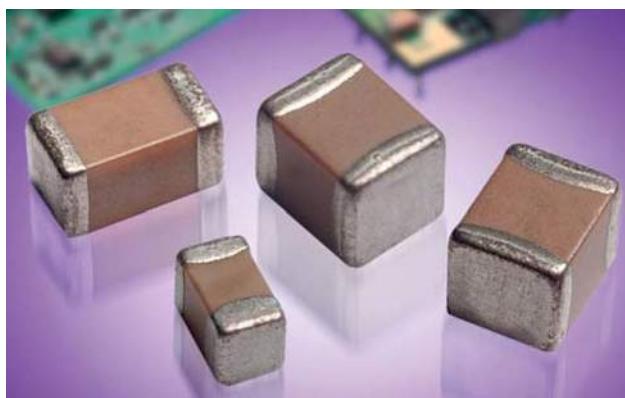


X7R Dielectric General Specifications



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.

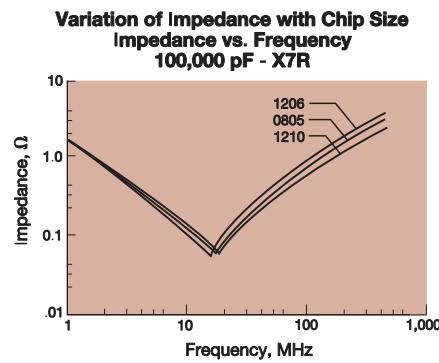
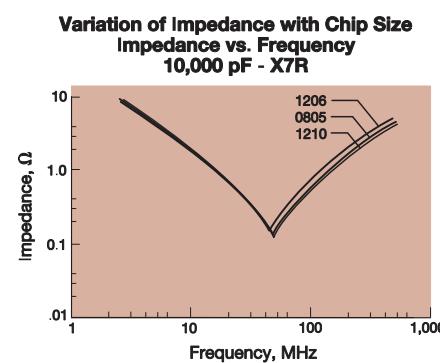
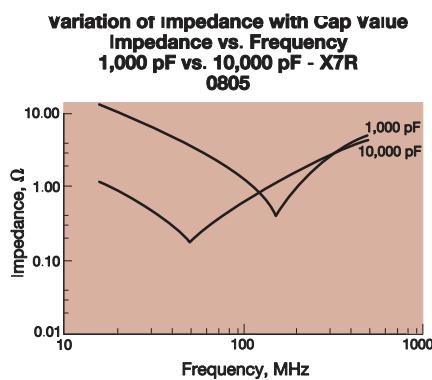
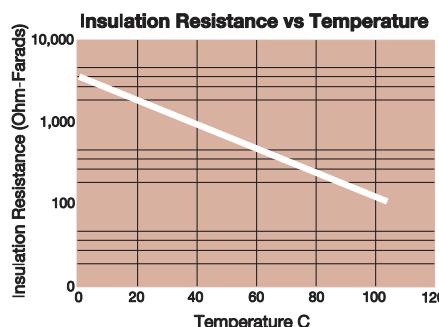
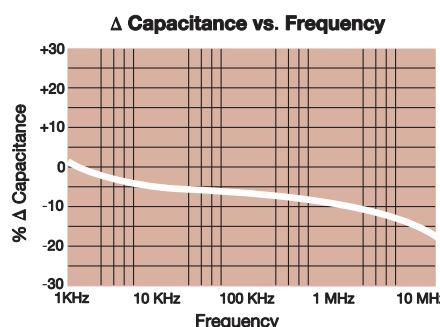
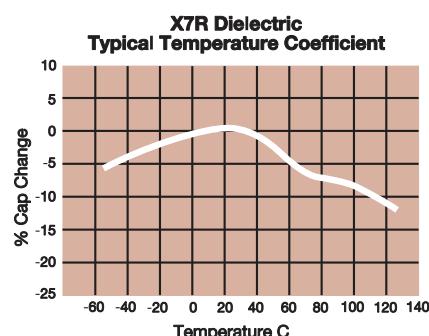
X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.



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

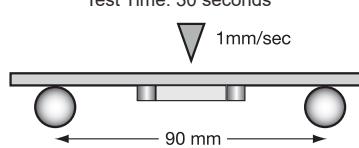
0805	5	C	103	M	A	T	2	A
Size (L" x W")	Voltage 4V = 4 6.3V = 6 10V = Z 16V = Y 25V = 3 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric X7R = C	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance J = $\pm 5\%$ * K = $\pm 10\%$ M = $\pm 20\%$	Failure Rate A = Not Applicable	Terminations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

