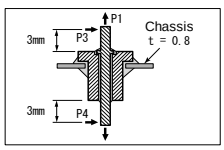
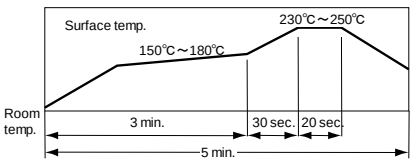
Performance and Test Methods

■Performance and Test Methods

Item		Performance	Test Methods and Conditions
Withstanding Voltage		No damage	Class 1(SL,YN) : 300% of rated voltage applied for 1-5 sec. Class 2(YE,X7R,YF) : 250% of rated voltage applied for 1-5sec. Charging and discharging current : 50 mA max.
Insulation Resistance		5,000 MΩ or more	Rated voltage applied for 60±5sec. Charging and Discharging Current : 50 mA max.
Capacitance Temperature Characteristics		Class 1 (Temperature coefficient) SL : +350~–1,000ppm/ ℃ YN : –800~–5,800ppm/ ℃ Class 2 (Rate of capacitance change) X7R : Within 15% YE : Within +20~–55% YF : Within +30~–80%	Preconditioning #: Carry out heat treatment. Obtain the rate of change and the temperature coefficient from the capacitance at Step 3. Step 1: 20 ±2 Step 2: Minimum Operating Temp. Step 3: Maximum Operating Temp. Step 4: 20 ±2
Solderability		90% or more the immersed area shall be covered with new solder.	Solder : H60A or H63A Flux : Methanol solution of rosin (25wt%) Depth of immersion into flux: Immerse whole of capacitor. Preheating before immersion into solder : Temperature ; 130 to 150° C for 1 min. Temperature of Solder : 2,355° C Duration of immersion into solder : 20.5sec. Immerse continually after preheating.
Tensile Strength of Termination		No disconnection of terminals or damage of capacitors	The body of specimen shall be fixed as followed, the tension P1-P4 shall be applied for 5 sec.  Hole Size / P1, P2 / P3 / P4 Φ0.65 / 2kg / 1kg / 0.75kg Φ0.80 / 2kg / 1kg / 0.75kg Φ1.30 / 5kg / 3kg / 2kg
Resistance to Soldering Heat	**Visual**	No particular issue	Preconditioning #: Carry out heat treatment 1) Immersion into solder Immerse terminations to the position of 2mm from the body of the component at 260±5℃ for 10±0.5 sec. 2) Reflow soldering after fixing in a chassis, follow the temperature profile below for soldering.  3) Hand Soldering (only for terminals) Immersion into solder Immerse terminations to the position of 2mm from the body of the capacitor at 350±10℃ for 5 sec. The measuring shall me done after leaving in the standard condition for 4 – 24 hours.
	Rate Change in Capacitance	Change in pretest value Class1: No more than ±10% or ±0.25pF whichever is larger. Class2: YE, X7R→±15%, YF→±20%	
	Dissipation Factor	Class1: SL →1% or less, YN→1% or less Class2: YE, X7R→5% or less, YF→5% or less	
	Insulation Resistance	5,000 MΩ or more	
	Withstanding Voltage	No particular issue	
Temp. Cycle	**Visual**	No particular issue	Preconditioning #: Carry out heat treatment, continually 25 cycles of the temperature cycle below. Leaving at the standard conditions out of the bath for 4~24hrs. Step 1: Minimum operating temp. 30 min. Step 2: Room temp. 5 min. Step 3: Maximum operating temp. 30 min. Step 4: Room temp. 5 min. Min.: R -55℃, Other than R -25℃ Max.: R +125℃, Other than R +85℃
	Capacitance Change	Change in pretest value Class1: No more than ±10% or ±0.25pF whichever is larger. Class2: YE, X7R→±20%, YF→±30%	
	Dissipation Factor	Class1: SL→1% or less, YN→1% or less Class2: YE, X7R→5% or less, YF→7.5% or less	
	Insulation Resistance	1,000 MΩ or more	
Humidity Load Test	**Visual**	No particular issue	Preconditioning #: Carry out heat treatment Relative Humidity : 90 to 95% Test temperature : 40±2℃ Applied Voltage : Rated voltage Duration of Test : 500+24, –0h Charge and Discharge Current : Less than 50mA Recovery : The sample is taken out of the bath, wiped lightly, and left under the standard conditions for 12 to 24 hours.
	Capacitance Change	Change in pretest value Class1: No more than ±10% or ±0.25pF whichever is larger. Class2: YE, X7R→±20%, YF→±30%	
	Dissipation factor	Class1: SL→1% or less, N→1% or less Class2: YE, X7R→5% or less, YF→7.5% or less	
	Insulation resistance	1,000 MΩ or more	
Life Test (at High Temp. Load)	**Visual**	No abnormality	Preconditioning#: Carry out heat treatment Test temperature : Maximum of operation temp. 2℃ Applied Voltage : 200% of Rated voltage Duration of Test : 1,000 +48, –0 hours Charging and Discharging Current : Less than 50mA max Recovery : The sample is taken out of the bath and left under the standard conditions for 12 to 24 hours.
	Capacitance change	Change in pretest value Class1: No more than 10% or ±0.25pF whichever is larger. Class2: YE, X7R→2±0%, YF→±30%	
	Dissipation factor	Class1: SL→1% or less, YN→1% or less Class2: YE, X7R→5% or less, YF→7.5% or less	
	Insulation resistance	1,000 MΩ or more	

