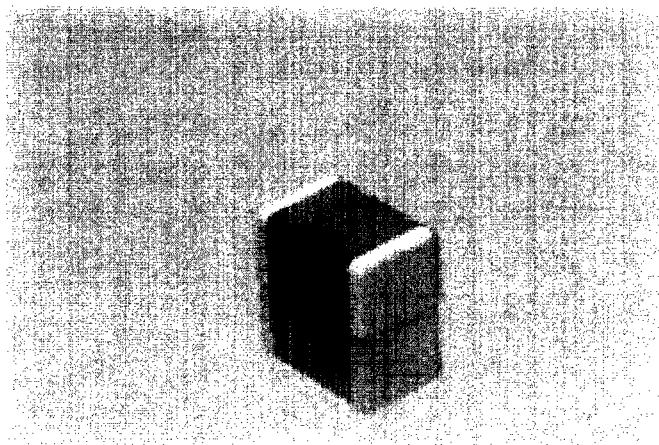


# X7R Dielectric

## General Specifications



X7R formulations are called "temperature-stable" ceramics and fall into EIA Class II materials. X7R is the most popular of these intermediate dielectric-constant materials. Its temperature variation of capacitance is within  $\pm 15\%$  from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ . This capacitance change is non-linear.

Capacitance for X7R varies under the influence of electrical operating conditions such as voltage and frequency. It also varies with time, approximately  $1\% \Delta C$  per decade of time, representing about 5% change in ten years.

X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

PART NUMBER (see page 7 for complete information and options)

<b>0805</b>	<b>5</b>	<b>C</b>	<b>103</b>	<b>M</b>	<b>A</b>	<b>T</b>	<b>2</b>	<b>A</b>
Size (L" x W")	Voltage 10V = Z 16V = Y 25V = 3 50V = 5 100V = 1	Dielectric X7R = C	Capacitance Code	Capacitance Tolerance Preferred M = $\pm 20\%$ K = $\pm 10\%$	Failure Rate A = Not Applicable	Terminations T = Plated Ni and Solder	Packaging 2 = 7" Reel Paper/Unmarked	Special Code A = Std. Product

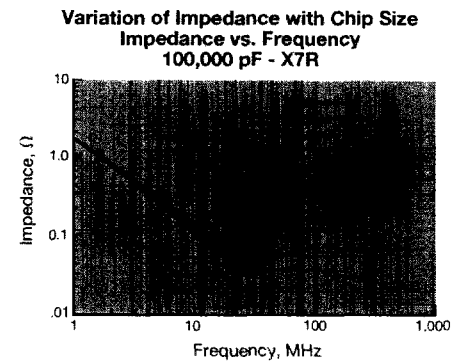
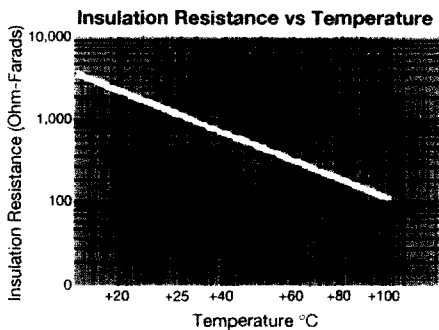
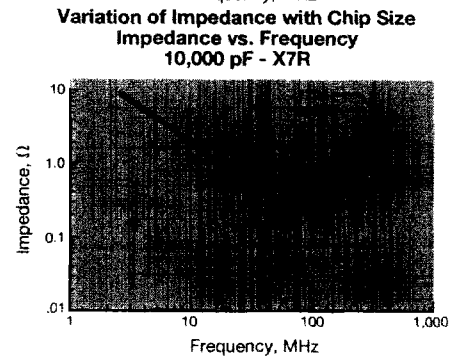
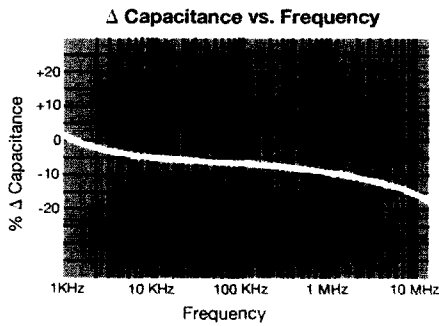
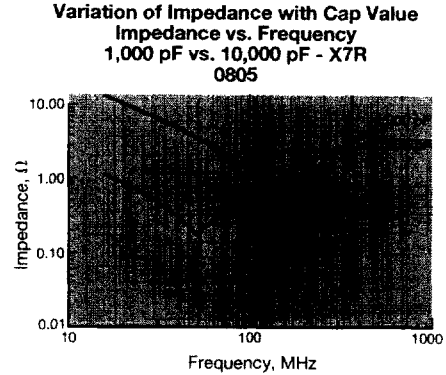
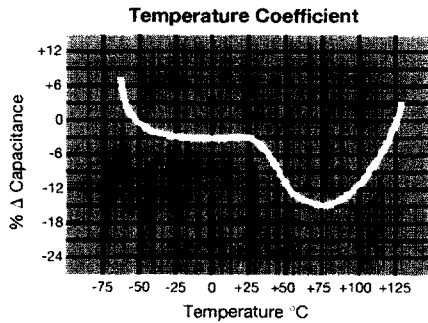
## PERFORMANCE CHARACTERISTICS

