MONOLITHIC (MULTILAYER) CERAMIC CAPACITORS

UNIVERSE CONDENSER CO. LTD

Dipped Axial Lead Type

● Part Number Description

A	X7R	103	K	1H	R15	TR
①	②	③	④	⑤	⑥	⑦

① Type

Symbol	Type
A	Axial

② Temperature Characteristic

Temp. Charact.	Temperature Range	Capacitance Change
NPO	-55 ~ 125℃	0±30 ppm/℃
X5R	-55 ~ 85℃	±15%
X7R	-55 ~ 125℃	±15%
Y5V	-30 ~ 85℃	+22%, -82%

③ Capacitance Value

Symbol	Cap. Value
060	6pF
6R8	6.8pF
120	12pF
471	470pF
222	2200pF
104	100000pF

④ Capacitance Tolerance

Symbol	Cap. Tol.
D	±0.5pF
G	±2%
J	±5%
K	±10%
M	±20%
Z	+80%, -20%

⑤ Rated Voltage

Symbol	Rated Voltage
0J	DC 6.3V
1A	DC 10V
1C	DC 16V
1E	DC 25V
1H	DC 50V
2A	DC 100V
2E	DC 250V
2H	DC 500V

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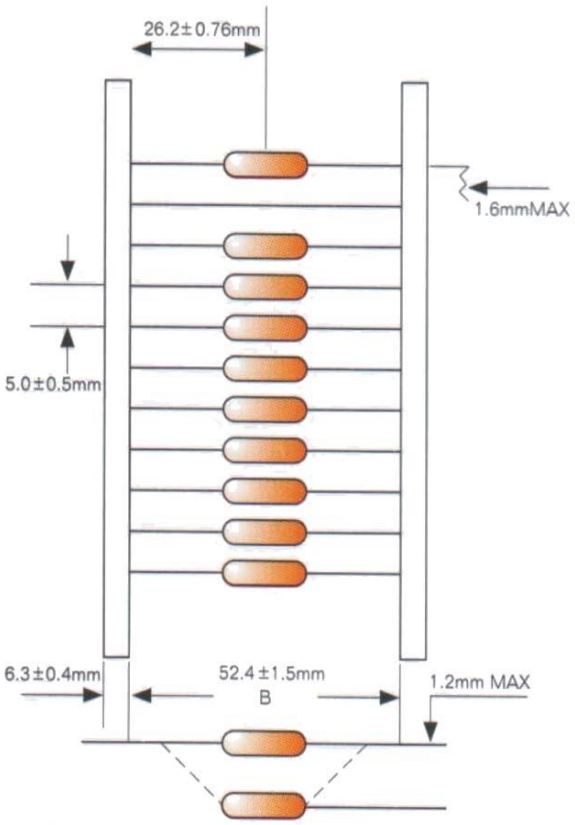
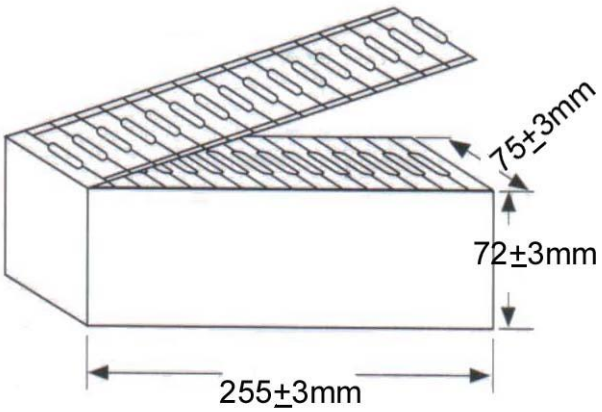
⑥ Size

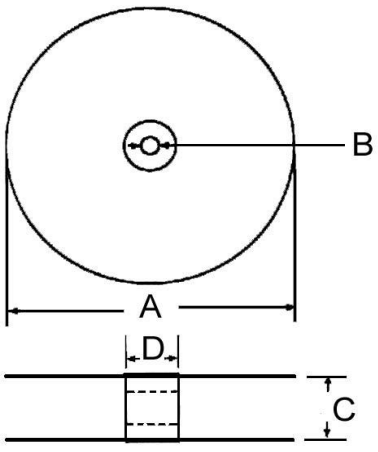
Symbol	Dimension (unit:mm)			
	T (max)	D (max)	F (±0.8)	Φd
R15	2.8	4.2	5 7.52 10	0.5 ±0.05



