

MD series Monolithic (Multilayer) Ceramic Capacitors

Part Number <u>MD</u> 471 **X7R** <u>500</u> K <u>R</u> <u>05</u> <u>25</u> <u>B</u> 1 9 (4) 6) (7) (8) 2 (3) (5)

(1) **Type:** MD = Monolithic (Multilayer) Ceramic Capacitors

(2) Capacitance Value

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

(3) Dielectric : NPO 、 X5R 、 X7R 、 Y5V 、 Z5U

(4) Capacitance tolerance

Tolerance	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%	±20%	+80%-20%
Code	С	D	F	G	J	К	М	Z

(7) Packing

Туре

Code

(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

Туре	Radial	Axial
Code	R	А

(8) Lead Spacing

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

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

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(mm)

Taping

(AMMO)

Т

(mm)

REEL

R

Bulk

В



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Electrical Characteristics

Ν	Ρ	Ο

Item	Temperature Compensating	Measuring Condition
Operating Temperature Range	-55 ~ +125℃	
Temperature Characteristics	0 ± 30 ppm/°C	
Capacitance	Within the specified tolerance	Shall be measured at 25°C± 2°C at the frequency and
Q	C ≥ $30pF$: Q ≥ 1000 C < $30pF$: Q ≥ $400 + 20 \times C$ (C is nominal capacitance)	voltage. 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 $10G\Omega$ or $500M\Omega$ • μ F , whichever is less 16Vdc product : More than $10G\Omega$ or $100M\Omega$ • 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

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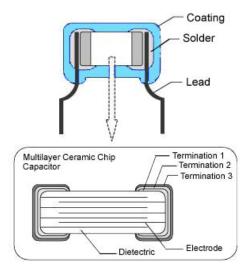


Electrical Characteristics X7R/X5R/Y5V/Z5U

Item	Hig	h Dielectric Constant	Measuring Condition
Operating Temperature Range	X7R = -55 ~+1 X5R = -55 ~+8 Y5V = -30 ~+8 Z5U = +10 ~+85	95°C 95°C	
Temperature Characteristics	X7R/X5R= ± 15 Y5V= +22 to - 82 Z5U= +22 to - 56	2%	
Capacitance	Within the specifi	ed tolerance	
	25V min	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	Shall be measured at 25°C± 2°C at the frequency and voltage.
Dissipation Factor (tan δ)	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



Material List



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Storage

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

Item	Temperature Compensating	Measuring Condition		
Strength of termination	Termination not to be broken or loosened Force : 2 LB min. Keep time : 10 \pm 1 sec.	F,		
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)		



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NPO

Item	Temperature Compensating	Measuring Condition				
Resistance to Soldering heat						
ΔC	± 2.5% or ± 0.25pF (Whichever is greater)					
Q	C ≧ $30pF$: Q ≧ 1000 C < $30pF$: Q ≧ $400 + 20 \times C$ (C is nominal capacitance)	The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at 260 \pm 5°C for				
I.R.	More than 10GΩ or 500MΩ • μ F , whichever is less. 16Vdc product :	10 \pm 0.5sec. Let sit at room temperature for 24 \pm 2 hrs. then measure.				
	More than $10G\Omega$ or $100M\Omega$ • μ F , whichever is less.	Perform the initial measurement.				
Withstanding voltage	No defects					
Exterior	No abnormalities					
Thermal shock						
ΔC	± 2.5% or ± 0.25pF (Whichever is greater)	Fix the capacitor to the supporting jig in the same				
Q	C ≧ $30pF$: Q ≧ 1000 C < $30pF$: Q ≧ $400 + 20 \times C$ (C is nominal capacitance)	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 ± 2 hrs., then measure.				
	More than 10GΩ or 500MΩ • μ F ,	Step 1 2 3 4				
LR.	whichever is less. 16Vdc product : More than $10G\Omega$ or $100M\Omega^{\bullet}$ µ F ,	Temp. (°C)Min. Operating Temp.Room Temp.Max. Operating Temp.Room Temp.				
	More than $10G\Omega$ or $100M\Omega$ • μ F , whichever is less.	Time 30±3 15 30±3 15				
Withstanding voltage Exterior	No defects No abnormalities	Perform the initial measurement.				



