





























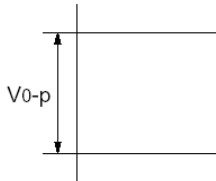
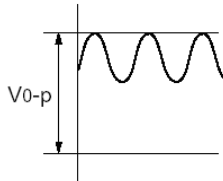
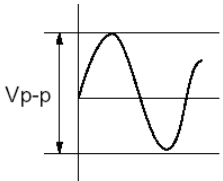
**9. Notices:**

9.1 Caution(Rating):

(1). Operating Voltage

Be sure to maintain the  $V_{p-p}$  value of the applied voltage or the  $V_{0-p}$  which contains DC bias within the rated voltage range.

When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use a capacitor within rated voltage containing this irregular voltage.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage
Positional measurement			

(2). Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself.

(3). Test condition for withstanding Voltage

I. Test Equipment

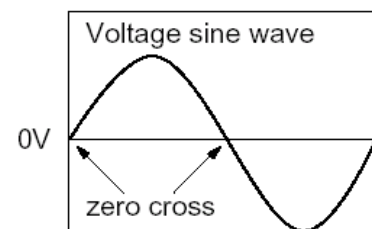
Test equipment for AC withstanding voltage shall be used with the performance of the wave similar to 50/60 Hz sine waves.

If the distorted sine wave or over load exceeding the specified voltage value is applied, the defective may be caused.

II. Voltage Applied Method

When the withstanding voltage is applied, capacitor's lead or terminal shall be firmly connected to the output of the withstanding voltage test equipment, and then the voltage shall be raised from near zero to the test voltage.

If the test voltage without the raise from near zero voltage would be applied directly to capacitor, test voltage should be applied with the \*zero cross. At the end of the test time, the test voltage shall be reduced to near zero, and then capacitor's lead or terminal shall be taken off the output of the withstanding voltage test equipment.



If the test voltage without the raise from near zero voltage would be applied directly to capacitor, the surge voltage may arise, and therefore, the defective may be caused.

ZERO CROSS is the point where voltage sine wave pass 0V.- See the right figure.

### III. Applied voltage

The voltages of Table shall be applied between the respective measuring points of 1 min for qualification approval and periodic testing and for a period of not less than 1 s for lot-by-lot quality conformance testing, a voltage proof test such as Test C shall be carried out only for qualification approval tests and periodic tests;

**Attention is drawn to the fact that repetition of the voltage proof test by the user may damage the capacitor. If repetition of the voltage proof test is made by the user, the applied voltage should not be greater than 66 % of the test voltage specified in Table .**

**Table –Voltage proof**

Class	Range of rated voltages	Test A	Test B or Test C
X1	$\leq 1\,000\text{ V}$	4,3 UR (d.c.) c	2 UR + 1 500 V (a.c.) with a minimum of 2 000 V (a.c.) a
Y2	$\geq 150\text{ V}$ $\leq 500\text{ V}$	UR + 1 200 V (a.c.) with a minimum of 1 500 V (a.c.) b	2 UR + 1 500 V (a.c.) with a minimum of 2 000 V (a.c.) b

a For Delta and T-connected capacitor units according to Figures 5b and 5c, the test voltage for terminals to case shall be the appropriate test voltage for the Y-capacitors.

b For lot-by-lot tests of Class Y2 capacitors, the a.c. test voltage may be replaced by a d.c. voltage of 1,5 times the prescribed a.c. voltage.

c The  $U_R$  in this d.c. test is the rated a.c. voltage value.

Note:

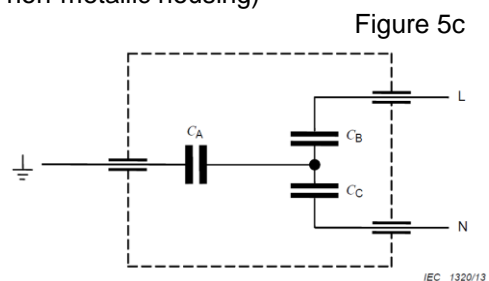
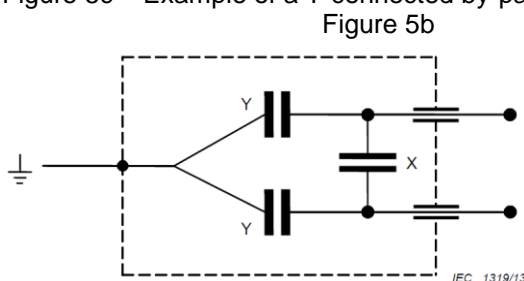
Test A – Between terminations

Test B – Internal insulation

Test C – External insulation (applicable only to insulated capacitors in nonmetallic case or in insulated metal case)

Figure 5b – Delta by-pass capacitor (in metallic housing)

Figure 5c – Example of a T-connected by-pass capacitor (in non-metallic housing)



**\*For capacitors with non-metallic housings, the earth connection is brought out as a separate termination as is shown in Figure 5c.**

#### (4). Fail-Safe

When capacitor would be broken, failure may result in a short circuit. Be sure to provide an appropriate fail-safe function like a fuse on your product if failure would follow an electric shock, fire or fume.

**Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.**

## 9.2 Caution (Storage and operating condition):

### Operating and storage environment

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade and 15 to 85 % for 6 months maximum and use within the period after receiving the capacitors.

**"Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used."**

## 9.3 Caution (Soldering and Mounting):

### 9.3.1 Vibration and impact:

Do not expose a capacitor or its leads to excessive shock or vibration during use.

### 9.3.2 Soldering:

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

When soldering capacitor with a soldering iron, it should be performed in following conditions.

Temperature of iron-tip: 400 degrees C. max.

Soldering iron wattage: 50W max.

Soldering time: 3.5 sec. max.

### 9.3.3 Cleaning (ultrasonic cleaning):

To perform ultrasonic cleaning, observe the following conditions.

Rinse bath capacity: Output of 20 watts per liter or less.

Rinsing time: 5 min maximum.

Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

**"Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used."**

9.3.4 List of substances that affect the insulation strength of coating :

**Epoxy resin solvent**

Category	Model		
Ketone	Acetone	Butanone	Cyclohexanone
Esters	Ethyl acetate	Dibutyl phthalate	
Chlorinated hydrocarbons	Dichloromethane		

**Epoxy resin thinner**

Category		Model	
Reactive diluentactivated thinner	Simple function group	HK-66 (Alkyl glycidyl ether)	
		501 (Butyl glycidyl ether)	
		690 (Phenyl Glycidyl Ether )	
		AGE (C12-14Aliphatic Polyalcohol Glycidyl Ether)	
		692 (Benzyl Glycidyl Ether)	
	Two functional groups	D-678 ( Neopentyl glycol diglycidyl ether )	
		622 (1,4-Butanediol diglycidyl ether)	
		669 (Ethylene glycol diglycidyl ether)	
		X-632 (Polypropylene glycol diglycidyl ether)	
		X-652 (1,6-Hexadiol diglycidyl ether)	
		D-691Epoxypropane o-methylphenyl ether	
Non-activated thinner	Anhydrous ethanol	Toluene	
	Ethyl acetate	Dimethylbenzene	
	Dimethyl formamide	Butyl acetate	
	Acetone	Styrene	
	Polyol	Benzyl alcohol	

**Note: The above substances should not contact the coating of the product body, otherwise it will affect the insulation strength of the product**

9.4 Caution (Handling):

Vibration and impact

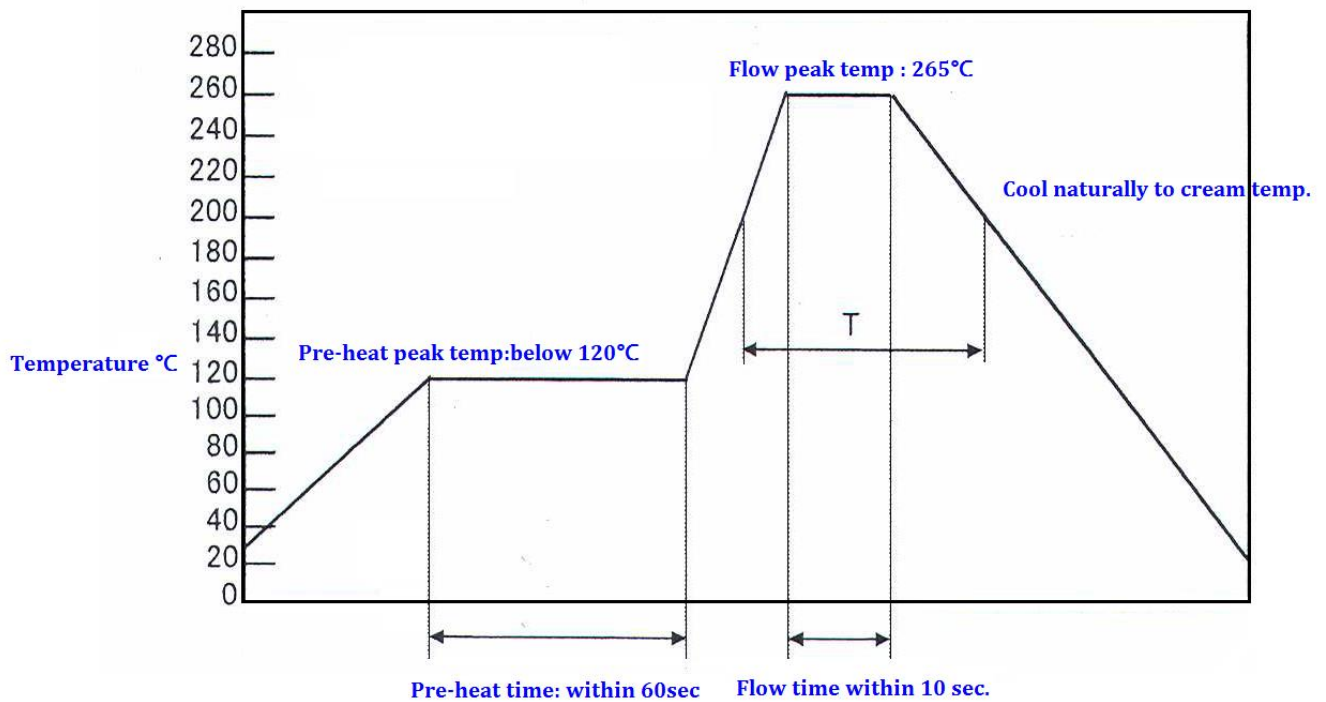
Do not expose a capacitor or its leads to excessive shock or vibration during use.