⑦ Packing or Pitch of Bulk

Symbol	Packing
Blank	Bulk
A	AMMO
R	REEL
D	5±0.8
F	7.52±0.8
G	10±0.8





Reel Package Unit:mm

A	B	C	D	
365max	28±1.5	51.0max	102max	

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● Capacitance Range

Style	Rate Voltage	NPO	X7R	X5R	Y5V
R15	6.3V			155 ~ 106	475 ~ 106
	10V			334 ~ 475	225 ~ 106
	16V		224 ~ 225	105	105 ~ 475
	25V		104 ~ 155	224	474 ~ 225
	50V	010 ~ 103	221 ~ 334		104 ~ 105
	100V	010 ~ 472	221 ~ 104		
	250V	101 ~ 272	102 ~ 333		

Dipped Axial Lead Type

● Electrical Characteristics

NPO

Item	Temperature Compensating	Measuring Condition
Operating Temperature Range	- 55 ~ +125℃	
Temperature Characteristics	0 ± 30 ppm/℃	
Capacitance	Within the specified tolerance	Shall be measured at 25℃± 2℃ at the frequency and voltage C≦1000pF@1MHz ± 20% , 1± 0.2Vrms C＞1000pF@1KHz ± 10% , 1± 0.2Vrms
Q	C≧30pF：Q≧1000 C＜30pF：Q≧400 + 20 × C (C is nominal capacitance)	
Withstanding Voltage	No defects	Applied voltage： Rated voltage ×2.5 100V～500V Rated voltage(over) ×1.5 Duration：1 to 5 sec. The charge/discharge current is less than 50mA
Insulation Resistance	More than 10GΩ or 500MΩ・μF , whichever is less 16Vdc product： More than 10GΩ or 100MΩ・μF , whichever is less	Apply rated voltage for 1 minute at 25℃± 2℃and 70% R.H. max. . 16Vdc product： Measurement voltage is 25Vdc