<b>Capacitance Range</b>	100 pF to 2.2 $\mu\text{F}$ (1.0 $\pm 0.2$ Vrms, 1kHz)
<b>Capacitance Tolerances</b>	Preferred $\pm 10\%$ , $\pm 20\%$ others available: $\pm 5\%$ , +80 -20%
<b>Operating Temperature Range</b>	$-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
<b>Temperature Characteristic</b>	$\pm 15\%$ (0 VDC)
<b>Voltage Ratings</b>	10, 16, 25, 50, 100 VDC ( $+125^{\circ}\text{C}$ )
<b>Dissipation Factor</b>	For 50 volts and 100 volts: 2.5% max. For 25 volts: 3.0% max. For 16 volts: 3.5% max. For 10 volts: 5% max.
<b>Insulation Resistance</b> ( $+25^{\circ}\text{C}$ , RVDC)	100,000 megohms min. or 1000 $\text{M}\Omega$ - $\mu\text{F}$ min., whichever is less
<b>Insulation Resistance</b> ( $+125^{\circ}\text{C}$ , RVDC)	10,000 megohms min. or 100 $\text{M}\Omega$ - $\mu\text{F}$ min., whichever is less
<b>Aging Rate</b>	$\approx 1\%$ per decade hour
<b>Dielectric Strength</b>	250% of rated voltage for 5 seconds at 50 mamp max. current
<b>Test Voltage</b>	1.0 $\pm 0.2$ Vrms
<b>Test Frequency</b>	1 KHz

# X7R Dielectric



## Typical Characteristic Curves\*\*



### SUMMARY OF CAPACITANCE RANGES VS. CHIP SIZE

Style	10V	16V	25V	50V	100V
0402*	—	100pF - 47nF	100pF - 6.8nF	100pF - 3.9nF	—
0504	—	—	—	100pF - .01 $\mu$ F	100pF - 3.3nF
0603*	100pF - 0.22 $\mu$ F	100pF - 0.1 $\mu$ F	100pF - 47nF	100pF - 15nF	100pF - 4.7nF
0805*	100pF - 1 $\mu$ F	100pF - 0.47 $\mu$ F	100pF - 0.22 $\mu$ F	100pF - 0.1 $\mu$ F	100pF - 22nF
1206*	1.5 $\mu$ F - 2.2 $\mu$ F	1nF - 1 $\mu$ F	1nF - 0.47 $\mu$ F	1nF - 0.22 $\mu$ F	1nF - 0.1 $\mu$ F
1210*	→	1nF - 1.8 $\mu$ F	1nF - 1 $\mu$ F	1nF - 0.22 $\mu$ F	1nF - 0.1 $\mu$ F
1505	→	→	→	1nF - 0.1 $\mu$ F	1nF - 27nF
1808	→	→	10nF - 0.33 $\mu$ F	10nF - 0.33 $\mu$ F	10nF - 0.1 $\mu$ F
1812*	→	→	→	10nF - 1 $\mu$ F	10nF - 0.47 $\mu$ F
1825*	→	→	→	10nF - 1 $\mu$ F	10nF - 0.47 $\mu$ F
2220	→	→	→	10nF - 1.5 $\mu$ F	10nF - 1.2 $\mu$ F
2225	→	→	→	10nF - 2.2 $\mu$ F	10nF - 1.5 $\mu$ F

\* Standard Sizes

\*\*For additional information on performance changes with operating conditions consult AVX's software SpiCap.



