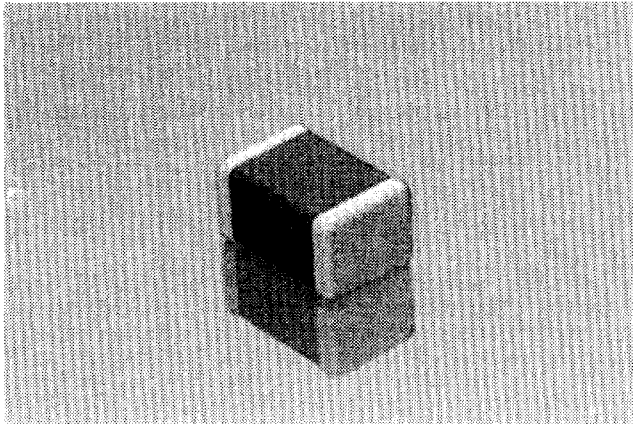


X7R Dielectric General Specifications



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°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 3 for complete information and options)

0805

Size
(L" x W")

5

Voltage
16V = Y
25V = 3
50V = 5
100V = 1

C

Dielectric
X7R = C

103

Capacitance
Code

M

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

A

Failure
Rate

T

Terminations
T = Plated Ni
and Solder

2

Marking
Packaging
2 = 7" Reel
Paper/Unmarked

A

Special
Code
A = Std.
Product

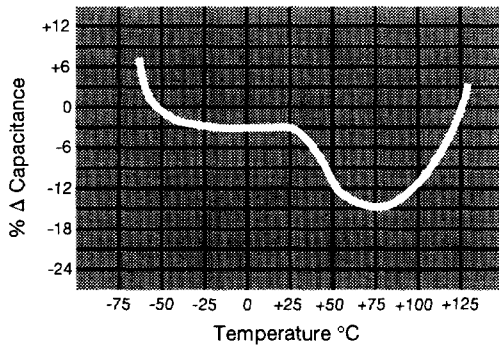
Performance Characteristics

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

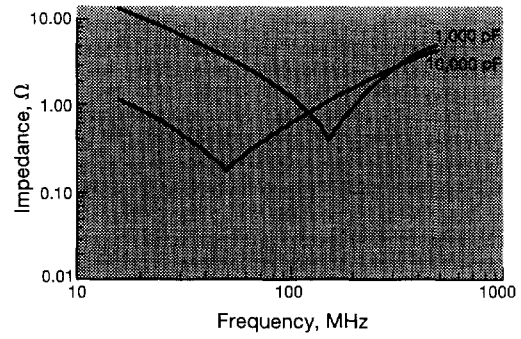
X7R Dielectric Typical Characteristic Curves



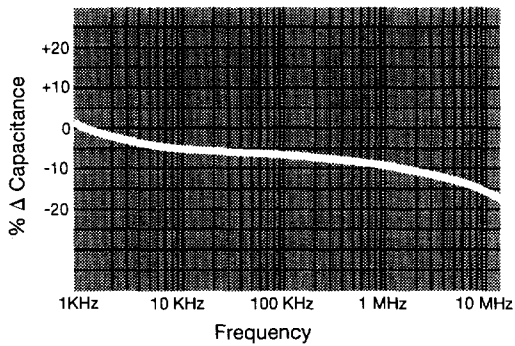
Temperature Coefficient



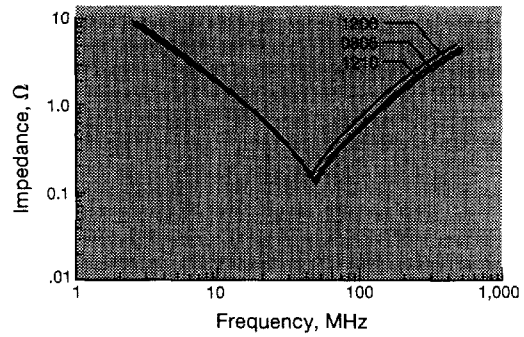
**Variation of Impedance with Cap Value
Impedance vs. Frequency
1,000 pF vs. 10,000 pF - X7R
0805**



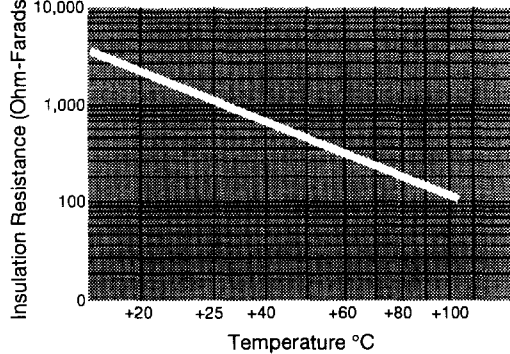
Δ Capacitance vs. Frequency



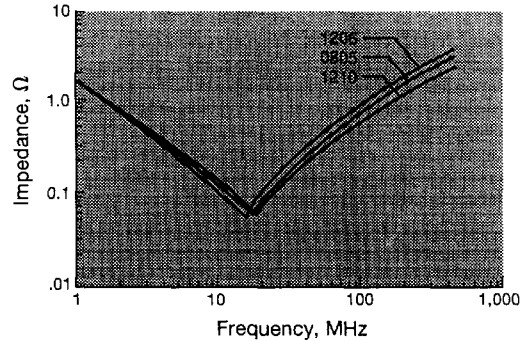
**Variation of Impedance with Chip Size
Impedance vs. Frequency
10,000 pF - X7R**



