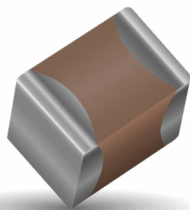


X7R Dielectric

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.

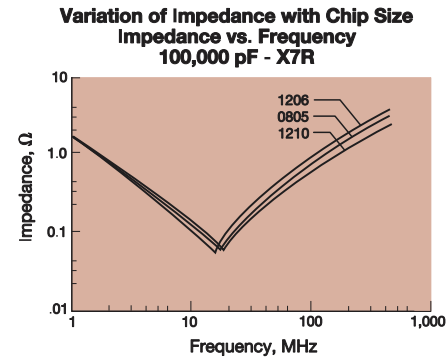
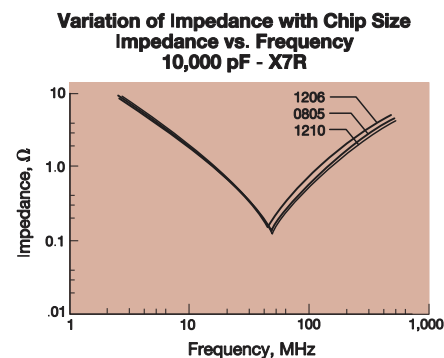
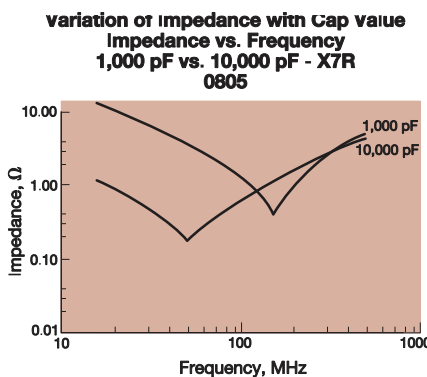
X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.



PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

0805	5	C	103	M	A	T	2	A
Size (L" x W")	Voltage 4V = 4 6.3V = 6 10V = Z 16V = Y 25V = 3 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric X7R = C	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance J = $\pm 5\%$ * K = $\pm 10\%$ M = $\pm 20\%$ * $\leq 1\mu\text{F}$ only, contact factory for additional values	Failure Rate A = Not Applicable	Terminations T = Plated Ni and Sn Z = FLEXITERM®** *Optional termination **See FLEXITERM® X7R section	Packaging 2 = 7" Reel 4 = 13" Reel Contact Factory For Multiples	Special Code A = Std. Product

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



X7R Dielectric

Specifications and Test Methods



Parameter/Test		X7R Specification Limits	Measuring Conditions	
Operating Temperature Range		-55°C to +125°C	Temperature Cycle Chamber	
Capacitance		Within specified tolerance	Freq.: 1.0 kHz $\pm$ 10% Voltage: 1.0Vrms $\pm$.2V For Cap > 10 μ F, 0.5Vrm @ 120Hz	
Dissipation Factor		$\leq$ 10% for $\geq$ 50V DC ratings $\leq$ 12.5% for 25V and 16V DC rating $\leq$ 12.5% for $\leq$ 10V DC rating Contact Factory for DF by PN		
Insulation Resistance		100,000M Ω or 1000M Ω - μ F, whichever is less	Charge device with rated voltage for 120 $\pm$ 5 secs @ room temp/humidity	
Dielectric Strength		No breakdown or visual defects	Charge device with 250% of rated voltage for 1-5 seconds, w/ charge and discharge current limited to 50 mA (max) Note: Charge device with 150% of rated voltage for 500V devices.	
Resistance to Flexure Stresses	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		
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: +125°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	Pre-treatment: After mounting, perform heat treatment 150+0/-10C for 2 hour, then stabilise for 24+/-2 hour at room temp, then measure.	
	Capacitance Variation	$\leq \pm 12.5\%$		
	Dissipation Factor	$\leq$ Initial Value x 2.0 (See Above)	Charge device with $\geq$ rated voltage in test chamber set at 125°C $\pm$ 2°C for 1000 hours (+48, -0).	
	Insulation Resistance	$\geq$ Initial Value x 0.3 (See Above)	Pre-treatment: After remove from test chamber, perform heat treatment 150+0/-10C for 2 hour, then stabilise for 24+/-2 hour at room temp, then measure.	
	Dielectric Strength	Meets Initial Values (As Above)	Contact KYOCERA AVX for datasheet of specific parts.	
Load Humidity	Appearance	No visual defects	Pre-treatment: After mounting, perform heat treatment 150+0/-10C for 2 hour, then stabilise for 24+/-2 hour at room temp, then measure.	
	Capacitance Variation	$\leq \pm 12.5\%$		
	Dissipation Factor	$\leq$ Initial Value x 2.0 (See Above)	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.	
	Insulation Resistance	$\geq$ Initial Value x 0.3 (See Above)	Pre-treatment: After remove from test chamber, perform heat treatment 150+0/-10C for 2 hour, then stabilise for 24+/-2 hour at room temp, then measure.	
	Dielectric Strength	Meets Initial Values (As Above)		

