drop capacitors onto a floor nor use them.
- Do not mount deformed capacitors.
- Do not mount heating parts around capacitors and on the back of the PCB (under or back of capacitors).

### 2. Do not apply excessive pressure to the capacitor or its terminals

- Pay attention to the impact given by the component receptacles of the automatic insertion/mounting machines and the product checker, and from the centering operation.

### 3. Soldering

- SMD type have no capability to with stand such dip or wave soldering immersing components into a solder bath.
- Reflow soldering  
Reflow the capacitors within recommended reflow soldering conditions. Verify there is no temperature stress to the capacitors because the following differences might degrade capacitors electrically and mechanically.
- Caution for reflow soldering
  - 1) Location of components : Temperature increases at the edge of PC board more than the center.
  - 2) Population of PC board : The lower the component population is, the more temperature rises.
  - 3) Material of PC board : A ceramic-made board needs more heat than a glass epoxy-made board. The heat increase may cause damage to the capacitors.
  - 4) Thickness of PC board : A thicker board needs more heat than a thinner board. The heat may damage the capacitors.
  - 5) Size of PC board : A larger board needs more heat than a smaller board. The heat may damage the capacitors.
  - 6) Solder paste thickness  
If thin solder paste is to be used compared recommend solder paste thickness, please consult with us.
  - 7) Location of infrared ray lamps : IR reflow as well as hot plate reflow heats only on the reverse side of the PC board to lessen heat stress to the capacitors.
  - 8) Case leakage current will increase (about several mA at the maximum) after the reflow process, the leakage current which rose gradually decreases when voltage is applied.

9) Please consult us about vapor phase soldering (VPS).

- Rework of soldering  
Use a soldering iron for rework. Do not exceed an iron tip temperature of 400 $\pm$ 5 $^{\circ}$ C and an exposure time of 3 $\frac{1}{2}$  seconds.
- Do not allow flux to adhere to areas other than the terminals.
- In case of a long-term use of equipment, control the soldering characteristics so that capacitors and PCB do not fail to connect to avoid abnormal current passage by a failure of soldering to mount.

### 4. Handling after Soldering

- After soldering, applying mechanical stress to the capacitor may cause it to fail. Avoid holding or pushing the capacitor body and bending the PC board.
- Do not bump capacitors against objects. When stacking PCB's, make sure that capacitors do not touch the PCB's or other components.
- Do not subject capacitors to excessive stress.

### 5. Cleaning after Soldering

- Recommended cleaning method
  - 1) Cleaning solutions:
    - (a) CLEANTHROUGH 710M, 750H, 750L
    - (b) PINEALPHA ST-100S
  - 2) Cleaning conditions:
    - (a) The temperature of cleaning solution shall be less than 60 $^{\circ}$ C.
    - (b) Use immersion or ultrasonic waves within two minutes.
    - (c) After cleaning, capacitors and PCB's shall thoroughly be rinsed and dried with hot blast for more than 10 minutes. The temperature of such breeze should be less than the upper category temperature.
    - (d) After cleaning, do not keep capacitors in cleaning solution atmosphere or airtight containers.
- During cleaning, control the cleaning solution against contamination.

### 6. Fixing adhesives and coating materials.

- Do not use fixing adhesive or coating material containing halogen-based solvent.
- Before applying the fixing adhesive or the coating material, make sure that there is no remaining flux or stains between the PCB and the sealed part of the capacitor.
- Before applying the fixing adhesive or the coating material, make sure that the detergent etc. has dried up.
- Do not cover the whole surface of the sealed part (terminal side) of the capacitor with the fixing adhesive or the coating material.

- Observe the description in this catalog or the technical specifications concerning the thermal stiffening conditions of the fixing adhesive or the coating material (If there is no such description, contact us). When both discrete and SMT components are on the same PCB, the fixing material for the SMT components may cause crack, tear or shrinkage on the external sleeve depending on the thermal stiffening condition.
- Recommended fixing adhesives and coating materials  
Fixing adhesives : Cemedine 1500  
Diabond DN83K  
Bond G103  
Coating materials : HumiSeal 1B66NS, 1A27NS

### ■ Other Cautions

#### 1. Do not touch capacitor terminals with bare hands.

- Failure to do so can cause electric shock or burns. Before use, allow capacitors to discharge through a 1kΩ resistor (with a sufficient margin to the heat generation capacity) as needed.

#### 2. Do not short the capacitor terminals with a conductor

- Do not spill conductive solution including acid or alkaline solution on the capacitor.

#### 3. Periodic inspection should be performed on the capacitors for the industrial equipment application.

- The following items should be checked:  
(1) Appearance : Check if there is any open valve or leakage.  
(2) Electrical performance: leakage current, rated capacitance, tangent of loss angle, ESR, and items specified in this catalog or the technical specifications.

#### 4. Be careful of the following cases of emergency.

- If you see gas coming out of the capacitor valve when the set is in operation, turn off the power switch of the unit or unplug the power cord from the outlet.
- In case of a short, producing gas, it may take a few seconds to a few minutes depending on the conditions. Therefore, ensure that the protective circuit of the power supply works during this time.
- Keep your face away from the capacitor pressure valve, since the high temperature gas at over 100°C bursts out when the valve works. If the gas gets into your eyes or your mouth, wash your eyes or your mouth. Do not ingest the capacitor electrolyte. If the electrolyte gets on your skin, wash it out with soap.

#### 5. Storage Conditions.

- Avoid high temperature, high humidity and direct rays when storing capacitors. Keep the storing temperature at 5°C to 35°C and the relative humidity not more than 75%. (Recommended storage term: 2 year or less after delivery)
- There may have increased leakage current when unused or stored for a long time after mounted on equipment. This phenomenon often occurs at high ambient temperatures; however, leakage current will decrease through voltage treatment. If necessary, treatment by voltage application should be made on the capacitors which have been stored for a long period (more than 2 years after production). Recommended voltage treatment conditions are provided for each series (According to JIS C5101-4 4.1 described in Shelf life).

If anything is unclear, please contact us.

And also, in design of equipment, consider the effect of increase in initial current, and install protective circuits as needed.

- Do not store capacitors in an environment directly exposed to water, saltwater spray, oil spill or condensation. JEDEC-J-STD-020 regulations are not applicable.
- Do not store capacitors in an environment exposed to the air contains dense hazardous gas. (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, ozone, ammonia, etc.)
- Do not store capacitors at a place where it gets ultra-violet or radioactive rays.
- Fumigation treatment with toxic gas covering the whole wooden container frames as moth proofing during shipment may leave residual toxic gas.

#### 6. Please take the following actions when disposing of capacitors.

- Entrust to specialists of industrial waste treatment for incineration.

#### 7. Others

- Before using capacitors, check the details of this catalog and the technical specifications as well as the following.

Technical Report of Japan Electronics and Information Technology Industries Association  
EIAJ RCR-2367  
Guideline of notabilia for fixed aluminum electrolytic capacitors for use in electronic equipment