

**MD** series Monolithic (Multilayer) Ceramic Capacitors◆ **Part Number**

MD    471    X7R    K    500    R    B    -    05    25  
 ①        ②        ③        ④        ⑤        ⑥        ⑦        ⑧        ⑨

① **Type:** MD = Monolithic (Multilayer) Ceramic Capacitors② **Capacitance Value**

Value	6.8pF	12pF	470pF	2200pF	100nF
Code	6P8	120	471	222	104

③ **Dielectric :** NPO、X5R、X7R、Y5V、Z5U④ **Capacitance tolerance**

Tolerance	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%	±20%	+80%-20%
Code	C	D	F	G	J	K	M	Z

⑤ **Rated Voltage (VDC)**

Voltage	6.3V	10V	16V	25V	50V	100V	250V	500V
Code	6V3	100	160	250	500	101	251	501

⑥ **Lead Type**

Type	Radial	Axial
Code	R	A

⑦ **Packing**

Type	Bulk	Taping (AMMO)	REEL
Code	B	T	R

⑧ **Lead Spacing**

(mm)

Lead Spacing	2.5 ± 0.8	5 ± 0.8	6.35 ± 0.8	7.5 ± 1.0	10 ± 1.0
Code	03	05	06	07	10

⑨ **Lead Length**

(mm)

Lead Length	3.5 ± 1.0	6 ± 1.0	10 ± 1.0	16 +1.5/-1.0	20 +1.5/-1.0	25 (Min.)
Code	04	06	10	16	20	25



## Dipped Radial Lead Type

## ◆ Electrical Characteristics

## NPO

Item	Temperature Compensating	Measuring Condition
Operating Temperature Range	-55 ~ +125°C	
Temperature Characteristics	0 ± 30 ppm/°C	
Capacitance	Within the specified tolerance	Shall be measured at 25°C± 2°C at the frequency and voltage.
Q	$C \geq 30\text{pF} : Q \geq 1000$ $C < 30\text{pF} : Q \geq 400 + 20 \times C$ (C is nominal capacitance)	$C \leq 1000\text{pF} @ 1\text{MHz} \pm 20\%, 1\pm 0.2\text{Vrms}$ $C > 1000\text{pF} @ 1\text{KHz} \pm 10\%, 1\pm 0.2\text{Vrms}$
Withstanding Voltage	No defects	Applied voltage : Rated voltage ×3 500V Rated voltage(over) ×2 Duration : 1 to 5 sec. The charge/discharge current is less than 50mA.
Insulation Resistance	More than 10GΩ or 500MΩ · μ F , whichever is less 16Vdc product : More than 10GΩ or 100MΩ · μ F , whichever is less	Apply rated voltage for 1 minute at 25°C ± 2°C and 70% R.H. max.  16Vdc product : Measurement voltage is 25Vdc



