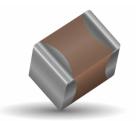
General Specifications





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.

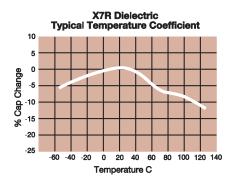
Capacitance for X7R varies under the influence of electrical operating con-ditions such as voltage and frequency.

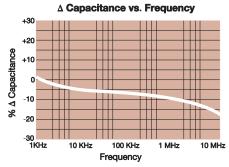
X7R dielectric chip usage covers the broad spectrum of industrial applications where known changes in capacitance due to applied voltages are acceptable.

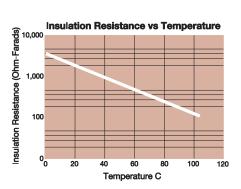
PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

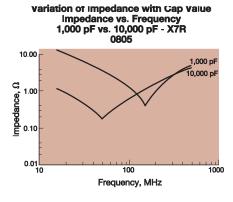
0805	5	С	103	М	Α	T	2	Α
	T	T	$\overline{}$	T	T	T	T	T
Size	Voltage	Dielectric	Capacitance	Capacitance	Failure	Terminations	Packaging	Special
(L" x W")	4V = 4	X7R = C	Code (In pF)	Tolerance	Rate	T = Plated Ni and Sn	2 = 7" Reel	Code
	6.3V = 6		2 Sig. Digits +	$J = \pm 5\%$ *	A = Not	Z= FLEXITERM®**	4 =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

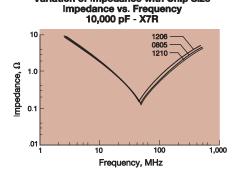
Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers. Contact factory for non-specified capacitance values.



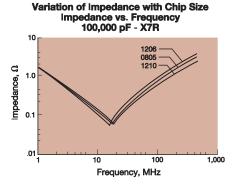








Variation of Impedance with Chip Size







Parameter/Test Operating Temperature Range		X7R Specification Limits	M	easuring Conditions							
		-55°C to +125°C	Temp	perature Cycle Chamber							
Capacit Dissipation		Within specified tolerance ≤ 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	Vo	Freq.: 1.0 kHz ± 10% oltage: 1.0Vrms ± .2V o > 10μF, 0.5Vrm @ 120Hz							
Insulation R	esistance	100,000MΩ or 1000MΩ - μF, whichever is less		levice with rated voltage for ecs @ room temp/humidity							
Dielectric S	Strength	No breakdown or visual defects	charge and disch	50% of rated voltage for 1-5 seconds, w/ arge current limited to 50 mA (max) th 150% of rated voltage for 500V devices.							
	Appearance	No defects									
Resistance to	Capacitance Variation	≤ ±12%	Deflection: 2mm								
Flexure Dissipation Factor		Meets Initial Values (As Above)	Test Time: 30 seconds								
	Insulation Resistance	≥ Initial Value x 0.3									
Soldera	bility	≥ 95% of each terminal should be covered with fresh solder		in eutectic solder at 230 ± 5°C or 5.0 ± 0.5 seconds							
Appearance		No defects, <25% leaching of either end terminal									
	Capacitance Variation	≤ ±7.5%									
Resistance to Solder Heat	Dissipation Factor	Meets Initial Values (As Above)	Dip device in eutectic room temperature for	solder at 260°C for 60 seconds. Store at 24 ± 2hours before measuring electrical							
Solder Heat	Insulation Resistance	Meets Initial Values (As Above)		properties.							
	Dielectric Strength	Meets Initial Values (As Above)									
	Appearance	No visual defects	Step 1: -55°C ± 2°	30 ± 3 minutes							
	Capacitance Variation	≤ ±7.5%	Step 2: Room Temp	≤ 3 minutes							
Thermal Shock	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 roor temperature								
	Appearance Capacitance Variation	No visual defects ≤ ±12.5%	Pre-treatment: After m 10C for 2 hour, then	ounting, perform heat treatment 150+0/- stabilise for 24+/-2 hour at room temp, then measure.							
	Dissipation Factor	≤ Initial Value x 2.0 (See Above)		≥ rated voltage in test chamber set at							
Load Life	Insulation Resistance	≥ Initial Value x 0.3 (See Above)		2°C for 1000 hours (+48, -0).							
	Dielectric Strength	Meets Initial Values (As Above)	treatment 150+0/-100 at roo	emove from test chamber, perform heat of or 2 hour, then stabilise for 24+/-2 hour om temp, then measure. A AVX for datasheet of specific parts.							
	Appearance	No visual defects	Pre-treatment: After m	ounting, perform heat treatment 150+0/-							
	Capacitance Variation	≤ ±12.5%	10C for 2 hour, then	stabilise for 24+/-2 hour at room temp, then measure.							
Load	Dissipation Factor	≤ Initial Value x 2.0 (See Above)		per set at 85°C ± 2°C/85% ± 5% relative							
Humidity	Insulation Resistance	≥ Initial Value x 0.3 (See Above)		emove from test chamber, perform heat							
	Dielectric Strength	Meets Initial Values (As Above)	treatment 150+0/-100	for 2 hour, then stabilise for 24+/-2 hour om temp, then measure.							