Dipped Axial Lead Type

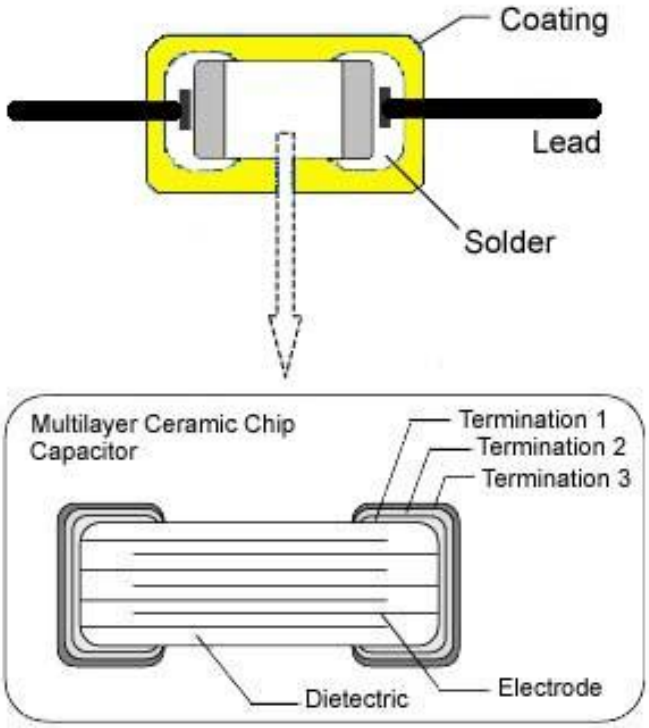
● Electrical Characteristics

X7R/X5R/Y5V

Item	High Dielectric Constant		Measuring Condition
Operating Temperature Range	X7R = －55 ~ +125℃ X5R = －55 ~ +85℃ Y5V = －30 ~ +85℃		
Temperature Characteristics	X7R/X5R= ± 15% Y5V= +22 to - 82%		
Capacitance	Within the specified tolerance		Shall be measured at 25℃± 2℃ at the frequency and voltage X7R/X5R/Y5V @1KHz ± 10% , 1± 0.2Vrms
Dissipation Factor (tanδ)	**25V min**	X7R=0.03max. X7R=0.055max. (C≧1.0uF) Y5V=0.075max.	
	16V	X7R/X5R=0.05max. Y5V=0.10max.	
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.	
	6.3V	X5R=0.075max.	
Withstanding Voltage	No defects		Applied voltage： Rated voltage ×2.5 100V～500V Rated voltage(over) ×1.5 Duration：1 to 5 sec. The charge/discharge current is less than 50mA
Insulation Resistance	More than 10GΩ or 500MΩ・μF , whichever is less. 16Vdc product： More than 10GΩ or 100MΩ・μF , whichever is less.		Apply rated voltage for 1 minute at 25℃± 2℃and 70% R.H. max. . 16Vdc product： Measurement voltage is 25Vdc

Dipped Axial Lead Type

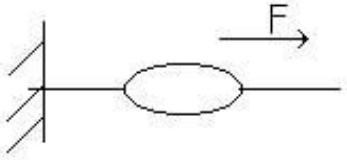
● Material List



● Storage

1. The storage conditions should be:
   Temperature = Lower than 40℃
   Humidity = Lower than 70% R.H.
2. 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：5 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：235 ± 5℃ Dipping：2 ± 0.5 sec. (Flux shall be used)

● Environmental and Test Characteristics

NPO

<table>
<tr><th>Item</th><th>Temperature Compensating</th><th>Measuring Condition</th></tr>
<tr><td colspan="3">Resistance to Soldering heat</td></tr>
<tr><td>ΔC</td><td>± 2.5% or ± 0.25pF
(Whichever is greater)</td><td rowspan="4">The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at 260 ± 5℃ for 10 ± 0.5sec.
Let sit at room temperature for 24 ± 2 hrs. then measure.

Perform the initial measurement.</td></tr>
<tr><td>Q</td><td>C≧30pF：Q≧1000
C＜30pF：Q≧400 + 20 × C
(C is nominal capacitance)</td></tr>
<tr><td>I.R.</td><td>More than 10GΩ or 500MΩ・μF, whichever is less.
16Vdc product：
More than 10GΩ or 100MΩ・μF, whichever is less.</td></tr>
<tr><td>Withstanding voltage</td><td>No defects</td></tr>
<tr><td>Exterior</td><td>No abnormalities</td><td></td></tr>
<tr><td colspan="3">Thermal shock</td></tr>
<tr><td>ΔC</td><td>± 2.5% or ± 0.25pF
(Whichever is greater)</td><td rowspan="4">Fix the capacitor to the supporting jig in the same manner and under the same conditions as (Resistance to Soldering heat). Perform the five cycles according to the four heat treatments listed in the following table. Remove and let sit at room temperature for 24 ± 2 hrs., then measure.

<table>
<tr><td>Step</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Temp. (℃)</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>
</table>

Perform the initial measurement.</td></tr>
<tr><td>Q</td><td>C≧30pF：Q≧1000
C＜30pF：Q≧400 + 20 × C
(C is nominal capacitance)</td></tr>
<tr><td>I.R.</td><td>More than 10GΩ or 500MΩ・μF, whichever is less.
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</table>

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● Environmental and Test Characteristics

NPO

Item	Temperature Compensating	Measuring Condition
Moisture resistance (Steady state)		
ΔC	± 5% or ± 0.5pF (Whichever is greater)	Apply the rated DC voltage at 40 ± 2℃ and 90 to 95% R.H. for 500^{+24}_{-0} hrs. Remove and let sit at room temperature for 24 ± 2 hrs., then measure. Perform the initial measurement.
Q	C≧30pF：Q≧350 10pF>C<30pF：$Q \geqq 275 + \frac{5}{2} \times C$ C≦10pF：Q≧200 + 10 × C (C is nominal capacitance)	
I.R.	More than 1000MΩ or 50MΩ・μF, whichever is less. 16Vdc product： More than 1000MΩ or 10MΩ・μF, whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	
High temperature loading		
ΔC	± 3% or ± 0.3pF (Whichever is greater)	Apply 200% of the rated DC voltage for 1000^{+48}_{-0} hrs. at the maximum operating temperature ± 2℃. Remove and let sit at room temperature for 24 ± 2 hrs., then measure. The charge/discharge current is less than 50mA. Perform initial measurement. * 100% for 100V～500V over.
Q	C≧30pF：Q≧350 10pF>C<30pF：$Q \geqq 275 + \frac{5}{2} \times C$ C≦10pF：Q≧200 + 10 × C (C is nominal capacitance)	
I.R.	More than 1000MΩ or 50MΩ・μF, whichever is less. 16Vdc product： More than 1000MΩ or 10MΩ・μF, whichever is less.	
Withstanding voltage	No defects	
Exterior	No abnormalities	