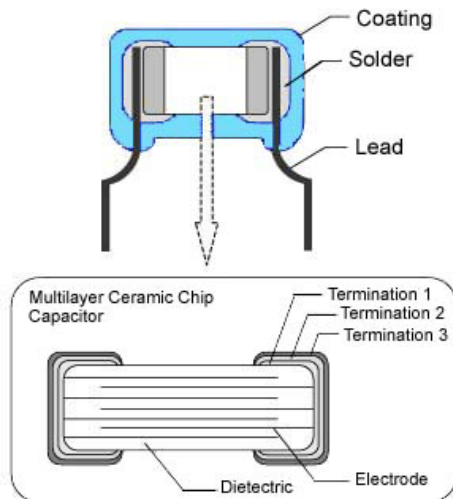
## Dipped Radial Lead Type

### ◆ Electrical Characteristics X7R/X5R/Y5V/Z5U

Item	High Dielectric Constant		Measuring Condition
Operating Temperature Range	X7R = - 55 ~ +125°C X5R = - 55 ~ +85°C Y5V = - 30 ~ +85°C Z5U = +10 ~ +85°C		
Temperature Characteristics	X7R/X5R= ± 15% Y5V= +22 to - 82% Z5U= +22 to - 56%		
Capacitance	Within the specified tolerance		
Dissipation Factor (tan δ)	25V min	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	Shall be measured at 25°C± 2°C at the frequency and voltage.
	16V	X7R/X5R=0.05max. Y5V=0.10max.	X7R/X5R/Y5V @ 1KHz ± 10%, 1± 0.2Vrms
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.	Z5U @ 1KHz ± 10%, 0.5± 0.2Vrms
	6.3V	X5R=0.075max.	
Withstanding Voltage	No defects		Applied voltage : Rated voltage ×2.5 500V Rated voltage(over) ×2 Duration : 1 to 5 sec. The charge/discharge current is less than 50mA
Insulation Resistance	More than 10G Ω or 500M Ω · uF , whichever is less. 16Vdc product : More than 10G Ω or 100M Ω · uF , whichever is less.		Apply rated voltage for 1 minute at 25°C ± 2°C and 70% R.H. max. 16Vdc product : Measurement voltage is 25Vdc

## Dipped Radial Lead Type

### ◆ Material List



### ◆ Storage

- » The storage conditions should be:
  - Temperature = Lower than 40°C
  - Humidity = Lower than 70% R.H.
- » After opening the package, please store in desiccators.

### ◆ Environmental and Test Characteristics

Item	Temperature Compensating	Measuring Condition
Strength of termination	Termination not to be broken or loosened  Force : 2 LB min. Keep time : 10 ± 1 sec.	
Solderability of leads	Lead wire to be soldered vertically up to the coating end point. At least 75% of lead surface is covered.	Solder temperature : 270 ± 5°C Dipping : 2 ± 0.5 sec. (Containing Ag 2 ~ 5%) (Flux shall be used)



## Dipped Radial Lead Type

### ◆ Environmental and Test Characteristics NPO

Item	Temperature Compensating	Measuring Condition
<b>Resistance to Soldering heat</b>		
$\Delta C$	$\pm 2.5\%$ or $\pm 0.25\text{pF}$ (Whichever is greater)	The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at $260 \pm 5^\circ\text{C}$ for $10 \pm 0.5\text{sec}$ . Let sit at room temperature for $24 \pm 2$ hrs. then measure.  Perform the initial measurement.
Q	$C \geq 30\text{pF} : Q \geq 1000$ $C < 30\text{pF} : Q \geq 400 + 20 \times C$ (C is nominal capacitance)	
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product :  More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	

<b>Thermal shock</b>																	
$\Delta C$	$\pm 2.5\%$ or $\pm 0.25\text{pF}$ (Whichever is greater)	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Remove and let sit at room temperature for $24 \pm 2$ hrs., then measure. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>Min. Operating Temp.</td> <td>Room Temp.</td> <td>Max. Operating Temp.</td> <td>Room Temp.</td> </tr> <tr> <td>Time</td> <td>30±3</td> <td>15</td> <td>30±3</td> <td>15</td> </tr> </tbody> </table>	Step	1	2	3	4	Temp. (°C)	Min. Operating Temp.	Room Temp.	Max. Operating Temp.	Room Temp.	Time	30±3	15	30±3	15
Step	1		2	3	4												
Temp. (°C)	Min. Operating Temp.		Room Temp.	Max. Operating Temp.	Room Temp.												
Time	30±3		15	30±3	15												
Q	$C \geq 30\text{pF} : Q \geq 1000$ $C < 30\text{pF} : Q \geq 400 + 20 \times C$ (C is nominal capacitance)																
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product :  More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.																
Withstanding voltage	No defects																
Exterior	No abnormalities	Perform the initial measurement.															



