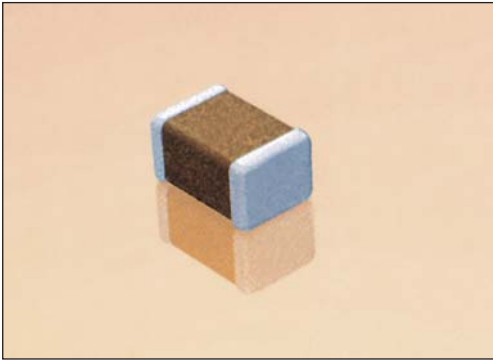


X5R Dielectric

General Specifications



GENERAL DESCRIPTION

- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within $\pm 15\%$ from -55°C to $+85^{\circ}\text{C}$
- Well suited for decoupling and filtering applications
- Available in High Capacitance values (up to $100\mu\text{F}$)

PART NUMBER (see page 2 for complete part number explanation)

1210

Size
(L" x W")

4

Voltage
4 = 4V
6 = 6.3V
Z = 10V
Y = 16V
3 = 25V
D = 35V
5 = 50V

D

Dielectric
D = X5R

107

Capacitance Code (In pF)
2 Sig. Digits + Number of Zeros

M

Capacitance Tolerance
K = $\pm 10\%$
M = $\pm 20\%$

A

Failure Rate
A = N/A

T

Terminations
T = Plated Ni and Sn

2

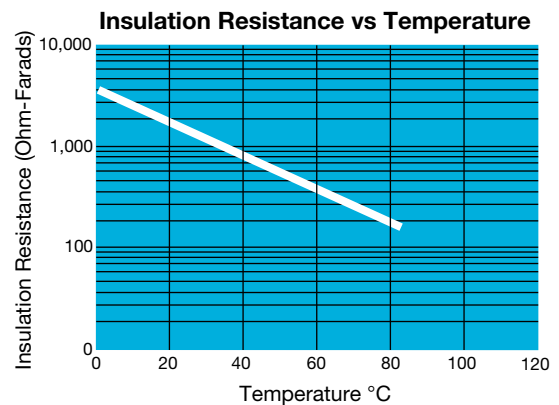
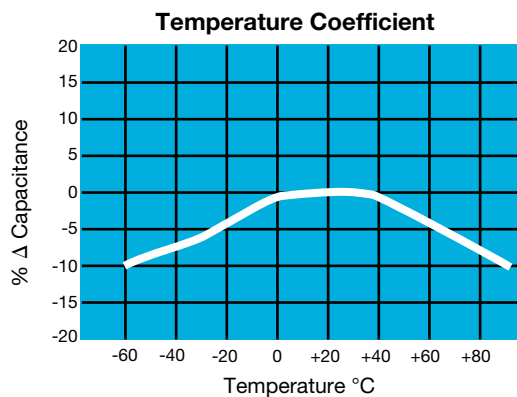
Packaging
2 = 7" Reel
4 = 13" Reel
7 = Bulk Cass.
9 = Bulk

A

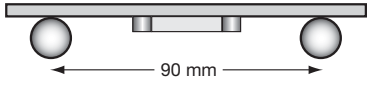
Special Code
A = Std.

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.

TYPICAL ELECTRICAL CHARACTERISTICS



Specifications and Test Methods

Parameter/Test		X5R Specification Limits	Measuring Conditions	
Operating Temperature Range		-55°C to +85°C	Temperature Cycle Chamber	
Capacitance		Within specified tolerance	Freq.: 1.0 kHz $\pm$ 10% Voltage: 1.0Vrms $\pm$.2V For Cap > 10 μ F, 0.5Vrms @ 120Hz	
Dissipation Factor		$\leq$ 2.5% for $\geq$ 50V DC rating $\leq$ 3.0% for 25V DC rating $\leq$ 12.5% Max. for 16V DC rating and lower Contact Factory for DF by PN		
Insulation Resistance		10,000M Ω or 500M Ω - μ F, whichever is less		
Dielectric Strength		No breakdown or visual defects	Charge device with rated voltage for 120 $\pm$ 5 secs @ room temp/humidity Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max)	
Resistance to Flexure Stresses	Appearance	No defects	Deflection: 2mm Test Time: 30 seconds  1mm/sec 90 mm	
	Capacitance Variation	$\leq \pm 12\%$		
	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	$\geq$ Initial Value x 0.3		
Solderability		$\geq$ 95% of each terminal should be covered with fresh solder	Dip device in eutectic solder at 230 $\pm$ 5°C for 5.0 $\pm$ 0.5 seconds	
Resistance to Solder Heat	Appearance	No defects, <25% leaching of either end terminal	Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 $\pm$ 2 hours before measuring electrical properties.	
	Capacitance Variation	$\leq \pm 7.5\%$		
	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	Meets Initial Values (As Above)		
	Dielectric Strength	Meets Initial Values (As Above)		
Thermal Shock	Appearance	No visual defects	Step 1: -55°C $\pm$ 2°	30 $\pm$ 3 minutes
	Capacitance Variation	$\leq \pm 7.5\%$	Step 2: Room Temp	$\leq$ 3 minutes
	Dissipation Factor	Meets Initial Values (As Above)	Step 3: +85°C $\pm$ 2°	30 $\pm$ 3 minutes
	Insulation Resistance	Meets Initial Values (As Above)	Step 4: Room Temp	$\leq$ 3 minutes
	Dielectric Strength	Meets Initial Values (As Above)	Repeat for 5 cycles and measure after 24 $\pm$ 2 hours at room temperature	
Load Life	Appearance	No visual defects	Charge device with 1.5X rated voltage in test chamber set at 85°C $\pm$ 2°C for 1000 hours (+48, -0). Note: Contact factory for *optional specification part numbers that are tested at < 1.5X rated voltage. Remove from test chamber and stabilize at room temperature for 24 $\pm$ 2 hours before measuring.	
	Capacitance Variation	$\leq \pm 12.5\%$		
	Dissipation Factor	$\leq$ Initial Value x 2.0 (See Above)		
	Insulation Resistance	$\geq$ Initial Value x 0.3 (See Above)		
	Dielectric Strength	Meets Initial Values (As Above)		
Load Humidity	Appearance	No visual defects	Store in a test chamber set at 85°C $\pm$ 2°C/ 85% $\pm$ 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature and humidity for 24 $\pm$ 2 hours before measuring.	
	Capacitance Variation	$\leq \pm 12.5\%$		
	Dissipation Factor	$\leq$ Initial Value x 2.0 (See Above)		
	Insulation Resistance	$\geq$ Initial Value x 0.3 (See Above)		
	Dielectric Strength	Meets Initial Values (As Above)		

