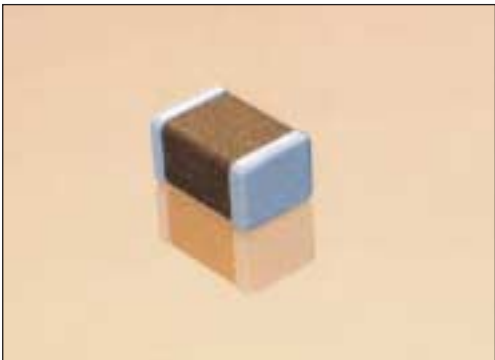


# X5R Dielectric

## General Specifications



### GENERAL DESCRIPTION

- General Purpose Dielectric for Ceramic Capacitors
- EIA Class II Dielectric
- Temperature variation of capacitance is within  $\pm 15\%$  from  $-55^{\circ}\text{C}$  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)

**2220**

**Size**  
(L" x W")

**6**

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

**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

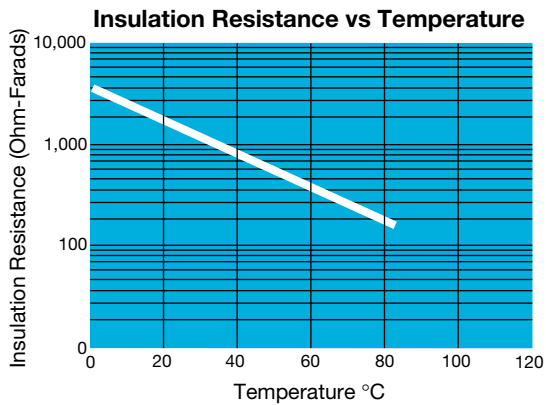
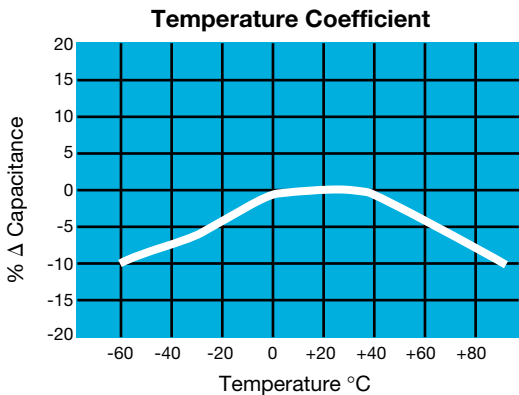
**2**

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

**A**

**Special Code**  
A = Std.

### TYPICAL ELECTRICAL CHARACTERISTICS



## Specifications and Test Methods

Parameter/Test		X5R Specification Limits	Measuring Conditions	
<b>Operating Temperature Range</b>		-55°C to +85°C	Temperature Cycle Chamber	
<b>Capacitance</b>		Within specified tolerance	Freq.: 1.0 kHz $\pm$ 10% Voltage: 1.0Vrms $\pm$ .2V For Cap > 10 $\mu$ F, 0.5Vrms @ 120Hz	
<b>Dissipation Factor</b>		$\leq$ 2.5% for $\geq$ 50V DC rating $\leq$ 3.0% for 25V DC rating $\leq$ 3.5% for 16V DC rating $\leq$ 5.0% for $\leq$ 10V DC rating		
<b>Insulation Resistance</b>		100,000M $\Omega$ or 500M $\Omega$ - $\mu$ F, whichever is less	Charge device with rated voltage for 60 $\pm$ 5 secs @ room temp/humidity	
<b>Dielectric Strength</b>		No breakdown or visual defects	Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max)	
<b>Resistance to Flexure Stresses</b>	Appearance	No defects	Deflection: 2mm Test Time: 30 seconds 	
	Capacitance Variation	$\leq \pm 12\%$		
	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	$\geq$ Initial Value x 0.3		
<b>Solderability</b>		$\geq$ 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	
<b>Resistance to Solder Heat</b>	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)		
<b>Thermal Shock</b>	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	
<b>Load Life</b>	Appearance	No visual defects	Charge device with twice rated voltage in test chamber set at 85°C $\pm$ 2°C for 1000 hours (+48, -0)  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)		
<b>Load Humidity</b>	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)		