## Dipped Radial Lead Type

### ◆ Environmental and Test Characteristics

#### NPO

Item	Temperature Compensating	Measuring Condition
<b>Moisture resistance (Steady state)</b>		
$\Delta C$	$\pm 5\%$ or $\pm 0.5\text{pF}$ (Whichever is greater)	Apply the rated DC voltage at $40 \pm 2^\circ\text{C}$ and 90 to 95% R.H. for 500 +24/-0 hrs.  Remove and let sit at room temperature for $24 \pm 2$ hrs., then measure.  Perform the initial measurement.
Q	$C \geq 30\text{pF} : Q \geq 350$ $10\text{pF} > C < 30\text{pF} : Q \geq 275 + 2/5 \times C$ $C \leq 10\text{pF} : Q \geq 200 + 10 \times C$ (C is nominal capacitance)	
I.R.	More than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product :  More than $1000\text{M}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	
<b>High temperature loading</b>		
$\Delta C$	$\pm 3\%$ or $\pm 0.3\text{pF}$ (Whichever is greater)	Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^\circ\text{C}$ . Remove and let sit at room temperature for $24 \pm 2$ hrs., then measure. The charge/discharge current is less than 50mA.  Perform initial measurement. * 150% for 500V over.
Q	$C \geq 30\text{pF} : Q \geq 350$ $10\text{pF} > C < 30\text{pF} : Q \geq 275 + 2/5 \times C$ $C \leq 10\text{pF} : Q \geq 200 + 10 \times C$ (C is nominal capacitance)	
I.R.	More than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product :  More than $1000\text{M}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	



## Dipped Radial Lead Type

### ◆ Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Temperature Compensating	Measuring Condition	
<b>Resistance to Soldering heat</b>			
$\Delta C$	X7R/X5R= $\pm 7.5\%$ Y5V= $\pm 20\%$ Z5U= $\pm 20\%$	<p>The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at <math>260 \pm 5^\circ\text{C}</math> for <math>10 \pm 0.5\text{sec}</math>.</p> <p>Let sit at room temperature for <math>48 \pm 4\text{hrs.}</math>, then measure.</p> <p>Initial measurement for Perform a heat treatment at <math>150+0/-10^\circ\text{C}</math> for 1 hour.</p> <p>Remove and let sit for <math>48 \pm 4</math> hours at room temperature.</p> <p>Perform the initial measurement.</p>	
D.F	25V min.		X7R=0.03max. Y5V=0.075max. Z5U=0.09max.
	16V		X7R/X5R=0.05max. Y5V=0.10max.
	10V max.		X7R/X5R=0.05max. Y5V=0.125max.
	6.3V		X5R=0.075max.
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less		
Withstanding voltage	No defects		
Exterior	No abnormalities		

#### Thermal Shock

$\Delta C$	X7R/X5R= $\pm 7.5\%$ Y5V= $\pm 20\%$ Z5U= $\pm 30\%$	<p>Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table.</p> <p>Remove and let sit at room temperature for <math>48 \pm 4\text{hrs.}</math>, then measure.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (<math>^\circ\text{C}</math>)</td> <td>Min. Operating Temp.</td> <td>Room Temp.</td> <td>Max. Operating Temp.</td> <td>Room Temp.</td> </tr> <tr> <td>Time</td> <td><math>30 \pm 3</math></td> <td>15</td> <td><math>30 \pm 3</math></td> <td>15</td> </tr> </tbody> </table> <p>Initial measurement for Perform a heat treatment at <math>150+0/-10^\circ\text{C}</math> for 1 hour.</p> <p>Remove and let sit for <math>48 \pm 4\text{hrs.}</math> At room temperature.</p> <p>Perform the initial measurement.</p>	Step	1	2	3	4	Temp. ( $^\circ\text{C}$ )	Min. Operating Temp.	Room Temp.	Max. Operating Temp.	Room Temp.	Time	$30 \pm 3$	15	$30 \pm 3$	15
Step	1		2	3	4												
Temp. ( $^\circ\text{C}$ )	Min. Operating Temp.		Room Temp.	Max. Operating Temp.	Room Temp.												
Time	$30 \pm 3$		15	$30 \pm 3$	15												
D.F	25V min.		X7R=0.03max. Y5V=0.075max. Z5U=0.09max.														
	16V	X7R/X5R=0.05max. Y5V=0.10max.															
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.															
	6.3V	X5R=0.075max.															
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.																
Withstanding voltage	No defects																
Exterior	No abnormalities.																