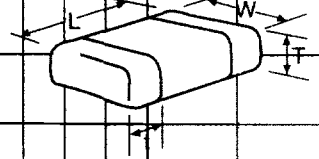
# X7R Dielectric

## Capacitance Range



PREFERRED SIZES ARE SHADED

SIZE	0402*		0504*		0603*		0605		1206		1505							
	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)	MM (in.)						
(L) Length	1.00 ± .10 (.040 ± .004)	1.27 ± .25 (.050 ± .010)	1.60 ± .15 (.063 ± .006)	2.01 ± .20 (.079 ± .008)	3.20 ± .20 (.126 ± .008)	3.81 ± .25 (.150 ± .010)												
(W) Width	.50 ± .10 (.020 ± .004)	1.02 ± .25 (.040 ± .010)	.81 ± .15 (.032 ± .006)	1.25 ± .20 (.049 ± .008)	1.60 ± .20 (.063 ± .008)	1.27 ± .25 (.050 ± .010)												
(T) Max. Thickness	.60 (.024)	1.02 (.040)	.90 (.035)	1.30 (.051)	1.50 (.059)	1.27 (.050)												
(t) Terminal	.25 ± .15 (.010 ± .006)	.38 ± .13 (.015 ± .005)	.35 ± .15 (.014 ± .006)	.50 ± .25 (.020 ± .010)	.50 ± .25 (.020 ± .010)	.50 ± .25 (.020 ± .010)												
WVDC	16	25	50	50	100	10	16	25	50	100	10	16	25	50	100	50	100	
Cap. (pF)	100 120 150																	
	180 220 270																	
	330 390 470																	
	560 680 820																	
	1000 1200 1500																	
	1800 2200 2700																	
	3300 3900 4700																	
	5600 6800 8200																	
Cap. (μF)	.010 .012 .015																	
	.018 .022 .027																	
	.033 .039 .047																	
	.066 .068 .082																	
	.10 .12 .15																	
	.18 .22 .27																	
	.33 .47 .56																	
	.68 .82 1.0																	
	1.2 1.5 1.8																	
	2.2																	



\*IR and vapor phase soldering only recommended.

NOTES:  
For higher voltage chips, see pages 24 and 25.



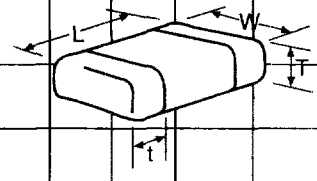
# X7R Dielectric

## Capacitance Range



PREFERRED SIZES ARE SHADED

SIZE		1210				1808*			1812*		1825*		2220			2225*	
(L) Length	MM (in.)	3.20 ± .20 (.126 ± .008)				4.57 ± .25 (.180 ± .010)			4.50 ± .30 (.177 ± .012)		4.50 ± .30 (.177 ± .012)		5.7 ± 0.4 (.225 ± .016)			5.72 ± .25 (.225 ± .010)	
(W) Width	MM (in.)	2.50 ± .20 (.098 ± .008)				2.03 ± .25 (.080 ± .010)			3.20 ± .20 (.126 ± .008)		6.40 ± .40 (.252 ± .016)		5.0 ± 0.4 (.197 ± .016)			6.35 ± .25 (.250 ± .010)	
(T) Max. Thickness	MM (in.)	1.70 (.067)				1.52 (.060)			1.70 (.067)		1.70 (.067)		2.30 (.090)			1.70 (.067)	
(t) Terminal	MM (in.)	.50 ± .25 (.020 ± .010)				.64 ± .39 (.025 ± .015)			.61 ± .36 (.024 ± .014)		.61 ± .36 (.024 ± .014)		.64 ± .39 (.025 ± .015)			.64 ± .39 (.025 ± .015)	
WVDC		16	25	50	100	25	50	100	50	100	50	100	50	100	200	50	100
Cap. (pF)	1000	Shaded															
	1200	Shaded															
	1500	Shaded															
	1800	Shaded															
	2200	Shaded															
	2700	Shaded															
	3300	Shaded															
	3900	Shaded															
	4700	Shaded															
	5600	Shaded															
	6800	Shaded															
	8200	Shaded															
Cap. (µF)	.010	Shaded															
	.012	Shaded															
	.015	Shaded															
	.018	Shaded															
	.022	Shaded															
	.027	Shaded															
	.033	Shaded															
	.039	Shaded															
	.047	Shaded															
	.066	Shaded															
	.068	Shaded															
	.082	Shaded															
	.10	Shaded															
	.12	Shaded															
	.15	Shaded															
	.18	Shaded															
	.22	Shaded															
	.27	Shaded															
	.33	Shaded															
	.39	Shaded															
	.47	Shaded															
	.56	Shaded															
	.66	Shaded															
	.82	Shaded															
	1.0	Shaded															
	1.2	Shaded															
	1.5	Shaded															
	1.8	Shaded															
	2.2	Shaded															



\*IR and vapor phase soldering only recommended.

NOTES:

For higher voltage chips, see pages 24 and 25.