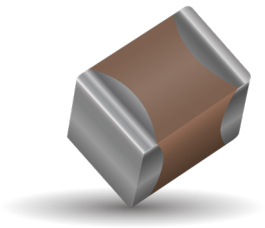
X7R Dielectric

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 ±15% from -55°C to +125°C. This capacitance change is non-linear.

Capacitance for X7R varies under the influence of electrical operating con-ditions such as voltage and frequency.

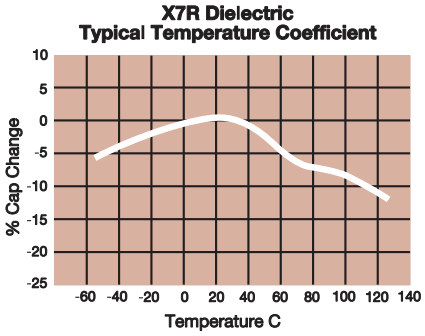
X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

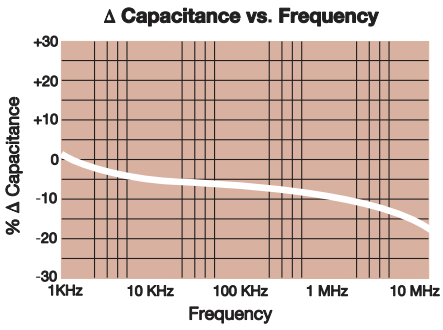
RoHS COMPLIANT

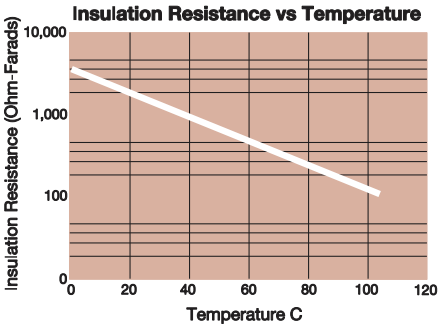
PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

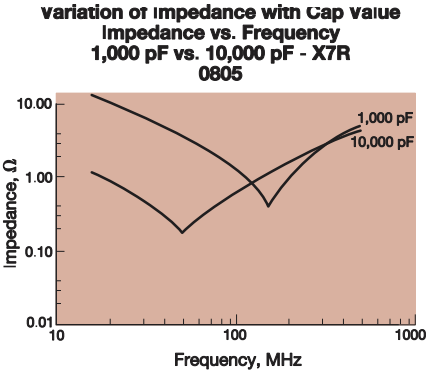
0805	5	C	103	M	A	T	2	A
Size (L” x W”)	**Voltage** 4V = 4 6.3V = 6 10V = Z 16V = Y 25V = 3 50V = 5 100V = 1 200V = 2 500V = 7	**Dielectric** X7R = C	**Capacitance** Code (In pF) 2 Sig. Digits + Number of Zeros	**Capacitance Tolerance** J = ± 5%* K = ±10% M = ± 20% *≤1µF only, contact factory for additional 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

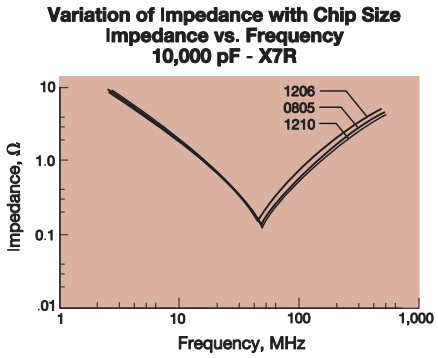
NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers.
Contact factory for non-specified capacitance values.