**"Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used."**

## 10. Soldering Recommendation:

### 10.1 Wave Soldering Profile:

- Temperature conditions of the flow is recommended as shown in the chart
- Must implement the pre-heat
- Maximum peak flow temperature is recommended 265°C
- Time “ T ” implement in the chart recommended within 20 sec. if temperature exceed 200°C
- Take care with the flow solder not to touch the capacitor body directly at mounting



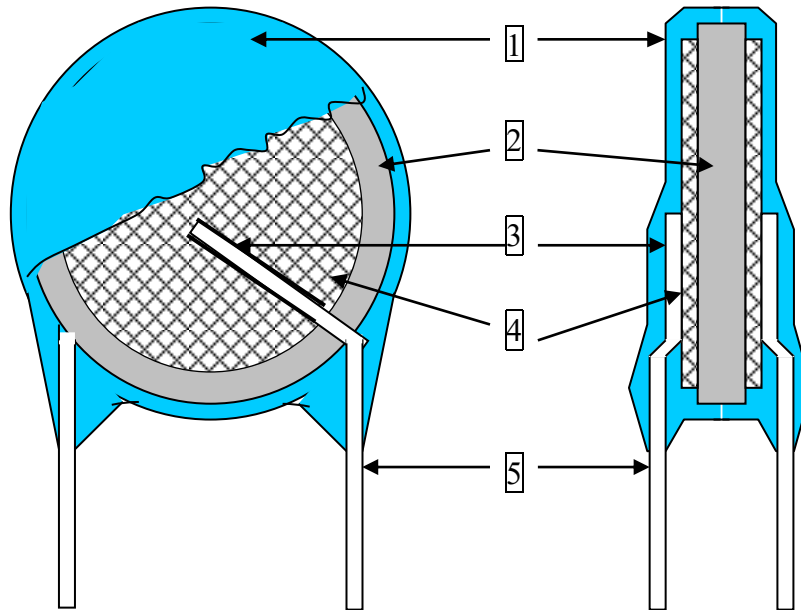
**Chart to show flow recommended temp**

### 10.2 Recommended Reworking Conditions with Soldering Iron :

- Temperature of iron-tip: 400 degrees C. max.
- Soldering iron wattage: 50W max.
- Soldering time: 3.5 sec. max.
- Distance from coating body: 2 mm (min.)

### 10.3 Reflow-Soldering : Lead Ceramic Cap. should not be soldered by reflow-soldering.

**11. Drawing of internal structure and material list :**



**Remarks :**

No.	Part name	Material	Model/Type	Component
1	Insulation Coating	Epoxy polymer	EF-150 PCE-300 ECP-357	Epoxy resin、Pigment (Blue / UL 94 V-0 )
2	Dielectric Element	Ceramic	SL/Y5P/Y5U/Y5V	SL: SrCO <sub>3</sub> /TiO <sub>2</sub> /Bi <sub>2</sub> O <sub>3</sub> /CaCO <sub>3</sub> Y5P: BaTiO <sub>3</sub> /Bi <sub>2</sub> O <sub>3</sub> /SnO <sub>2</sub> /CeO <sub>2</sub> Y5U: BaTiO <sub>3</sub> /ZrO <sub>2</sub> / CaCO <sub>3</sub> Y5V: BaTiO <sub>3</sub> / WO <sub>3</sub> / CeO <sub>2</sub>
3	Solder	Tin-silver	Sn96.5-Ag3-Cu0.5	Sn96.5-Ag3-Cu0.5
4	Electrodes	Ag	SP-160PL SP-260PL	Silver 、Glass frit
5	Leads wire	Tinned copper clad steel wire	0.55±0.05 mm	Substrate metal: Fe & Cu Surface plating: Sn 100%(3~7μm)