

# Application Guide for Polymer Film Capacitors

Please note the following with film capacitor usage.

## 1. Applications that contain AC voltage.

Whenever film capacitors are used in any application that contains AC voltage, the following four notes should be adhered to. It is imperative to follow each of these recommendations to insure proper conditions are met for the operation of film capacitors.

### 1. Applied Voltage.

The maximum peak voltage, the sum of the DC bias voltage and the peak AC voltage, should not exceed the capacitors' rated voltage.

### 2. Ripple Current.

Select the type and rating of capacitors properly, not exceeding more than 10°C temperature increase due to the self-heating. Because the permissible ripple current value varies with the type and rating of the capacitors. Please contact Matsuo's Sales Department for further details.

### 3. Pulse Voltage.

#### A) Film Capacitors with Film and Foil Electrodes.

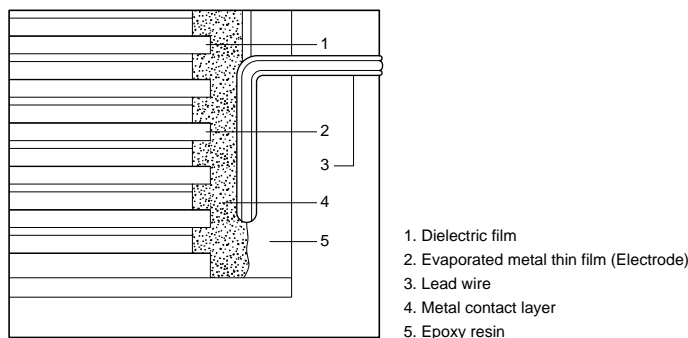
Film capacitors, which are constructed using metal foil as an internal electrode, can accept a sharp and high pulse voltage providing that the maximum peak voltage does not exceed the rated voltage.

#### B) Film Capacitors with Metallized Film Electrode

The following Chart 7 shows a cross-section of Film Capacitors in which the internal electrode is composed of Evaporated Metal Thin Film (approx. 0.05μm thickness).

This electrode is connected to the metal contact layer by Metal Spray. In this construction, the strength of the electric connection is weaker than that of Film and Foil Capacitors. Keeping this in mind, please pay close attention to the increased rate of voltage when choosing your capacitors. We recommend using Metallized Film capacitors where the rate of voltage increase is less than 5V/μsec. High performance products, able to withstand a pulse voltage increase at a rate of less than 10V/μsec, are also available. If your required pulse voltage value is more than stated above, please inquire with the Matsuo Sales Department for custom products.

Chart 7 CONSTRUCTION of Film Capacitors  
with Metallized Film Electrode



### 4. Corona Voltage.

Corona discharge is a phenomenon of ionization discharge caused by internal voids in the insulation material or points of high electric intensity at the surface of the insulation material. Such a phenomenon is rarely a cause of insulation breakdown, however, in the case of continuous occurrence, cumulative damage may lead to insulation breakdown. If more than 200VAC are used, please select the product and rating in which the applied AC voltage to the capacitor is less than the minimum value of corona voltage.

## 2. Soldering Recommendations

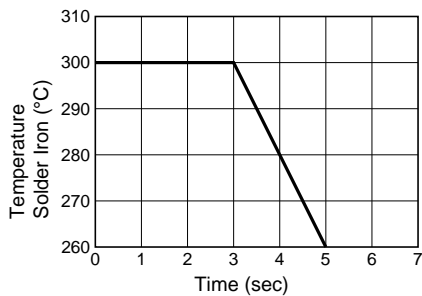
### A) Leaded Devices

The following conditions are recommended for the soldering of leaded devices.

#### 1) Soldering Iron

The soldering iron should not make contact with the body of the capacitor.

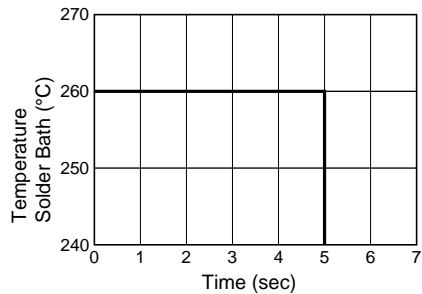
Fig-8



#### 2) Flow Soldering

Flow Soldering is accomplished by applying a “Jet Stream” where components are to be placed on a substrate.

Fig-9



**Note 1)** Conditions will change according to the actual density and size of the PC board. Epoxy Resin is used for external coating on both the dipped style of film capacitors and the box style of film capacitors. During the soldering process, high temperatures may cause failures, such as cracking of the product due to the characteristics of the epoxy resin. Please set the temperature and time so that the internal temperature of the capacitor stays below 140°C.

**Note 2)** Please do not move the capacitor after soldering for a minimum of 20 seconds. Failures by shorting or by opening may result.

### B) Surface Mount Devices

#### 1) Pre-heating

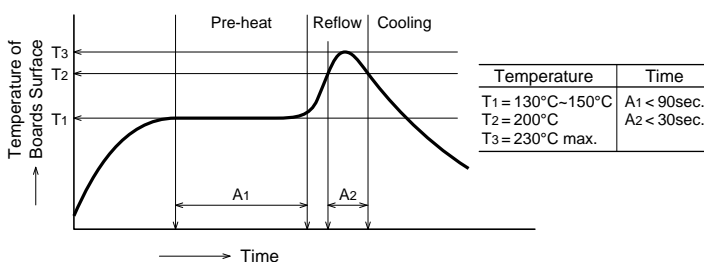
Pre-heating is recommended to minimize the thermal stress of the soldering process.

#### 2) Soldering

Matsuo recommends Reflow Soldering for SMT film capacitors.

\*Recommended conditions: The internal temperature of capacitor body should be within the limit of the following profile:

Fig-10



Please contact the Matsuo Sales Department for further assistance with soldering.

**Note:** Please do not move the capacitor after soldering for a minimum of 20 seconds. Failures by shorting or by opening may result.

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### 3) Ultrasonic Cleaning

Matsuo does not recommend Ultrasonic Cleaning. This may cause damage to the capacitors, and may even cause broken terminals. If the Ultrasonic Cleaning process will be used, please note the following:

The solvent should not be boiled.

The cleaning process should be kept to a minimum time period.

The recommended wattage is less than 0.5 watts per cm<sup>2</sup>.

Drying should be done under the capacitors' maximum operating temperature.

### 3 Solvents

The following solvents may be used for the cleaning process of our plastic film capacitors:

Alcohols with 20°C~30°C for 5 minutes may be used for cleaning process of our Plastic film capacitors.

**Note: If you intend to use a special organic solvent, please inquire with the Matsuo Sales Department.**

### 4 Others

- Capacitors should not be operated or stored in environments containing acids, alkalis, or active gasses.
- Capacitors should not be touched or manipulated while in operation.
- In the event of a capacitor burning, smoking, or emitting an offensive smell during operation, please turn the circuit "off", and keep hands and face away from the capacitor.
- Capacitors should be stored at room temperature under low humidity. Capacitors should not be stored under direct sunlight, and should not be stored in an environment containing dust.
- When capacitors are disposed of as "scrap" or waste, they should be treated as "Industrial Waste", since they contain various metals and polymers.
- Capacitors received as samples should not be used for production purposes.
- Capacitors should not be dismantled in any way by customers. If a problem is suspected with a capacitor, the Matsuo Sales Department should be contacted to arrange for Matsuo's QA Department to examine the capacitor.

Reference: Electronic Industries Association of Japan (EIAJ). (EIA RCR-2350, March, 1995)