NPO					
Item	Temperature Compensating	Measuring Condition			
Moisture resistance (Steady state)					
ΔC	± 5% or ± 0.5pF (Whichever is greater)				
Q	C \ge 30pF : Q \ge 350 10pF > C < 30pF : Q \ge 275 +2/5 × C C \le 10pF : Q \ge 200 + 10 × C (C is nominal capacitance)	Apply the rated DC voltage at 40 \pm 2°C and 90 to 95% R.H. for 500 +24/-0 hrs.			
I.R.	More than 1000MΩ or 50MΩ • μ F , whichever is less. 16Vdc product : More than 1000MΩ or 10MΩ • μ F , whichever is less.	Remove and let sit at room temperature for 24 ± 2 hrs., then measure. Perform the initial measurement.			
Withstanding voltage	No defects				
Exterior	No abnormalities				
High temperature loading					
ΔC	± 3% or ± 0.3pF (Whichever is greater)				
Q	C \ge 30pF : Q \ge 350 10pF > C < 30pF : Q \ge 275 +2/5 × C C \le 10pF : Q \ge 200 + 10 × C (C is nominal capacitance)	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			
I.R.	More than 1000MΩ or 50MΩ • μ F , whichever is less. 16Vdc product : More than 1000MΩ or 10MΩ • μ F , whichever is less.	temperature for 24 ± 2 hrs., then measure. The charge/discharge current is less than 50mA. Perform initial measurement. * 150% for 500V over.			
Withstanding voltage	No defects				
Exterior	No abnormalities				



Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	ТТ	emperature Compensating		Me	easuring (Condition		
Resistance to Soldering heat								
ΔC	X7R/X5R= ± Y5V= ± 20% Z5U= ± 20%	6						
	25V min.	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	The lead wire is immersed in the melted sold 1.5mm to 2mm from the main body at 260					
D.F	16V	X7R/X5R=0.05max. Y5V=0.10max.	for 10 ±0. Let sit at r measure.		ature for 48	3 ± 4hrs., th	en	
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.		asurement for	Perform a	a heat treatme	ent at	
	6.3V	X5R=0.075max.) °C for 1 ho				
LR.	whichever is 16Vdc produ	ct: 10GΩ or 100MΩ ・μF,	Remove and let sit for 48 ± 4 hours at room temperature. Perform the initial measurement.					
Withstanding voltage	No defects	No defects						
Exterior	No abnorma	lities						
Thermal Shock								
ΔC	X7R/X5R= ± Y5V= ± 20% Z5U= ± 30%	6	manner a	nd under the	same con	g jig in the sa ditions as (10 our heat treati). Perform	
	25V min.	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	listed in the following table. Remove and let sit at room temperature for 48 ± 4 hrs. , then measure.					
D.F	16V	X7R/X5R=0.05max. Y5V=0.10max.	Step	1	2	3	4	
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.	Temp. (°C)	Min. Operating	Room Temp.	Max. Operating	Room Temp.	
	6.3V	X5R=0.075max.	(0)	Temp.	remp.	Temp.	Temp.	
	More than 10 whichever is	DGΩ or 500MΩ ・ μ F , less.	Time	30±3	15	30±3	15	
LR.	16Vdc produ More than 10 whichever is	OGΩ or 100MΩ · μ F ,	Initial measurement for Perform a heat treatment at $150+0/-10$ °C for 1 hour. Remove and let sit for 48 ± 4 hrs. At room temperature.					
Withstanding voltage	No defects							
Exterior	No abnorma	lities.	Perform the	ne initial mea	surement.			
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E-MAIL: faithful@faithfullink.com