X5R Dielectric

Capacitance Range



PREFERRED SIZES ARE SHADED

SIZE		0101*			0201			0402					0603					0805					1206					1210					1812								
Soldering		Reflow Only			Reflow Only			Reflow/Wave					Reflow/Wave					Reflow/Wave					Reflow/Wave					Reflow Only					Reflow Only								
Packaging		Paper/Embossed			All Paper			All Paper					All Paper					Paper/Embossed					Paper/Embossed					Paper/Embossed					All Embossed								
(L) Length	mm	0.40 ± 0.02			0.60 ± 0.03			1.00 ± 0.10					1.60 ± 0.15					2.01 ± 0.20					3.20 ± 0.20					3.20 ± 0.20					4.50 ± 0.30								
	(in.)	(0.016 ± 0.0008)			(0.024 ± 0.001)			(0.040 ± 0.004)					(0.063 ± 0.006)					(0.079 ± 0.008)					(0.126 ± 0.008)					(0.126 ± 0.008)					(0.177 ± 0.012)								
(W) Width	mm	0.20 ± 0.02			0.30 ± 0.03			0.50 ± 0.10					0.81 ± 0.15					1.25 ± 0.20					1.60 ± 0.20					2.50 ± 0.20					3.20 ± 0.20								
	(in.)	(0.008 ± 0.0008)			(0.011 ± 0.001)			(0.020 ± 0.004)					(0.032 ± 0.006)					(0.049 ± 0.008)					(0.063 ± 0.008)					(0.098 ± 0.008)					(0.126 ± 0.008)								
(t) Terminal	mm	0.10 ± 0.04			0.15 ± 0.05			0.25 ± 0.15					0.35 ± 0.15					0.50 ± 0.25					0.50 ± 0.25					0.50 ± 0.25					0.61 ± 0.36								
	(in.)	(0.004 ± 0.016)			(0.006 ± 0.002)			(0.010 ± 0.006)					(0.014 ± 0.006)					(0.020 ± 0.010)					(0.020 ± 0.010)					(0.020 ± 0.010)					(0.024 ± 0.014)								
WDC		6.3	10		4	6.3	10	16	25	50	4	6.3	10	16	25	35	50	6.3	10	16	25	35	50	6.3	10	16	25	35	50	100	4	6.3	10	16	25	35	50	6.3	10	25	50
Cap (pF)	100			B																																					
	150			B																																					
	220			B													C																								
	330			B													C																								
	470			B													C																								
	680			B													C																								
	1000			B													C																								
	1500		B	B													C																								
	2200		B	B				A	A	A							C																								
	3300		B	B																																					
	4700		B	B													C																								
	6800		B	B													C																								
Cap (μF)	0.010		B	B																																					
	0.015		B														G	G																							
	0.022		B														G	G																							
	0.033		B														G	G																							
	0.047		B														G	G																							
	0.068		B														G	G																							
	0.10		B																																						
	0.15																G	G																							
	0.22																G	G																							
	0.33																																								
	0.47																G	G																							
	0.68																G	G																							
	1.0																G	G																							
	1.5																G	G																							
	2.2																G	G																							
	3.3																																								
	4.7																																								
	10																																								
	22																																								
	47																																								
	100																																								
WDC		6.3	10		4	6.3	10	16	25	50	4	6.3	10	16	25	35	50	6.3	10	16	25	35	50	6.3	10	16	25	35	50	100	4	6.3	10	16	25	35	50	6.3	10	25	50

Diagram of a rectangular capacitor with dimensions L (length), W (width), and T (thickness) labeled.

SIZE	0101*			0201			0402					0603					0805					1206					1210					1812							
Letter	A	B		C			E				G				J			K																					
Max. Thickness	0.33 (0.013)	0.22 (0.009)		0.56 (0.022)			0.71 (0.028)				0.90 (0.035)				0.94 (0.037)			1.02 (0.040)																					
Thickness	PAPER											EMBOSSED																											

= Under Development
 = *Optional Specifications – Contact factory

NOTE: Contact factory for non-specified capacitance values

*EIA 01005