SIZE		0101*						0201						0402						0603						0805						1206											
Soldering		Reflow Only						Reflow Only						Reflow/Wave						Reflow/Wave						Reflow/Wave						Reflow/Wave											
Packaging		Paper/ Embossed						All Paper						All Paper						All Paper						Paper/Embossed						Paper/Embossed											
(L) Length	mm (in.)	0.40 ± 0.02 (0.016 ± 0.0008)						0.60 ± 0.09 (0.024 ± 0.004)						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 ± 0.30 (0.126 ± 0.012)											
(W) Width	mm (in.)	0.20 ± 0.02 (0.008 ± 0.0008)						0.30 ± 0.09 (0.011 ± 0.004)						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 ± 0.30 (0.063 ± 0.012)											
(t) Terminal	mm (in.)	0.10± 0.04 (0.004 ± 0.0016)						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)											
WVDC		16						6.3	10	16	25	50	6.3	10	16	25	50	100	6.3	10	16	25	50	100	200	250	6.3	10	16	25	50	100	200	250	6.3	10	16	25	50	100	200	250	500
Cap 100 101	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J																			G	G	N	N	N	
(pF) 150 151	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J																			G	G	N	N	N	
220 221	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J	E	E	E	E	E	E	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P		
330 331	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P			
470 471	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P			
680 681	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P			
1000 102	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P			
1500 152		A	A	A	A		C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P				
2200 222		A	A	A	A		C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P					
3300 332		A	A	A	A		C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P						
3900 392		A	A	A	A																																						
4700 472		A	A	A	A		C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	P						
5600 562		A	A	A	A																																						
6800 682		A	A	A	A		C	C	C	C	C	C	G	G	G	G	G	J	J		J	J	J	J	J	P	P	J	J	J	J	J	J	N	N	P							
Cap 0.01 103																																											

NOTE: Contact factory for non-specified capacitance values
*EIA 01005
**Contact Factory for Specifications