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				
Dissipation Factor	$\leq 10\%$ for $\geq 50\text{V}$ DC rating $\leq 12.5\%$ for 25V DC rating $\leq 12.5\%$ for 25V and 16V DC rating $\leq 12.5\%$ for $\leq 10\text{V}$ DC rating		Freq.: 1.0 kHz $\pm 10\%$ Voltage: 1.0Vrms $\pm .2\text{V}$ For Cap $> 10\mu\text{F}$, 05Vrm @ 120Hz		
Insulation Resistance	100,000MΩ or 1000MΩ - μF , whichever is less		Charge device with rated voltage for 120 ± 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			
	Capacitance Variation	$\leq \pm 12\%$			
	Dissipation Factor	Meets Initial Values (As Above)			
	Insulation Resistance	\geq Initial Value $\times 0.3$			
Solderability	$\geq 95\%$ of each terminal should be covered with fresh solder		Dip device in eutectic solder at 230 $\pm 5^\circ\text{C}$ for 5.0 ± 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 60seconds. Store at room temperature for 24 ± 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 $\pm 2^\circ$	
	Capacitance Variation	$\leq \pm 7.5\%$		Step 2: Room Temp	
	Dissipation Factor	Meets Initial Values (As Above)		Step 3: +125°C $\pm 2^\circ$	
	Insulation Resistance	Meets Initial Values (As Above)		Step 4: Room Temp	
	Dielectric Strength	Meets Initial Values (As Above)		Repeat for 5 cycles and measure after 24 ± 2 hours at room temperature	
Load Life	Appearance	No visual defects		Charge device with 1.5 rated voltage ($\leq 10\text{V}$) in test chamber set at 125°C $\pm 2^\circ\text{C}$ for 1000 hours (+48, -0) If RV > 10V then Life Test voltage will be 2xRV but there are exceptions (please contact AVX for further details on exceptions) Remove from test chamber and stabilize at room temperature for 24 ± 2 hours before measuring.	
	Capacitance Variation	$\leq \pm 12.5\%$			
	Dissipation Factor	\leq Initial Value $\times 2.0$ (See Above)			
	Insulation Resistance	\geq Initial Value $\times 0.3$ (See Above)			
	Dielectric Strength	Meets Initial Values (As Above)			
Load Humidity	Appearance	No visual defects		Store in a test chamber set at 85°C $\pm 2^\circ\text{C}$ / 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 ± 2 hours before measuring.	
	Capacitance Variation	$\leq \pm 12.5\%$			
	Dissipation Factor	\leq Initial Value $\times 2.0$ (See Above)			
	Insulation Resistance	\geq Initial Value $\times 0.3$ (See Above)			
	Dielectric Strength	Meets Initial Values (As Above)			

X7R Dielectric Capacitance Range



PREFERRED SIZES ARE SHADEd

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 ± 0.03 (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)
(W) Width	mm (in)	0.20 ± 0.02 (0.008 ± 0.0008)	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)
(t) Terminal	mm (in)	0.10 ± 0.04 (0.004 ± 0.016)	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	6.3 10 16 25 50 100 200	6.3 10 16 25 50 100 200	6.3 10 16 25 50 100 200	6.3 10 16 25 50 100 200 500
Cap	100	B	A A A A A	C C C	G G G		
(pF)	150	B	A A A A A	C C C	G G G		
	220	B	A A A A A	C C C	E E E E E		
	330	B	A A A A A	C C C	G G G	J J J J J	
	470	B	A A A A A	C C C	G G G	J J J J J	
	680	B	A A A A A	C C C	G G G	J J J J J	
	1000	B	A A A A A	C C C	G G G	J J J J J	
	1500	B	A A A A A	C C C	G G	J J J J J	J J J J J M
	2200	B	A A A A A	C C C	G G	J J J J J	J J J J J M
	3300	B	A A A A A	C C C	G G	J J J J J	J J J J J M
	4700	B	A A A A A	C C C	G G	J J J J J	J J J J J M
	6800	B	A A A A A	C C C	G G	J J J J J	J J J J J P
Cap	0.01	103	A A A A A	C C C C C	G G G J	J J J J J	J J J J J J P
(pF)	0.015	153		C C C C C	G G G J	J J J J J	J J J J J M Q
	0.022	223		C C C C C	G G G	J J J J J	J J J J J M Q
	0.033	333		C C C C C	G G G J	J J J J J N N	J J J J J J M Q
	0.047	473		C C C C C	G G G J	J J J J J N N	J J J J J J M Q
	0.068	683		C C C C C	G G G J	J J J J J N N	J J J J J J P
	0.1	104		C C C C C	G G G G J	J J J J J N N	J J J J J J P P
	0.15	154			G G G G G	J J J J N N	J J J J J J Q
	0.22	224		C C C C	G G G J J	J J J N N N N	J J J J J J Q
	0.33	334			J J J J J J	N N N N N N	J J J M P Q
	0.47	474		C C	J J J J J J	N N N N N N	M M M P Q
	0.68	684			J J J J J J	N N N N N N	M M M Q Q
	1.0	105			J J J J J J	N N N N N N	M M M Q Q
	2.2	225			J J J J J J	P P P P P	Q Q Q Q Q
	4.7	475			J	P P P	Q Q Q Q Q
	10	106				P P	Q Q X X
	22	226					Q Q Q
	47	476					Q Q X
	100	107					X
WVDC	16	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50 100 200	6.3 10 16 25 50 100 200	6.3 10 16 25 50 100 200	6.3 10 16 25 50 100 200 500
SIZE	0101	0201	0402	0603	0805	1206	