PREFERRED SIZES ARE SHADED

	SIZE		0101*			0201	1				04	102						0	603								805								12	06			
S	oldering	,	Reflow Only			low (F		v/Wa	ve					Reflo		ave			Reflow/Wave							Reflow/Wave									
	ackagin		Paper/ Embossed			II Pap						Paper							Pape						P	aper/	Embo	ssed						Pap	er/Er	nboss	sed		
(L) Le	ngth	mm (in.)	0.40 ± 0.02 (0.016 ± 0.0008)			0 ± 0		.)		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) Wi	idth	mm (in.)	0.20 ± 0.02 (0.008 ± 0.0008)			0 ± 0		.)		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) Te	rmin al	mm	0.10± 0.04		0.1	5 ± 0	0.05	-			0.25	± 0.1	5		0.35 ± 0.15									0.5) ± 0.2	5			0.50 ± 0.25										
. ,		(in.)	(0.004 ± 0.0016)		<u> </u>	06 ± 0						± 0.0					$\overline{}$	0.014							`) ± 0.0	10)								0.01			
	WVDC		16	6.3	10	_	25	_	6.3	10	16	25	50	100	6.3	_	_	25	_		200	250	6.3	10	16	25	50	100	200	250	6.3	10	16	25	50	100	200	250	500
Cap	100	101	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J													G	G	N	N	N
(pF)		151	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J									G	G	G	G	G	G	N	N	N
	220	221	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J	Е	Е	Е	Е	Е	Е	Е	J	J	J	J	J	J	J	N	N	Р
		331	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	470	471	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	680	681	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	1000	102	В	Α	Α	Α	Α	Α	С	С	С	С	С	С	G	G	G	G	G	G	J	J		٦	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
		152		Α	Α	Α	Α		С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	2200	222		Α	Α	Α	Α		С	С	С	С	С	С	G	G	G	G	G	G	J	J		٦	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	3300	332		Α	Α	Α	Α		С	С	С	С	С	С	G	G	G	G	G	G	J	J		٦	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	3900	392		Α	Α	Α	Α																																
	4700	472		Α	Α	Α	Α		С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	J	J	J	J	J	J	J	J	N	N	Р
	5600	562		Α	Α	Α	Α																																\Box
	6800	682		Α	Α	Α	Α		С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	Р	Р	J	J	J	J	J	J	N	N	Р
Cap	0.01	103		Α	Α	Α	Α		С	С	С	С	С	С	G	G	G	G	G	G	J	J		J	J	J	J	J	Р	Р	J	J	J	J	J	J	N	N	Р
(µF)	0.012	123																	П																				\Box
	0.015	153							С	С	С	С	Е		G	G	G	G	G	J	J	J		J	J	J	J	J	Р	Р	J	J	J	J	J	J	N	N	Q
	0.018	183																																					\Box
	0.022	223		Α	Α	Α			С	С	С	С	Е		G	G	G	G	G	J	J	J		J	J	J	J	J	Р	Р	J	J	J	J	J	J	Р	Р	Q
	0.027	273																																					\Box
	0.033	333			İ		Ī	İ	С	С	С	С	Е		G	G	G	G	J	J				J	J	J	J	Р	Р	Р	J	J	J	J	J	J	Q	Q	Q
	0.039	393																																					\Box
	0.047	473							С	С	С	С	Е		G	G	G	G	J	J				J	J	J	J	Р	Р	Р	J	J	J	J	J	J	Q	Q	Q
	0.068	683							С	С	С	С	Е		G	G	G	G	J	J				J	J	J	J	Р	Р		J	J	J	J	J	Р	Q	Q	П
	0.082	823																																					
	0.1	104		Α					С	С	С	С	Е		G	G	G	G	J	J				J	J	J	J	Р	Р		J	J	J	J	J	Р	Q	Q	
	0.12	124																																					\neg
	0.15	154													G	G	G	J	J					N	N	N	N	Р			K	K	K	К	K	Q	Q	Q	\neg
	0.22	224							С	С	С	С			G	G	J	J	J					N	N	N	N	Р			K	K	К	К	К	Q	Q	Q	\neg
	0.33	334													J	J	J	J	J					Р	Р	Р	Р	Р			K	K	K	К	N	Q			
	0.47	474							С	С					J	J	J	J	J					Р	Р	Р	Р	Р			М	М	М	М	Х	Х			
	0.68	684													J	J	J							Р	Р	Р					М	М	М	М	Х	Х			\neg
	1.0	105							С						J	J	J	J	Κ					Р	Р	Р	Р				М	М	М	М	Х	Х			\neg
	2.2	225													J	J	K							Р	Р	Р	Р				М	М	М	Х	Х	Х			\Box
	4.7	475													K									Р	Р	Р					Х	Х	Х	Х	Z				\neg
	10	106																					Р	Р	Р						Х	Х	Х	Х					\neg
	22	226																													Х	Х							\neg
	47	476					Г			Г						П																			Г				\neg
	100	107					Г		İ	Г						П																			Г				\neg
	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							0	603			•				(805								12	06					
				0-01								0000				0000						1200																	