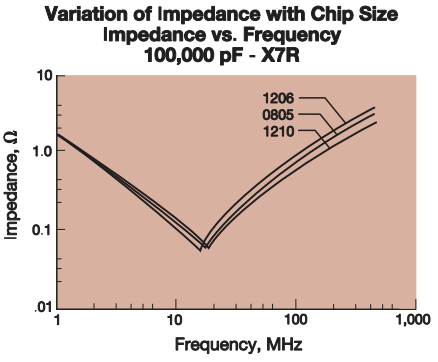












X7R Dielectric

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 ± 10% Voltage: 1.0Vrms ± .2V For Cap > 10µF, 0.5Vrm @ 120Hz	
Dissipation Factor		≤ 10% for ≥ 50V DC rating≤ 12.5% for 25V DC rating ≤ 12.5% for 25V and 16V DC rating ≤ 12.5% for ≤ 10V DC rating Contact Factory for DF by PN		
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	Deflection: 2mm Test Time: 30 seconds	
	Capacitance Variation	≤ ±12%		
	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	≥ Initial Value x 0.3		
Solderability		≥ 95% of each terminal should be covered with fresh solder	Dip device in eutectic solder at 230 ± 5°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 60 seconds. Store at room temperature for 24 ± 2hours before measuring electrical properties.	
	Capacitance Variation	≤ ±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 ± 2°	30 ± 3 minutes
	Capacitance Variation	≤ ±7.5%	Step 2: Room Temp	≤ 3 minutes
	Dissipation Factor	Meets Initial Values (As Above)	Step 3: +125°C ± 2°	30 ± 3 minutes
	Insulation Resistance	Meets Initial Values (As Above)	Step 4: Room Temp	≤ 3 minutes
	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 (≤ 10V) in test chamber set at 125°C ± 2°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	≤ ±12.5%		
	Dissipation Factor	≤ Initial Value x 2.0 (See Above)		
	Insulation Resistance	≥ Initial Value x 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 ± 2°C/ 85% ± 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	≤ ±12.5%		
	Dissipation Factor	≤ Initial Value x 2.0 (See Above)		
	Insulation Resistance	≥ Initial Value x 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	0.40 ± 0.02	0.60 ± 0.09					1.00 ± 0.10						1.60 ± 0.15								2.01 ± 0.20								3.20 ± 0.30								
	(in.)	(0.016 ± 0.0008)	(0.024 ± 0.004)					(0.040 ± 0.004)						(0.063 ± 0.006)								(0.079 ± 0.008)								(0.126 ± 0.012)								
W) Width	mm	0.20 ± 0.02	0.30 ± 0.09					0.50 ± 0.10						0.81 ± 0.15								1.25 ± 0.20								1.60 ± 0.30								
	(in.)	(0.008 ± 0.0008)	(0.011 ± 0.004)					(0.020 ± 0.004)						(0.032 ± 0.006)								(0.049 ± 0.008)								(0.063 ± 0.012)								
(t) Terminal	mm	0.10± 0.04	0.15 ± 0.05					0.25 ± 0.15						0.35 ± 0.15								0.50 ± 0.25								0.50 ± 0.25								
	(in.)	(0.004 ± 0.0016)	(0.006 ± 0.002)					(0.010 ± 0.006)						(0.014 ± 0.006)								(0.020 ± 0.010)								(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	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	G	J	J									G	G	G	G	G	G	N	N	N
	220 221	B	A	A	A	A	A	C	C	C	C	C	C	G	G	G	G	G	G	J	J	E	E	E	E	E	E	E	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	G	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	G	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	G	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	G	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	G	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	G	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	G	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	G	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	G	J	J		J	J	J	J	J	P	P	J	J	J	J	J	J	N	N	P
Cap	0.01 103		A	A	A	A		C	C	C	C	C	C	G	G	G	G	G	G	J	J		J	J	J	J	J	P	P	J	J	J	J	J	J	N	N	P
(µF)	0.012 123																																					
	0.015 153							C	C	C	C	E		G	G	G	G	G	J	J	J		J	J	J	J	J	P	P	J	J	J	J	J	J	N	N	Q
	0.018 183																																					
	0.022 223		A	A	A			C	C	C	C	E		G	G	G	G	G	J	J	J		J	J	J	J	J	P	P	J	J	J	J	J	J	P	P	Q
	0.027 273																																					
	0.033 333							C	C	C	C	E		G	G	G	G	J	J	J			J	J	J	J	P	P	P	J	J	J	J	J	J	Q	Q	Q
	0.039 393																																					
	0.047 473							C	C	C	C	E		G	G	G	G	J	J	J			J	J	J	J	P	P	P	J	J	J	J	J	J	Q	Q	Q
	0.068 683							C	C	C	C	E		G	G	G	G	J	J	J			J	J	J	J	P	P		J	J	J	J	J	P	Q	Q	
	0.082 823																																					
	0.1 104		A					C	C	C	C	E		G	G	G	G	J	J	J			J	J	J	J	P	P		J	J	J	J	J	P	Q	Q	
	0.12 124																																					
	0.15 154													G	G	G	J	J					N	N	N	N	P			K	K	K	K	K	Q	Q	Q	
	0.22 224							C	C	C	C			G	G	J	J	J					N	N	N	N	P			K	K	K	K	K	Q	Q	Q	
	0.33 334													J	J	J	J	J					P	P	P	P	P			K	K	K	K	N	Q			
	0.47 474							C	C					J	J	J	J	J					P	P	P	P	P			M	M	M	M	X	X			
	0.68 684													J	J	J							P	P	P					M	M	M	M	X	X			
	1.0 105							C						J	J	J	J	J					P	P	P	P				M	M	M	M	X	X			
	2.2 225													J	J	K							P	P	P	P				M	M	M	X	X	X			
	4.7 475													K									P	P	P					X	X	X	X	Z				
	10 106																					P	P	P						X	X	X	X					
	22 226																													X	X	X						
	47 476																																					
	100 107																																					
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
SIZE		0101*	0201					0402						0603								0805								1206								

