

# **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/°C YN:-800~-5,800ppm/°C Class 2 (Rate of capacitance change) XTR: Within 15% YE: Within +20~-55% YF: Within +30~-80%	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	
Solderability		90% or more the immersed area shall be covered with new solder.	Flux: Rosin/IPA (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: 245±3°C Duration of immersion into solder: 3±0.5sec.	
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.    P1	
	Visual	No particular issue	Preconditioning #: Carry out heat treatment	
	Rate Change in Capacitance	Change in pretest value Class1: No more than $\pm 10\%$ or $\pm 0.25$ pF whichever is larger. Class2: YE, X7R $\rightarrow \pm 15\%$ , YF $\rightarrow \pm 20\%$	1) Immersion into solder Immerse terminations to the position of 2mm from the body of the component at 260±5°C for 10±0.5 sec. 2) Reflow soldering after fixing in a chassis, follow the temperature profile below for soldering.	
Resistance	Dissipation Factor	Class1: SL →1% or less, YN→1% or less Class2: YE, X7R→5% or less, YF→5% or less	Surface temp. 230°C ~250°C 150°C ~180°C	
to Soldering Heat	Insulation Resistance	$5,000$ M $\Omega$ or more		
	Withstanding Voltage	No particular issue	Room 3 min. 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°C for 5 sec. The measuring shall me done after leaving in the standard condition for 4 – 24 hours.	
	Visual	No particular issue	Preconditioning #: Carry out heat treatment, continually 25 cycles of	
Temp. Cycle	Capacitance Change	Change in pretest value Class1: No more than $\pm 10\%$ or $\pm 0.25$ pF whichever is larger. Class2: YE, X7R $\rightarrow \pm 20\%$ , YF $\rightarrow \pm 30\%$	the temperature cycle below. Leaving at the standard conditions out of the bath for 4~24hrs.  Step Temperature (°C) Time  1 Minimum operating temp. 30 min.	
	Dissipation Factor	Class1: SL→1% or less, YN→1% or less	2 Room temp. 5 min. R Other than R	
	<u> </u>	Class2: YE, X7R→5% or less, YF→7.5% or less	3   Maximum operating temp.   30 min.   Min.   -55°C   -25°C	
	Visual	1,000 MΩ or more  No particular issue	Preconditioning #: Carry out heat treatment	
Humidity Load Test	Capacitance Change	Change in pretest value Class1: No more than ±10% or ±0.25pF whichever is larger. Class2: YE, X7R→±20%, YF→±30%	Relative Humidity: 90 to 95%  Relative Humidity: 90 to 95%  Test temperature: 40±2°C  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.	
	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	
	Capacitance change	Change in pretest value Class1: No more than 10% or ±0.25pF whichever is larger. Class2: YE, X7R→2±0%, YF→±30%	Test temperature: Maximum of operation temp. 2°C 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.	
	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		

<sup>#:</sup> 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 °C 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**

Dielectric ceramics of the capacitors may be damaged by excessive mechanical and heat stress. Please be careful not to drop and give the mechanical and heat shock to feed through ceramic capacitors.

## ■ Soldering

- 1. reflow soldering
  - ·Recommended Solder

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

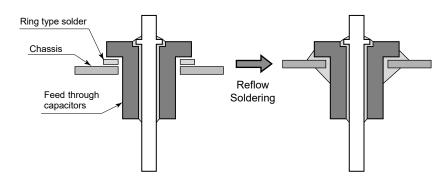
Recommended Method

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

Туре	Hole size
PLE123	Ф1.6±0.05
PLE12, 22, 32	Ф2.1±0.05
PLE255	Ф2.6±0.05
PLE23, 33	Ф3.2±0.05
PLE335	Ф3.7±0.05



## ■Soldering to Lead Wire

#### 1. Recommended Methods

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. Note

Do not bend a lead wire. Please 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

Туре	Quantity (pcs/bag)	Max. quantity (pcs/bag)
PLE123	1,000	5,000
PLE12, 22, 32, 255, 23	1,000	15,000
PLE 33,335	1,000	10,000

#### 2. With pin type

500 pcs/bag (All size)