## Dipped Radial Lead Type

### ◆ Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Temperature Compensating	Measuring Condition	
<b>Moisture resistance (Steady State)</b>			
<b>ΔC</b>	X7R/X5R= ± 12.5% Y5V= ± 30% Z5U= ± 30%	<p>Apply the rated DC voltage at 40 ± 2°C and 90 to 95% R.H. for 500+24/-0 hrs.</p> <p>Remove and let sit at room temperature for 48 ± 4 hrs. , then measure.</p> <p>Initial measurement for perform a heat treatment at 150+0/-10 °C for 1 hour.</p> <p>Remove and let sit for 48 ± 4 hrs. At room temperature.</p> <p>Perform the initial measurement.</p>	
<b>D.F</b>	25V min. X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.		
	16V X7R/X5R=0.10max. Y5V=0.15max.		
	10V max. X7R/X5R=0.10max. Y5V=0.1875max.		
	6.3V X5R=0.15max.		
<b>I.R.</b>	More than 1000MΩ or 50MΩ * μ F , whichever is less. 16Vdc product : More than 1000MΩ or 10MΩ * μ F , whichever is less.		
<b>Withstanding voltage</b>	No defects		
<b>Exterior</b>	No abnormalities		
<b>High temperature loading</b>			
<b>ΔC</b>	X7R/X5R= ± 15% Y5V= ± 30% Z5U= ± 30%		<p>Apply 200% of the rated DC voltage for 1000 +48/-0 hrs. at the maximum operating temperature ± 2°C. Remove and let sit at room temperature for 48 ± 4 hrs. , then measure.</p> <p>The charge/discharge current is less than 50mA.</p> <p>Initial measurement for Apply 200% of the rated DC voltage for 1 hour at the maximum operating temperature ±2 °C . Remove and let sit at room temperature for 48 ± 4 hrs.</p> <p>Perform initial measurement.. * 150% for 500V</p>
<b>D.F</b>	25V min. X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.		
	16V X7R/X5R=0.10max. Y5V=0.15max.		
	10V max. X7R/X5R=0.10max. Y5V=0.1875max.		
	6.3V X5R=0.15max.		
<b>I.R.</b>	More than 1000MΩ or 50MΩ * μ F , whichever is less. 16Vdc product : More than 1000MΩ or 10MΩ * μ F , whichever is less.		
<b>Withstanding voltage</b>	No defects		
<b>Exterior</b>	No abnormalities		





## Dipped Axial Lead Type

### ◆ Electrical Characteristics

#### NPO

Item	Temperature Compensating	Measuring Condition
Operating Temperature Range	- 55 ~ +125°C	
Temperature Characteristics	0 ± 30 ppm/°C	
Capacitance	Within the specified tolerance	Shall be measured at 25°C ± 2°C at the frequency and voltage.
Q	C ≥ 30pF : Q ≥ 1000 C < 30pF : Q ≥ 400 + 20 × C (C is nominal capacitance)	C ≤ 1000pF @ 1MHz ± 20%, 1± 0.2Vrms C > 1000pF @ 1KHz ± 10%, 1± 0.2Vrms
Withstanding Voltage	No defects	Applied voltage : Rated voltage ×3 500V Rated voltage (over) ×2 Duration : 1 to 5 sec. The charge/discharge current is less than 50mA.
Insulation Resistance	More than 10GΩ or 500MΩ · μ F , whichever is less 16Vdc product : More than 10GΩ or 100MΩ · μ F , whichever is less	Apply rated voltage for 1 minute at 25°C ± 2°C and 70% R.H. max.  16Vdc product : Measurement voltage is 25Vdc