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							

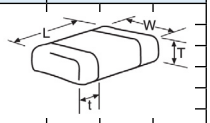
NOTE: Contact factory for non-specified capacitance values
*EIA 01005
**Contact Factory for Specifications

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	M	P	Z	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		X	X	X
	1.0	105	P	P	P	X	Z			Q	Q	Q	X	Z		X	X	X		X	X	X		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		



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

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

AVX:

08055C393KAT2A 08055C393KAT4A 08055C393MAT2A 08055C471JAT2A 08055C471KAT2A 08055C471KAT4A 08055C471MAT2A 08055C472JAT2A 08055C472KAT2A 08055C472KAT4A 08055C472MAT2A 08055C473JAT2A 08055C473KAT2A 08055C473KAT4A 08055C473MAT2A 08055C473MAT4A 08055C561KAT2A 08055C561KAT4A 08055C561MAT2A 08055C562JAT2A 08055C562KAT2A 08055C562KAT4A 08055C562MAT2A 08055C563JAT2A 08055C563KAT2A 08055C563KAT4A 08055C563MAT2A 08055C681KAT2A 08055C681KAT4A 08055C681MAT2A 08055C682JAT2A 08055C682KAT2A 08055C682KAT4A 08055C682MAT2A 08055C682MAT4A 08055C683KAT2A 08055C683KAT4A 08055C683MAT2A 08055C683MAT4A 08055C821KAT2A 08055C821KAT4A 08055C821MAT2A 08055C822JAT2A 08055C822KAT2A 08055C822KAT4A 08055C823JAT2A 08055C823KAT2A 08055C823MAT2A 08055C101JAT2A 08055C101KAT2A 08055C102JAT2A 08055C102KAT2A 08055C102KAT4A 08055C102MAT2A 08055C102MAT4A 08055C103JAT2A 08055C103JAT4A 08055C103KAT4A 08055C103MAT2A 08055C103MAT4A 08055C104MAT2A 08055C104MAT4A 08055C105KAT2A 08055C122KAT2A 08055C123KAT2A 08055C123MAT2A 08055C124KAT2A 08055C151KAT2 08055C151KAT2A 08055C152KAT4A 08055C152MAT2A 0805YC474MAT2A 0805YC474MAT4A 0805YC561KAT2A 0805YC562KAT2A 0805YC562MAT2A 0805YC563KAT2A 0805YC563KAT4A 0805YC682KAT2A 0805YC683KAT2A 0805YC821KAT2A 0805YC821MAT2A 0805YC822KAT2A 0805YC822KAT4A 0805YC823KAT2A 0805ZC102KAT2A 0805ZC102MAT2A 0805ZC103KAT2A 0805ZC103MAT2A 0805ZC103MAT4A 0805ZC104KAT2A 0805ZC104MAT2A 0805ZC105JAT2A 0805ZC105JAT4A 0805ZC105KAT2A 0805ZC105KAT4A 0805ZC105MAT2A 0805ZC105MAT4A 0805ZC124KAT2A 0805ZC153KAT2A