Website: www.faithfullink.com



Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Tem	perature Compensating	Measuring Condition
Moisture resistance (Steady State)			
ΔC	X7R/X5R= ± 30 ⁶ Z5U= ± 30 ⁶	%	
	25V min.	X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.	Apply the rated DC voltage at 40 \pm 2°C and
D.F	16V	X7R/X5R=0.10max. Y5V=0.15max.	90 to 95% R.H. for 500+24/-0 hrs. Remove and let sit at room temperature for 48 \pm 4 hrs., then measure.
	10V max.	X7R/X5R=0.10max. Y5V=0.1875max.	Initial measurement for perform a heat treatment at
	6.3V	X5R=0.15max.	150+0/-10 °C for 1 hour.
l.R.	whichever is 16Vdc produ		Remove and let sit for 48 ± 4 hrs. At room temperature. Perform the initial measurement.
	whichever is		
Withstanding voltage	No defects		
Exterior	No abnorma	lities	
High temperature loading			
ΔC	X7R/X5R= : Y5V= ± 30 ^o Z5U= ± 30 ^o	%	
	25V min.	X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.	Apply 200% of the rated DC voltage for 1000 +48/-0 hrs. at the maximum operating temperature \pm 2°C. Remove and let sit at room
D.F	16V	X7R/X5R=0.10max. Y5V=0.15max.	temperature for 48 \pm 4 hrs. , then measure. The charge/discharge current is less than 50mA.
	10V max.	X7R/X5R=0.10max. Y5V=0.1875max.	Initial measurement for Apply 200% of the rated DC
	6.3V More than whichever is	X5R=0.15max. 1000M Ω or 50M Ω • μ F , s less.	voltage for 1 hour at the maximum operating temperature ± 2 °C . Remove and let sit at room temperature for 48 \pm 4 hrs.
LR.		$1000M\Omega$ or $10M\Omega$ ' μ F ,	Perform initial measurement * 150% for 500V
Withstanding voltage	whichever is	s less.	
Exterior	No defects No abnorma	lities	
	NU ADHUIMA	8	

Tel: 886-2-8221-2898

E-MAIL: faithful@faithfullink.com



Electrical Characteristics

NPO

ltem	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 \pm 2°C at the frequency and
Q	C ≧ $30pF$: Q ≧ 1000 C < $30pF$: Q ≧ $400 + 20 \times C$ (C is nominal capacitance)	voltage. 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

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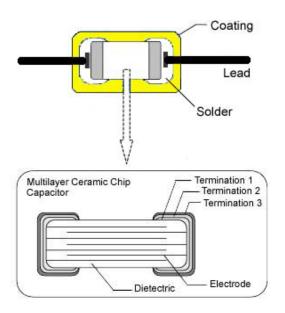


Electrical Characteristics X7R/X5R/Y5V/Z5U

ltem	Hig	h Dielectric Constant	Measuring Condition
Operating Temperature Range	X7R = - 55 ~ + X5R = - 55 ~ + Y5V = - 30 ~ + Z5U = +10 ~ +	85℃ 85℃	
Temperature Characteristics	X7R/X5R= ± Y5V= +22 to - Z5U= +22 to -	82%	
Capacitance	Within the spe	cified tolerance	
	25V min	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	Shall be measured at 25°C± 2°C at the frequency and voltage
Dissipation Factor (tan δ)	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	whichever is le 16Vdc product	:: GΩ or 100ΜΩ · μ F,	Apply rated voltage for 1 minute at 25°C± 2°C and 70% R.H. max. 16Vdc product : Measurement voltage is 25Vdc.



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 \pm 1 sec.	\downarrow \xrightarrow{F}		
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)		

Tel: 886-2-8221-2898 E-MAIL: fai

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NPO								
Item	Temperature Compensating	Measuring Condition						
Resistance to Soldering heat								
ΔC	± 2.5% or ± 0.25pF (Whichever is greater)							
Q	C ≧ $30pF$: Q ≧ 1000 C < $30pF$: Q ≧ $400 + 20 \times C$ (C is nominal capacitance)	The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at 260 \pm 5°C for						
I.R.	More than $10G\Omega$ or $500M\Omega \cdot \mu$ F , whichever is less. 16Vdc product: More than $10G\Omega$ or $100M\Omega \cdot \mu$ F , whichever is less.	10 \pm 0.5sec. Let sit at room temperature for 24 \pm 2 hrs. then measure. Perform the initial measurement.						
Withstanding voltage	No defects							
Exterior	No abnormalities							
Thermal Shock								
ΔC	± 2.5% or ± 0.25pF (Whichever is greater)		pacitor to the					
Q	C \ge 30pF : Q \ge 1000 C < 30pF : Q \ge 400 + 20 × C (C is nominal capacitance)	cycles according to the four heat treatments listed in the following table. Remove and let sit at room temperature for						
	More than 10G Ω_{-} or 500M Ω_{-} μ F , whichever is less.	24 ± 2 hrs., then measure.						
LR.	16Vdc product :	Step	1	2	3	4		
	More than $10G\Omega~$ or $100M\Omega~$ μ F , whichever is less.	Temp. (°C)	Min. Operating	Room Temp.	Max. Operating	Room Temp.		
Withstanding voltage	No defects		Temp.		Temp.			
Exterior	No abnormalities	Time Perform th	30±3 ne initial meas	15 urement.	30±3	15		