PAPER and EMBOSSED available for 01005

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														
	Reflow Only							Reflow Only							Reflow Only							Reflow Only														
Soldering	Reflow Only							Reflow Only							Reflow Only							Reflow Only														
Packaging	Paper/Embossed							All Embossed							All Embossed							All Embossed														
(L) Length	mm (in.)	3.30 ± 0.4 (0.130 ± 0.016)							4.50 ± 0.30 (0.177 ± 0.012)							4.50 ± 0.30 (0.177 ± 0.012)							5.70 ± 0.40 (0.225 ± 0.016)													
(W) Width	mm (in.)	2.50 ± 0.20 (0.098 ± 0.008)							3.20 ± 0.20 (0.126 ± 0.008)							6.40 ± 0.40 (0.252 ± 0.016)							5.00 ± 0.40 (0.197 ± 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)													
	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	25	50	100	200							
Cap	100	101																																		
(pF)	150	151																																		
	220	221																																		
	330	331																																		
	470	471																																		
	680	681																																		
	1000	102																																		
	1500	152	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	M	M	M	M	X	X	X	X	M	P	P			
	2200	222	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	P	M	M	M	X	X	X	X	M	P	P			
	3300	332	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	P	M	M	M	X	X	X	X	M	P	P			
	4700	472	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	X	M	M	M	X	X	X	X	M	P	P			
	6800	682	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	Z	M	M	M	X	X	X	X	M	P	P			
Cap	0.01	103	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	M	M	M	M	X	X	X	X	M	P	P			
(μF)	0.015	153	J	J	J	J	J	J	J	J	J	J	J	J	P		K	K	K	K	K	K	P	M	M	M	X	X	X	X	M	P	P			
	0.022	223	J	J	J	J	J	J	J	J	J	J	J	J	Q		K	K	K	K	K	K	P	M	M	M	X	X	X	X	M	P	P			
	0.033	333	J	J	J	J	J	J	J	J	J	J	J	J	Q		K	K	K	K	K	K	X	M	M	M	X	X	X	X	M	P	P			
	0.047	473	J	J	J	J	J	J	J	J	J	J	J	J	Q		K	K	K	K	K	K	Z	M	M	M	X	X	X	X	M	P	P			
	0.058	683	J	J	J	J	J	J	J	J	J	J	J	J	M		K	K	K	K	K	K	Z	M	M	M	X	X	X	X	M	P	P			
	0.1	104	J	J	J	J	J	J	J	J	J	J	J	J	X		K	K	K	K	K	K	Z	M	M	M	X	X	X	X	M	P	P			
	0.15	154	J	J	J	J	J	J	J	J	J	J	J	J	Z		K	K	K	K	K	K	P	Z	M	M	M	X	X	X	X	M	P	X		
	0.22	224	J	J	J	J	P	Z									K	K	K	K	K	K	P	Z	M	M	M	X	X	X	X	M	P	X		
	0.33	334	J	J	J	J	Q										K	K	M	X			M	M				X	X	X	X	M	P	X		
	0.47	474	M	M	M	M	Q										K	K	P	X			M	M				X	X	X	X	M	P	X		
	0.68	684	M	M	P	X	X										M	M	Q				M	P				X	X			M	P	X		
	1.0	105	N	N	P	X	Z										M	M	X	Z			M	P				X	X			M	P	X		
	1.5	155	N	N	Z	Z	Z										Z	Z	Z				Q					X	X			M	X	Z		
	2.2	225	X	X	Z	Z	Z										Z	Z	Z									X	X			M	X	Z		
	3.3	335	X	X	Z	Z	Z										Z	Z	Z									X	Z							
	4.7	475	Z	Z	Z	Z											Z	Z	Z									X	Z							
	10	106	Z	Z	Z	Z											Z	Z	Z									Z	Z							
	22	226	Z	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	25	50	100	200	50	100	200				

Letter	A	B	C	E	G	J	K	M	N	P	Q	X	Y	Z
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)
PAPER							EMBOSSED							

NOTE: Contact factory for non-specified capacitance values