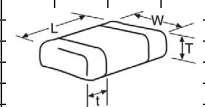
X7R Dielectric

Capacitance Range

PREFERRED SIZES ARE SHADED

SIZE		1210							1812							1825			2220					2225		
Soldering		Reflow Only							Reflow Only							Reflow Only			Reflow Only					Reflow Only		
Packaging		Paper/Embossed							All Embossed							All Embossed			All Embossed					All Embossed		
(L) Length	mm (in.)	3.30 ± 0.4 (0.130± 0.016)							4.50 ± 0.40 (0.177 ± 0.016)							4.50 ± 0.40 (0.177 ± 0.016)			5.70 ± 0.50 (0.224 ± 0.020)					5.70 ± 0.40 (0.224 ± 0.016)		
W) Width	mm (in.)	2.50 ± 0.30 (0.098 ± 0.012)							3.20 ± 0.40 (0.126 ± 0.016)							6.40 ± 0.40 (0.252 ± 0.016)			5.00 ± 0.40 (0.197 ± 0.016)					6.30 ± 0.40 (0.248 ± 0.016)		
(t) Terminal	mm (in.)	0.50 ± 0.25 (0.020 ± 0.010)							0.61 ± 0.36 (0.024 ± 0.014)							0.61 ± 0.36 (0.024 ± 0.014)			0.64 ± 0.39 (0.025 ± 0.015)					0.64 ± 0.39 (0.025 ± 0.015)		
WVDC		10	16	25	50	100	200	500	16	25	50	100	200	500	50	100	200	25	50	100	200	500	50	100	200	
Cap	100 101																									
(pF)	150 151																									
	220 221				K	K	K	M																		
	330 331				K	K	K	M			N	N	N	N												
	470 471				K	K	K	M			N	N	N	N												
	680 681				K	K	K	M			N	N	N	N												
	1000 102	K	K	K	K	K	K	M	N	N	N	N	N	N	X	X	X		X	X	X	X	X	X	X	
	1500 152	K	K	K	K	K	K	M	N	N	N	N	N	N	X	X	X		X	X	X	X	X	X	X	
	2200 222	K	K	K	K	K	K	M	N	N	N	N	N	N	X	X	X		X	X	X	X	X	X	X	
	3300 332	K	K	K	K	K	K	P	N	N	N	N	N	N	X	X	X		X	X	X	X	X	X	X	
	4700 472	K	K	K	K	K	K	P	N	N	N	N	N	P	X	X	X		X	X	X	X	X	X	X	
	6800 682	K	K	K	K	K	K	P	N	N	N	N	N	P	X	X	X		X	X	X	X	X	X	X	
Cap	0.01 103	K	K	K	K	K	K	P	N	N	N	N	N	P	X	X	X		X	X	X	X	X	X	X	
(μF)	0.015 153	K	K	K	K	K	K	P	N	N	N	N	N	P	X	X	X		X	X	X	X	X	X	X	
	0.022 223	K	K	K	K	K	P	Q	N	N	N	N	N	P	X	X	X		X	X	X	X	X	X	X	
	0.033 333	K	K	K	K	K	P	X	N	N	N	N	N	X	X	X	X		X	X	X	X	X	X	X	
	0.047 473	K	K	K	K	K	P	X	N	N	N	N	P	X	X	X	X		X	X	X	X	X	X	X	
	0.068 683	K	K	K	K	K	P	X	N	N	N	N	P	X	X	X	X		X	X	X	X	X	X	X	
	0.1 104	K	K	K	K	K	P	X	N	N	N	P	P	X	X	X	X		X	X	X	X	X	X	X	
	0.15 154	K	K	K	K	M	P	Z	N	N	N	P	P	Z	X	X	X		X	X	X	X	X	X	X	
	0.22 224	K	K	K	M	P	Z		N	N	N	P	Q	Z	X	X	X		X	X	X	X	X	X	X	
	0.33 334	K	K	K	M	Q	Z		N	N	N	P	X	Z	X	X	X		X	X	X	X	X	X	X	
	0.47 474	M	M	M	P	Q	Z		N	N	N	Q	X	Z	X	X	X		X	X	X	X	X	X	X	
	0.68 684	M	M	P	X	X	Z		Q	Q	Q	Q	Z		X	X	X		X	X	X	Z	X	X	X	
	1.0 105	P	P	P	X	Z			Q	Q	Q	X	Z		X	X	X		X	X	X	7	X	X	X	
	1.5 155	N	N	Z	Z	Z				Z	Z	Z			X	X	Z		X	X	Z		X	X	Z	
	2.2 225	X	X	Z	Z	Z				Z	Z	Z			X	X	Z		X	X	Z		X	X	Z	
	3.3 335	X	X	Z	Z	Z				Z	Z	Z			X	X			X	Z			X	X		
	4.7 475	Z	Z	Z	Z	Z				Z	Z	Z			X	X			Z	Z			X	X		
	10 106	Z	Z	Z	Z				Z	Z	Z				Z	Z			Z	Z			Z	Z		
	22 226	Z	Z	Z															Z							
	47 476	Z																								
	100 107																									
WVDC		10	16	25	50	100	200	500	16	25	50	100	200	500	50	100	200	25	50	100	200	500	50	100	200	
SIZE		1210							1812							1825			2220					2225		

A 3D perspective diagram of a rectangular surface-mount capacitor. Dimension lines indicate the following: 'L' for the length of the body, 'W' for the width of the body, and 'T' for the height of the component.



Letter	A	B	C	E	G	J	K	M	N	P	Q	X	Y	Z	7
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)	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)	3.30 (0.130)
PAPER							EMBOSS								

NOTE: Contact factory for non-specified capacitance values