#: The following preconditioning shall be carried out prior to the test when there is a provision of heat treatment in the table above.
Heat Treatment : The capacitor shall be allowed to stand in air at 150 +0, –10 ℃ for 1 hours, then the initial value is measured after leaving under room temperature for 24±2 hours.
Unless particularly specified in this table, the test methods shall be as specified in JIS C 5101-1.

Handling Precautions

Mechanical and heat stress sometimes damage dielectric ceramics of the capacitor. Be careful not to give the feed through ceramic capacitor the strong mechanical shock and the heat shock.

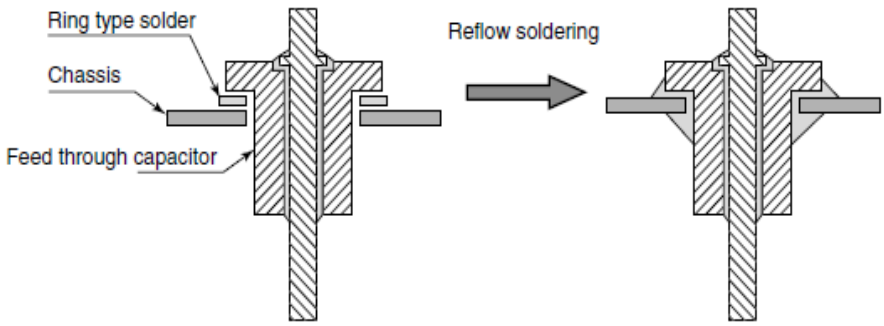
■Soldering

1.Please use reflow soldering.

・Recommended Solder
Solder should be a ring type of which melting temperature is 185° C max.

・Recommended Method
Avoid rapid heating/cooling, preheat to around 130° C, and then process at 250° C max. in the reflow zone for 10 sec. max.

2. Recommended the hole size of chassis



Type	Hole size
PLE123	Φ1.6±0.05
PLE12,22,32	Φ2.1±0.05
PLE255	Φ2.6±0.05
PLE23,33	Φ3.2±0.05
PLE335	Φ3.7±0.05

■Soldering to Lead Wire

1.The following conditions are recommended for soldering to the lead wire.

・Recommended Method
Please use a soldering iron with as large heat capacity as possible.
Temperature of soldering iron should be 300° C max., applied for a maximum of 10 seconds.
Do not let the solder get within 3mm of the body of the part.

2.Don't bend a lead wire. Be careful that mechanical stress is not applied to the EMI filter itself when you unavoidably bend a lead wire.

■Minimum packaging quantity

1.No pin type

Type	Quantity (pcs/bag)	Maximum quantity (pcs/bag)
PLE123	1,000	5,000
PLE12,22,32, 255,23	1,000	15,000
PLE33,335	1,000	10,000

2. With pin type

500 pcs./bag (All size)