## Dipped Axial Lead Type

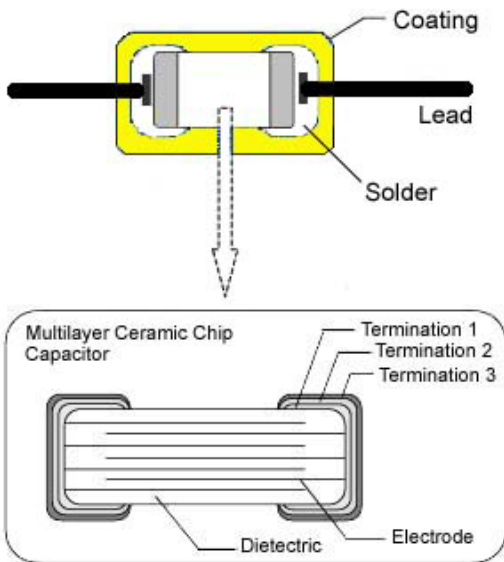
### ◆ Electrical Characteristics

#### X7R/X5R/Y5V/Z5U

Item	High Dielectric Constant		Measuring Condition
Operating Temperature Range	X7R = - 55 ~ +125°C X5R = - 55 ~ +85°C Y5V = - 30 ~ +85°C Z5U = +10 ~ +85°C		
Temperature Characteristics	X7R/X5R= ± 15% Y5V= +22 to - 82% Z5U= +22 to - 56%		
Capacitance	Within the specified tolerance		
Dissipation Factor (tan δ)	25V min	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	Shall be measured at 25°C± 2°C at the frequency and voltage
	16V	X7R/X5R=0.05max. Y5V=0.10max.	X7R/X5R/Y5V @ 1KHz ± 10%, 1± 0.2Vrms
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.	Z5U @ 1KHz ± 10%, 0.5± 0.2Vrms
	6.3V	X5R=0.075max.	
Withstanding Voltage	No defects		Applied voltage : Rated voltage ×2.5 500V Rated voltage(over) ×2 Duration : 1 to 5 sec. The charge/discharge current is less than 50mA.
Insulation Resistance	More than 10G Ω or 500M Ω · μ F , whichever is less. 16Vdc product : More than 10G Ω or 100M Ω · μ F , whichever is less.		Apply rated voltage for 1 minute at 25°C± 2°C and 70% R.H. max.  16Vdc product : Measurement voltage is 25Vdc.

## Dipped Axial Lead Type

### ◆ Material List



### ◆ Storage

- » The storage conditions should be:
  - Temperature = Lower than 40°C
  - Humidity = Lower than 70% R.H.
- » After opening the package, please store in desiccators.

### ◆ Environmental and Test Characteristics

Item	Temperature Compensating	Measuring Condition
Strength of termination	Termination not to be broken or loosened.  Force : 2 LB min. Keep time : 10 ± 1 sec.	
Solderability of leads	Lead wire to be soldered vertically up to the coating end point. At least 75% of lead surface is covered	Solder temperature : 270 ± 5°C Dipping : 2 ± 0.5 sec. (containing Ag 2 ~ 5%) (Flux shall be used)



## Dipped Axial Lead Type

### ◆ Environmental and Test Characteristics

#### NPO

Item	Temperature Compensating	Measuring Condition
<b>Resistance to Soldering heat</b>		
$\Delta C$	$\pm 2.5\%$ or $\pm 0.25\text{pF}$ (Whichever is greater)	<p>The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at <math>260 \pm 5^\circ\text{C}</math> for <math>10 \pm 0.5\text{sec}</math>. Let sit at room temperature for <math>24 \pm 2</math> hrs. then measure.</p> <p>Perform the initial measurement.</p>
Q	$C \geq 30\text{pF} : Q \geq 1000$ $C < 30\text{pF} : Q \geq 400 + 20 \times C$ (C is nominal capacitance)	
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	