Dipped Axial Lead Type

● Environmental and Test Characteristics

X7R/X5R/Y5V

Item	Temperature Compensating		Measuring Condition
Resistance to Soldering heat			
ΔC	X7R/X5R= ± 7.5% Y5V= ± 20%		The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at 260 ± 5℃ for 10 ± 0.5sec. Let sit at room temperature for 48 ± 4 hrs. , then measure. • Initial measurement for Perform a heat treatment at 150 $^{+0}_{-10}$ ℃ for 1 hour. Remove and let sit for 48 ± 4 hours at room temperature. Perform the initial measurement.
D.F.	**25V min**	X7R=0.03max. X7R=0.055max. (C≧1.0uF) Y5V=0.075max	
	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 10GΩ or 500MΩ・μF , whichever is less. 16Vdc product： More than 10GΩ or 100MΩ・μF , whichever is less.		
Withstanding voltage	No defects		
Exterior	No abnormalities		
Thermal shock			
ΔC	X7R/X5R= ± 7.5% Y5V= ± 20%		Fix the capacitor to the supporting jig in the same manner and under the same conditions as (*Resistance to Soldering heat*). Perform the five cycles according to the four heat treatments listed in the following table. Remove and let sit at room temperature for 48 ± 4 hrs. , then measure. • Initial measurement for Perform a heat treatment at 150 $^{+0}_{-10}$ ℃ for 1 hour. Remove and let sit for 48 ± 4 hrs. At room temperature. Perform the initial measurement.
D.F.	**25V min**	X7R=0.03max. X7R=0.055max. (C≧1.0uF) Y5V=0.075max	
	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 10GΩ or 500MΩ・μF , whichever is less. 16Vdc product： More than 10GΩ or 100MΩ・μF , whichever is less.		
Withstanding voltage	No defects		
Exterior	No abnormalities.		

Step	1	2	3	4
Temp. (℃)	Min. Operating Temp.	Room Temp.	Max. Operating Temp.	Room Temp.
Time	30±3	15	30±3	15

● Environmental and Test Characteristics

X7R/X5R/Y5V

Item	Temperature Compensating		Measuring Condition
Moisture resistance (Steady state)			
ΔC	X7R/X5R= ± 12.5% Y5V= ± 30%		Apply the rated DC voltage at 40 ± 2℃ and 90 to 95% R.H. for 500 $^{+24}_{-0}$ hrs. Remove and let sit at room temperature for 48 ± 4 hrs. , then measure. • Initial measurement for Perform a heat treatment at 150 $^{+0}_{-10}$ ℃ for 1 hour. Remove and let sit for 48 ± 4 hrs. At room temperature. Perform the initial measurement.
D.F.	**25V min**	X7R=0.06max. X7R=0.11max. (C≧1.0uF) Y5V=0.1125max	
	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 1000MΩ or 50MΩ・μF , whichever is less. 16Vdc product： More than 1000MΩ or 10MΩ・μF , whichever is less.		
Withstanding voltage	No defects		
Exterior	No abnormalities		
High temperature loading			
ΔC	X7R/X5R= ± 15% Y5V= ± 30%		Apply 200% of the rated DC voltage for 1000 $^{+48}_{-0}$ hrs. at the maximum operating temperature ± 2℃. Remove and let sit at room temperature for 48 ± 4 hrs. , then measure. The charge/discharge current is less than 50mA. • Initial measurement for Apply 200% of the rated DC voltage for 1 hour at the maximum operating temperature ± 2℃. Remove and let sit at room temperature for 48 ± 4 hrs. Perform initial measurement. * 100% for 100V～500V
D.F.	**25V min**	X7R=0.06max. X7R=0.11max. (C≧1.0uF) Y5V=0.1125max	
	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 1000MΩ or 50MΩ・μF , whichever is less. 16Vdc product： More than 1000MΩ or 10MΩ・μF , whichever is less.		
Withstanding voltage	No defects		
Exterior	No abnormalities		