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ItemTemperature CompensatingMeasuring ConditionMoisture resistance (Steady state) Δ C $\pm 5\%$ or $\pm 0.5pF$ (Whichever is greater) $\pm 5\%$ or $\pm 0.5pF$ (Whichever is greater) Q $C \ge 3opF : Q \ge 275 + 2/5 \times C$ $10pF > C \ge 200 + 10 \times C$ (C is nominal capacitance)Apply the rated DC voltage at 40 $\pm 2^{12}$ c 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.INVibutement16Vdc product : More than 1000MQ or 10MQ · μ F, whichever is less.Perform the initial measurement.Withstanding voltageNo defectsPerform the initial measurement.High temperature loading $\pm 3\%$ or $\pm 0.3pF$ (Whichever is greater)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. Q $C \ge 30pF : Q \ge 275 + 2/5 \times C$ $C \le 30pF : Q \ge 275 + 2/5 \times C$ $C \le 30pF : Q \ge 275 + 2/5 \times C$ $C \le 30pF : Q \ge 275 + 10 \times C$ $(C is nominal capacitance)Apply 200% of the rated DC voltage for 1000+48/-0 hrs.QLLLLQLLLQLLLQLLLQLLLQLLLQLLLLLLLLLLLLLLLLLLLLLLLQLLL$	NPO						
Δ C \pm 5% or \pm 0.5pF (Whichever is greater)Apply the rated DC voltage at 40 \pm 2°C and 90 to 95% (C is nominal capacitance)Q $C \ge$ 30pF : Q \ge 300 + 10 × C (C is nominal capacitance)Apply the rated DC voltage at 40 \pm 2°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. Hiddever is less.LR.More than 1000MQ or 50MQ · μ F, whichever is less.Remove and let sit at room temperature for 24 \pm 2 hrs., then measure. Perform the initial measurement.Withstanding voltageNo defectsPerform the initial measurement.Mithetwer is less.No abnormalitiesPerform the initial measurement.High temperature loading \pm 3% or \pm 0.3pF (Whichever is greater)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature \pm 2°C. Remove and let sit at room temperature for 24 \pm 2 hrs., then measure.Q \pm 3% or \pm 0.3pF (Whichever is greater)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature \pm 2°C. Remove and let sit at room temperature \pm 2°C. Remove and let sit at room temperature for 24 \pm 2 hrs., then measure.Q E 30pF : Q \ge 350 10pF > C < 30pF : Q \ge 275 +2/5 × C C \subseteq 10pF : Q \ge 275 +2/5 × C C \subseteq 10pF : Q \ge 275 +2/5 × C C \subseteq 10pF : Q \ge 275 +2/5 × C C \subseteq 10pF : Q \ge 275 +2/5 × C C \subseteq 10pF : Q \ge 200 + 10 × C (C is nominal capacitance)LR.More than 1000MQ or 50MQ · μ F, whichever is less.LR.More than 1000MQ or 50MQ · μ F, whichever is less.LR.More than 1000MQ or 50MQ · μ F, whichever is less.H	Item	Temperature Compensating	Measuring Condition				
ΔC (Whichever is greater)(Whichever is greater)	Moisture resistance (Steady state)						
Q10pF > C < 30pF : Q ≥ 275 + 2/5 × C C ≤ 10pF : Q ≥ 200 + 10 × C (C is nominal capacitance)Apply the rated DC voltage at 40 ± 2°C and 90 to 95% R.H. for 500+24/-0 hrs.LR.More than 1000MΩ or 50MΩ · µ F , whichever is less.Remove and let sit at room temperature for 24 ± 2 hrs., then measure.LR.16Vdc product : More than 1000MΩ or 10MΩ · µ F , whichever is less.Perform the initial measurement.Withstanding voltageNo defectsPerform the initial measurement.LR10 so abnormalitiesPerform the initial measurement.ΔC± 3% or ± 0.3pF (Whichever is greater)Apply 200% of the rated DC voltage for 1000+48/-0 hrs.Q2 so 30pF : Q ≥ 275 + 2/5 × C C ≤ 10pF : Q ≥ 200 + 10 × C (C is nominal capacitance)Apply 200% of the rated DC voltage for 1000+48/-0 hrs.LR.More than 1000MΩ or 50MΩ · µ F , whichever is less.More than 1000MΩ or 50MΩ · µ F , whichever is less.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 24 ± 2 hrs., then measure.LR.More than 1000MΩ or 50MΩ · µ F , whichever is less.Perform initial measurement.	ΔC						
I.R.More than 1000MD or 50MD · μ F, whichever is less.24 ± 2 hrs., then measure.I.R.16Vdc product : More than 1000MΩ or 10MΩ · μ F, whichever is less.Perform the initial measurement.Withstanding voltageNo defectsNo abnormalitiesExteriorNo abnormalities	Q	10pF > C < 30pF : Q ≧ 275 + 2/5 × C C ≦ 10pF : Q ≧ 200 + 10 × C	R.H. for 500+24/-0 hrs.				
ExteriorNo abnormalitiesHigh temperature loading ΔC $\pm 3\%$ or $\pm 0.3pF$ (Whichever is greater) ΔC $\pm 3\%$ or $\pm 0.3pF$ (Whichever is greater) ΔC $\pm 3\%$ or $\pm 0.3pF$ (Whichever is greater) ΔC $\pm 3\%$ or $\pm 0.3pF$ 	I.R.	whichever is less. 16Vdc product : More than 1000MΩ or 10MΩ \cdot μ F ,	24 ± 2 hrs., then measure.				
High temperature loading ΔC $\pm 3\% \text{ or } \pm 0.3 \text{ pF}$ (Whichever is greater) α $C \ge 30 \text{ pF} : Q \ge 350$ $10 \text{ pF} > C < 30 \text{ pF} : Q \ge 275 + 2/5 \times C$ $C \le 10 \text{ pF} : Q \ge 200 + 10 \times C$ (C is nominal capacitance) R. More than 1000MQ or 50MQ · μ F, whichever is less. I.R. 16Vdc product : More than 1000MQ or 10MQ : μ E	Withstanding voltage	No defects					
ΔC $\pm 3\% \text{ or } \pm 0.3\text{pF}$ (Whichever is greater)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^{\circ}C$. Remove and let sit at room temperature for 24 ± 2 hrs., then measure.Q. $C \ge 30\text{pF} : Q \ge 200 \pm 10 \times C$ (C is nominal capacitance)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^{\circ}C$. Remove and let sit at room temperature for 24 ± 2 hrs., then measure.I.R.More than 1000MQ or $50MQ \cdot \mu$ F, whichever is less. $16Vdc \text{ product :}$ More than 1000MQ or $10MQ \cdot \mu$ F, where then $1000MQ \cdot \mu$ F, where then	Exterior	No abnormalities					
ΔC (Whichever is greater)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^{\circ}$ C. Remove and let sit at room temperature for 24 ± 2 hrs., then measure. Q More than 1000MQ or 50MQ · μ F, whichever is less.Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^{\circ}$ C. Remove and let sit at room temperature for 24 ± 2 hrs., then measure. I.R. More than 1000MQ or 50MQ · μ F, whichever is less.Perform initial measurement.	High temperature loading						
Q $10pF > C < 30pF : Q \ge 275 + 2/5 \times C$ $C \le 10pF : Q \ge 200 + 10 \times C$ (C is nominal capacitance)Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^{\circ}C$. Remove and let sit at room temperature for 24 ± 2 hrs., then measure.I.R.More than 1000MQ or $50MQ \cdot \mu F$, whichever is less.Apply 200% of the rated DC voltage for 1000+48/-0 hrs. at the maximum operating temperature $\pm 2^{\circ}C$. Remove and let sit at room temperature for 24 ± 2 hrs., then measure.I.R.More than 1000MQ or $50MQ \cdot \mu F$, whichever is less.Perform initial measurement.	ΔC	•					
More than 1000MΩ or $50MΩ \cdot µ F$, whichever is less.The charge/discharge current is less than 50mA.L.R.16Vdc product : More than 1000MΩ or 10MΩ : µ FPerform initial measurement.	Q	10pF > C < 30pF : Q ≧ 275 +2/5 × C C ≦ 10pF : Q ≧ 200 + 10 × C	at the maximum operating temperature \pm 2°C. Remove and let sit at room temperature for 24 \pm 2 hrs., then				
whichever is less.	I.R.	whichever is less. 16Vdc product : More than 1000MΩ or 10MΩ \cdot µ F ,	The charge/discharge current is less than 50mA.				
Withstanding voltage No defects	Withstanding voltage	No defects					
Exterior No abnormalities	Exterior	No abnormalities					



Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Temperature Compensating			Measuring Condition				
Resistance to Soldering Heat								
ΔC	X7R/X5R= Y5V= ± 20 Z5U= ± 20	%						
	25V min	X7R=0.03max. Y5V=0.075max. Z5U=.0.09max.	The lead wire is immersed in the melted solder 1.5mm to 2mm from the main body at 260 \pm 5°C for 10 \pm					
D.F	16V	X7R/X5R=0.05max. Y5V=0.10max.	0.5sec. Let sit at measure.	room temp	perature fo	or 48 ± 4h	rs. , then	
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.	Initial mea	asurement fo	or Perforn	n a heat tre	atment at	
	6.3V	X5R=0.075max.	150+0/-10	°C for 1 hou	r.			
l.R.	More than 1 whichever is 16Vdc prode More than 1 whichever is	Remove and let sit for 48 ± 4 hours at room temperature. Perform the initial measurement.						
Withstanding voltage	No defects							
Exterior	No abnorma	alities						
Thermal Shock								
ΔC	X7R/X5R= Y5V= ± 20 Z5U= ± 20	%	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					
	25V min	X7R=0.03max. Y5V=0.075max. Z5U=0.09max.	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.					
D.F	16V	X7R/X5R=0.05max. Y5V=0.10max.		1	2	3	4	
	10V max.	X7R/X5R=0.05max. Y5V=0.125max.	Temp.	Min. Operating	Room	Max. Operating	Room	
	6.3V	X5R=0.075max.	(°C)	Temp.	Temp.	Temp.	Temp.	
	is less.	$0G\Omega~$ or $500M\Omega\cdot~\mu$ F , whichever	Time 30±3 15 30±3 15					
I.R.	16Vdc prod More than 1 is less.	Initial measurement for Perform a heat treatment at 150+0/-10 °C for 1 hour. Remove and let sit for 48 ± 4 hrs. At room temperature.						
Withstanding voltage	No defects		Perform th	e initial mea	surement.			
Exterior	No abnorma	alities.						