#### Thermal Shock

$\Delta C$	$\pm 2.5\%$ or $\pm 0.25\text{pF}$ (Whichever is greater)	<p>Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Remove and let sit at room temperature for <math>24 \pm 2</math> hrs., then measure.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>Min. Operating Temp.</td> <td>Room Temp.</td> <td>Max. Operating Temp.</td> <td>Room Temp.</td> </tr> <tr> <td>Time</td> <td>30±3</td> <td>15</td> <td>30±3</td> <td>15</td> </tr> </tbody> </table> <p>Perform the initial measurement.</p>	Step	1	2	3	4	Temp. (°C)	Min. Operating Temp.	Room Temp.	Max. Operating Temp.	Room Temp.	Time	30±3	15	30±3	15
Step	1		2	3	4												
Temp. (°C)	Min. Operating Temp.		Room Temp.	Max. Operating Temp.	Room Temp.												
Time	30±3		15	30±3	15												
Q	$C \geq 30\text{pF} : Q \geq 1000$ $C < 30\text{pF} : Q \geq 400 + 20 \times C$ (C is nominal capacitance)																
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.																
Withstanding voltage	No defects																
Exterior	No abnormalities																



## Dipped Axial Lead Type

### ◆ Environmental and Test Characteristics NPO

Item	Temperature Compensating	Measuring Condition
<b>Moisture resistance (Steady state)</b>		
$\Delta C$	$\pm 5\%$ or $\pm 0.5\text{pF}$ (Whichever is greater)	Apply the rated DC voltage at $40 \pm 2^\circ\text{C}$ and 90 to 95% R.H. for 500+24/-0 hrs. Remove and let sit at room temperature for $24 \pm 2$ hrs., then measure.  Perform the initial measurement.
Q	$C \geq 30\text{pF} : Q \geq 350$ $10\text{pF} > C < 30\text{pF} : Q \geq 275 + 2/5 \times C$ $C \leq 10\text{pF} : Q \geq 200 + 10 \times C$ (C is nominal capacitance)	
I.R.	More than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $1000\text{M}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	
<b>High temperature loading</b>		
$\Delta C$	$\pm 3\%$ or $\pm 0.3\text{pF}$ (Whichever is greater)	Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^\circ\text{C}$ . Remove and let sit at room temperature for $24 \pm 2$ hrs., then measure.  The charge/discharge current is less than 50mA.  Perform initial measurement. * 150% for 500V over.
Q	$C \geq 30\text{pF} : Q \geq 350$ $10\text{pF} > C < 30\text{pF} : Q \geq 275 + 2/5 \times C$ $C \leq 10\text{pF} : Q \geq 200 + 10 \times C$ (C is nominal capacitance)	
I.R.	More than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $1000\text{M}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	