Insulation Resistance vs Temperature



**Variation of Impedance with Chip Size
Impedance vs. Frequency
100,000 pF - X7R**

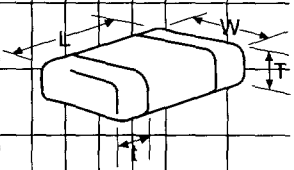


X7R Dielectric Capacitance Range



Preferred Sizes are Shaded

SIZE	0402*			0504*		0603*					0805					1005			0907			1206					1505		
	MM (in.)																												
(L) Length	.60 (.024)	.25 - .15 (.010 - .006)		.38 - .13 (.015 - .005)		.35 - .15 (.014 - .006)					.50 - .25 (.020 - .010)					.50 - .25 (.020 - .010)			.50 - .25 (.020 - .010)			1.60 - .20 (.063 - .008)					3.81 - .25 (.150 - .010)		
(W) Width	.60 (.024)	.25 - .15 (.010 - .006)		.38 - .13 (.015 - .005)		.35 - .15 (.014 - .006)					.50 - .25 (.020 - .010)					.50 - .25 (.020 - .010)			.50 - .25 (.020 - .010)			1.60 - .20 (.063 - .008)					3.81 - .25 (.150 - .010)		
(T) Max. Thickness	.60 (.024)	.25 - .15 (.010 - .006)		.38 - .13 (.015 - .005)		.35 - .15 (.014 - .006)					.50 - .25 (.020 - .010)					.50 - .25 (.020 - .010)			.50 - .25 (.020 - .010)			1.60 - .20 (.063 - .008)					3.81 - .25 (.150 - .010)		
(t) Terminal	.60 (.024)	.25 - .15 (.010 - .006)		.38 - .13 (.015 - .005)		.35 - .15 (.014 - .006)					.50 - .25 (.020 - .010)					.50 - .25 (.020 - .010)			.50 - .25 (.020 - .010)			1.60 - .20 (.063 - .008)					3.81 - .25 (.150 - .010)		
WVDC	16	25	50	50	100	10	16	25	50	100	10	16	25	50	100	25	50	100	25	50	100	10	16	25	50	100	100	50	
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. (F)	.010	.012	.015	.018	.022	.027	.033	.039	.047	.056	.068	.082	.10	.12	.15	.18	.22	.27	.33	.47	.56	.68	.82	1.0	1.2	1.5	1.8		



*IR and vapor phase soldering only recommended.

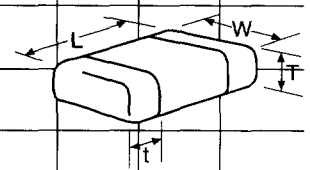
NOTES:
For higher voltage chips, see pages 20 and 21.

X7R Dielectric Capacitance Range



Preferred Sizes are Shaded

SIZE		1805*		1210		1808*		1812*		1825*		2225*	
(L) Length	MM (in.)	4.57 - .25 (.180 - .010)		3.20 - .20 (.126 - .008)		4.57 - .25 (.180 - .010)		4.50 - .30 (.177 - .012)		4.50 - .30 (.177 - .012)		5.72 - .25 (.225 - .010)	
(W) Width	MM (in.)	1.27 - .25 (.050 - .010)		2.50 - .20 (.098 - .008)		2.03 - .25 (.080 - .010)		3.20 - .20 (.126 - .008)		6.40 - .40 (.252 - .016)		6.35 - .25 (.250 - .010)	
(T) Max. Thickness	MM (in.)	1.27 (.050)		1.70 (.067)		1.52 (.060)		1.70 (.067)		1.70 (.067)		1.70 (.067)	
(t) Terminal	MM (in.)	.64 - .39 (.025 - .015)		.50 - .25 (.020 - .010)		.64 - .39 (.025 - .015)		.61 - .36 (.024 - .014)		.61 - .36 (.024 - .014)		.64 - .39 (.025 - .015)	
WVDC		50 100		16 25 50 100		25 50 100		50 100		50 100		50 100	
Cap (pF)	1000	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	1200	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	1500	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	1800	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	2200 2700	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
Cap. (F)	.010	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.012	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.015	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.018	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.022 .027	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
Cap. (F)	.033	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.039	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.047	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.056	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.068	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.082	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.10	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.12	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.15	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
	.18	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded	
.22	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.27	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.33	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.39	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.47	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.56	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.68	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
.82	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
1.0	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
1.2	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
1.5	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
1.8	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		
2.2	Shaded		Shaded		Shaded		Shaded		Shaded		Shaded		



*IR and vapor phase soldering only recommended.

NOTES:
For higher voltage chips, see pages 20 and 21.