Environmental and Test Characteristics X7R/X5R/Y5V/Z5U

Item	Temperature Compensating		Measuring Condition			
Moisture resistance (Steady state)						
ΔC	X7R/X5R= ± Y5V= ± 30% Z5U= ± 30%					
	25V min	X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.	Apply the rated DC voltage at 40 \pm 2°C and 90 to 95%			
D.F	16V	X7R/X5R=0.10max. Y5V=0.15max.	R.H. for 500 +24/-0hrs. Remove and let sit at room temperature for			
	10V max.	X7R/X5R=0.10max. Y5V=0.1875max.	48 ± 4 hrs. , then measure. Initial measurement for Perform a heat treatment at			
	6.3V	X5R=0.15max.	150+0/-10 °C for 1 hour.			
l.R.	whichever is 16Vdc produ	ct: 1000ΜΩ or 10ΜΩ·μF,	Remove and let sit for 48±4 hrs. At room temperature. Perform the initial measurement.			
Withstanding voltage	No defects					
Exterior	No abnormalities					
High Temperature loading						
ΔC	X7R/X5R= ± Y5V= ± 30% Z5U= ± 30%		Apply 200% of the rated DC voltage for 4000+40			
	25V min	X7R=0.06max. Y5V=0.1125max. Z5U=0.135max.	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.			
D.F	16V	X7R/X5R=0.10max. Y5V=0.15max.	then measure. The charge/discharge current is less than 50mA.			
	10V max.	X7R/X5R=0.10max. Y5V=0.1875max.	Initial measurement for Apply 200% of the rated DC			
	6.3V	X5R=0.15max.	voltage for 1 hour at the maximum operating			
I.R.	More than $1000M\Omega$ or $50M\Omega \cdot \mu$ F , whichever is less. 16Vdc product: More than $1000M\Omega$ or $10M\Omega \cdot \mu$ F , whichever is less.		temperature ±2 °C . Remove and let sit at room temperature for 48 ± 4 hrs. Perform initial measurement * 150% for 500V			
Withstanding voltage	No defects					
Exterior	No abnormal	ities				