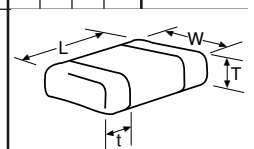
# X5R Dielectric



## Capacitance Range

### PREFERRED SIZES ARE SHADED

SIZE	0201		0402				0603					0805					1206					1210					1812					2220																																																																																																																																																																								
Soldering	Reflow Only		Reflow Only				Reflow/Wave					Reflow/Wave					Reflow/Wave					Reflow/Wave					Reflow Only					Reflow Only																																																																																																																																																																								
Packaging	All Paper		All Paper				All Paper					Paper/Embossed					Paper/Embossed					Paper/Embossed					All Embossed					All Embossed																																																																																																																																																																								
(L) Length	MM (in.) 0.60 ± 0.03 (0.024 ± 0.001)		1.00 ± 0.10 (0.040 ± 0.004)				1.60 ± 0.15 (0.063 ± 0.006)					2.01 ± 0.20 (0.079 ± 0.008)					3.20 ± 0.20 (0.126 ± 0.008)					3.20 ± 0.20 (0.126 ± 0.008)					4.50 ± 0.30 (0.177 ± 0.012)					5.70 ± 0.40 (0.225 ± 0.016)																																																																																																																																																																								
(W) Width	MM (in.) 0.30 ± 0.03 (0.011 ± 0.001)		0.50 ± 0.10 (0.020 ± 0.004)				0.81 ± 0.15 (0.032 ± 0.006)					1.25 ± 0.20 (0.049 ± 0.008)					1.60 ± 0.20 (0.063 ± 0.008)					2.50 ± 0.20 (0.098 ± 0.008)					3.20 ± 0.20 (0.126 ± 0.008)					5.00 ± 0.40 (0.197 ± 0.016)																																																																																																																																																																								
(t) Terminal	MM (in.) 0.15 ± 0.05 (0.006 ± 0.002)		0.25 ± 0.15 (0.010 ± 0.006)				0.35 ± 0.15 (0.014 ± 0.006)					0.50 ± 0.25 (0.020 ± 0.010)					0.50 ± 0.25 (0.020 ± 0.010)					0.50 ± 0.25 (0.020 ± 0.010)					0.61 ± 0.36 (0.024 ± 0.014)					0.64 ± 0.39 (0.025 ± 0.015)																																																																																																																																																																								
WVDC	10		4	6.3	10	16	4	6.3	10	16	25	6.3	10	16	25	35	6.3	10	16	25	35	4	6.3	10	16	25	35	6.3	10	16	25	6.3																																																																																																																																																																								
Cap (pF)	100																									150																									220																									330																									470																									680																																																																										
Cap (pF)	1000																									1200																									1500																									1800																									2200																									2700																																																																										
Cap (pF)	3300																									3900																									4700																									5600																									6800																									8200																																																																										
Cap (μF)	0.010																									0.012																									0.015																									0.018																									0.022																									0.027																																																																										
Cap (μF)	0.033																									0.039																									0.047																									0.056																									0.068																									0.082																																																																										
Cap (μF)	0.10																									0.12																									0.15																									0.18																									0.22																									0.27																																																																										
Cap (μF)	0.33																									0.47																									0.56																									0.68																									0.82																									1.0																																																																										
Cap (μF)	1.2																									1.5																									1.8																									2.2																									3.3																									4.7																									6.8																																																	
Cap (μF)	10																									22																									47																									100																									10																									22																									47																									100																								
WVDC	10		4	6.3	10	16	4	6.3	10	16	25	6.3	10	16	25	35	6.3	10	16	25	35	4	6.3	10	16	25	35	6.3	10	16	25	6.3																																																																																																																																																																								
SIZE	0201	0402				0603					0805					1206					1210					1812					2220																																																																																																																																																																									



Letter	A	C	E	G	J	K	M	N	P	Q	X	Y	Z	BB	CC
Max. Thickness	0.33 (0.013)	0.56 (0.022)	0.71 (0.028)	0.86 (0.034)	0.94 (0.037)	1.02 (0.040)	1.27 (0.050)	1.40 (0.055)	1.52 (0.060)	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)	3.05 (0.120)	3.175 (0.125)
	PAPER					EMBOSSED									

Contact Factory for Multiples