## Dipped Axial Lead Type

### ◆ Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Temperature Compensating	Measuring Condition															
<b>Resistance to Soldering Heat</b>																	
$\Delta C$	X7R/X5R= $\pm 7.5\%$ Y5V= $\pm 20\%$ Z5U= $\pm 20\%$	<p>The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at <math>260 \pm 5^\circ\text{C}</math> for <math>10 \pm 0.5\text{sec}</math>.</p> <p>Let sit at room temperature for <math>48 \pm 4\text{hrs}</math> , then measure.</p> <p>Initial measurement for Perform a heat treatment at <math>150+0/-10^\circ\text{C}</math> for 1 hour.</p> <p>Remove and let sit for <math>48 \pm 4</math> hours at room temperature.</p> <p>Perform the initial measurement.</p>															
D.F	25V min		X7R=0.03max. Y5V=0.075max. Z5U=.09max.														
	16V		X7R/X5R=0.05max. Y5V=0.10max.														
	10V max.		X7R/X5R=0.05max. Y5V=0.125max.														
	6.3V		X5R=0.075max.														
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.																
Withstanding voltage	No defects																
Exterior	No abnormalities																
<b>Thermal Shock</b>																	
$\Delta C$	X7R/X5R= $\pm 7.5\%$ Y5V= $\pm 20\%$ Z5U= $\pm 20\%$	<p>Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table.</p> <p>Remove and let sit at room temperature for <math>48 \pm 4\text{hrs}</math> , then measure.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (<math>^\circ\text{C}</math>)</td> <td>Min. Operating Temp.</td> <td>Room Temp.</td> <td>Max. Operating Temp.</td> <td>Room Temp.</td> </tr> <tr> <td>Time</td> <td><math>30 \pm 3</math></td> <td>15</td> <td><math>30 \pm 3</math></td> <td>15</td> </tr> </tbody> </table> <p>Initial measurement for Perform a heat treatment at <math>150+0/-10^\circ\text{C}</math> for 1 hour.</p> <p>Remove and let sit for <math>48 \pm 4\text{hrs}</math>. At room temperature.</p> <p>Perform the initial measurement.</p>	Step	1	2	3	4	Temp. ( $^\circ\text{C}$ )	Min. Operating Temp.	Room Temp.	Max. Operating Temp.	Room Temp.	Time	$30 \pm 3$	15	$30 \pm 3$	15
Step	1		2	3	4												
Temp. ( $^\circ\text{C}$ )	Min. Operating Temp.		Room Temp.	Max. Operating Temp.	Room Temp.												
Time	$30 \pm 3$		15	$30 \pm 3$	15												
D.F	25V min		X7R=0.03max. Y5V=0.075max. Z5U=0.09max.														
	16V		X7R/X5R=0.05max. Y5V=0.10max.														
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.															
	6.3V	X5R=0.075max.															
I.R.	More than $10\text{G}\Omega$ or $500\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $10\text{G}\Omega$ or $100\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.																
Withstanding voltage	No defects																
Exterior	No abnormalities.																



## Dipped Axial Lead Type

### ◆ Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Temperature Compensating		Measuring Condition
<b>Moisture resistance (Steady state)</b>			
$\Delta C$	X7R/X5R= $\pm 12.5\%$ Y5V= $\pm 30\%$ Z5U= $\pm 30\%$		<p>Apply the rated DC voltage at <math>40 \pm 2^\circ\text{C}</math> and 90 to 95% R.H. for 500 +24/-0hrs.</p> <p>Remove and let sit at room temperature for <math>48 \pm 4</math> hrs. , then measure.</p> <p>Initial measurement for Perform a heat treatment at <math>150+0/-10^\circ\text{C}</math> for 1 hour.</p> <p>Remove and let sit for <math>48\pm 4</math> hrs. At room temperature.</p> <p>Perform the initial measurement.</p>
D.F	25V min	X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.	
	16V	X7R/X5R=0.10max. Y5V=0.15max.	
	10V max.	X7R/X5R=0.10max. Y5V=0.1875max.	
	6.3V	X5R=0.15max.	
I.R.	More than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $1000\text{M}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.		
Withstanding voltage	No defects		
Exterior	No abnormalities		
<b>High Temperature loading</b>			
$\Delta C$	X7R/X5R= $\pm 15\%$ Y5V= $\pm 30\%$ Z5U= $\pm 30\%$		<p>Apply 200% of the rated DC voltage for 1000+48/-0 hrs.</p> <p>At the maximum operating temperature <math>\pm 2^\circ\text{C}</math>.</p> <p>Remove and let sit at room temperature for <math>48\pm 4</math> hrs. , then measure.</p> <p>The charge/discharge current is less than 50mA.</p> <p>Initial measurement for Apply 200% of the rated DC voltage for 1 hour at the maximum operating temperature <math>\pm 2^\circ\text{C}</math> .</p> <p>Remove and let sit at room temperature for <math>48 \pm 4</math> hrs.</p> <p>Perform initial measurement..</p> <p>* 150% for 500V</p>
D.F	25V min	X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.	
	16V	X7R/X5R=0.10max. Y5V=0.15max.	
	10V max.	X7R/X5R=0.10max. Y5V=0.1875max.	
	6.3V	X5R=0.15max.	
I.R.	More than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$ , whichever is less. 16Vdc product : More than $1000\text{M}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$ , whichever is less.		
Withstanding voltage	No defects		
Exterior	No abnormalities		