

## Cleaning

### *Installation of Non-Solid and Solid Aluminum Electrolytic Capacitors*

#### Explanatory Notes

1. Unless specified in the product literature, do not clean capacitors with the following solvents. These cleaning solvents will damage the capacitors.
  - o Halogenated solvents: causes capacitor failures due to corrosion.
  - o Alkali system solvents: partially corrodes (dissolves) the aluminum case.
  - o Petroleum system solvents: deteriorate the rubber sealing material.
  - o Xylene: deteriorates the rubber sealing material.
  - o Acetone: removes capacitor markings.

Halogenated solvents corrode capacitors according to the following formula:

Decomposition of solvent:  $RX \sim H_2O * ROH \sim H \sim X!$

Where: RX : halogenide

X! : halogen ion

Corrosion reactions:  $Al \sim 3X! * AlX_3 \sim 3e!$

$AlX_3 \sim 3H_2O * Al(OH)_3 \sim 3H_2 \sim 3X!$

Therefore, in the presence of halogen ions, aluminum is continuously dissolved producing hydrogen gas, increasing the capacitor's leakage current, resulting in venting or an open circuit failure.

When a capacitor is installed on the PC board with the spacing of its lead wires forcibly spread or narrowed, cleaning solvents can easily penetrate the capacitor, causing corrosion, venting or an open circuit while in service. Therefore, make sure the hole spacing on the PC board matches the lead spacing of the capacitor or pre-form the lead wires before installation.

2. When contaminated with a substance such as flux, the cleaning solvent will have an increased concentration of radical halogen that may penetrate a capacitor and cause corrosion resulting in failure due to venting or open circuit while in service. Flux concentration in the cleaning solvent should not be more than 2 wt.%.
3. If the residual cleaning solvent is not sufficiently evaporated after cleaning an assembly board, capacitors will be exposed to cleaning residuals for an extended period of time causing corrosion and subsequent venting or open circuit failure while in service.

#### Precaution

1. Do not use halogenated cleaning solvents. If it is necessary to use halogenated solvents, solvent proof capacitors are recommended. Follow specified conditions in the product literature.
2. Do not allow contamination of cleaning solvents. Monitor the conductivity, pH, specific gravity, water content, etc. of the cleaning solvents.

3. After cleaning an assembly board, immediately evaporate the residual solvent by forced hot air at a temperature less than the maximum rated operating temperature of the capacitors.

#### Footnotes

1. Acceptable cleaning solvents:
  - o Higher alcohol base:  
Pine Alpha ST-100S (Arakawa chemicals)  
Clean Through 750H, 750K, 750L and 710M (Kao)  
Technocare FRW-14 to 17 (Toshiba)

Cleaning conditions should be immersion with or without ultrasonic within 10 minutes at a maximum liquid temperature of 60°C. The wash, rinse and drying process should be arranged so that other components or assembly boards do not rub off the capacitor markings. Note that a shower cleaning can adversely affect the markings.

- o Isopropyl alcohol (IPA): Cleaning condition should be immersion or brush cleaning. Flux concentration in the cleaning solvent should not be more than 2 wt.%.
2. For environmental protection, avoid using substances that will affect the ozone layer. For CFC substitute solvents, consult United Chemi-Con.