Letter	Α	В	С	E	G	J	K	М	N	Р	Q	Х	Υ	Z			
Max.	0.33	0.22	0.56	0.71	0.90	0.94	1.02	1.27	1.40	1.52	1.78	2.29	2.54	2.79			
Thickness	(0.013)	(0.009)	(0.022)	(0.028)	(0.035)	(0.037)	(0.040)	(0.050)	(0.055)	(0.060)	(0.070)	(0.090)	(0.100)	(0.110)			
•			PAF	PER			EMBOSSED										

NOTE: Contact factory for non-specified capacitance values

^{**}Contact Factory for Specifications





PREFERRED SIZES ARE SHADED

Soldering Packaging	10 K	16 K	9.0.1 2.1 (0.0 0.0	eflow On r/Embos .30 ± 0.4 30± 0.0 50 ± 0.3 98 ± 0.0 50 ± 0.2 20 ± 0.0 K	ssed 4 16) 0 12)	200 K	500	16	25	Reflox All Emi 4.50 : (0.177 : 3.20 : (0.126 : 0.61 : (0.024 :	bossed ± 0.40 ± 0.016) ± 0.40 ± 0.016) ± 0.36 ± 0.014)			All 4. (0.1 6. (0.2	eflow On Emboss .50 ± 0.4 77 ± 0.0 .40 ± 0.4 .52 ± 0.0	ed 0 16) 0 16)		5. (0.2 5. (0.1	eflow On Emboss .70 ± 0.5 .24 ± 0.0 .00 ± 0.4 97 ± 0.0	sed 50 120) 10 116)		5. (0.2 6. (0.2	eflow Onl Emboss 70 ± 0.40 24 ± 0.0° 30 ± 0.40 48 ± 0.0° 64 ± 0.3° 25 ± 0.0°	ed 0 16) 0 16)
(L) Length (in) W) Width (in) (t) Terminal (in) WVDC Cap 100 101 (pF) 150 151 220 221 330 331 470 471	K		(0.1 2. (0.0 0.0 (0.0)	.30 ± 0.4 30± 0.0 50 ± 0.3 98 ± 0.0 50 ± 0.2 20 ± 0.0 50	16) 0 12) 5 10) 100 K	К		16	25	4.50 : (0.177 : 3.20 : (0.126 : 0.61 : (0.024 :	± 0.40 ± 0.016) ± 0.40 ± 0.016) ± 0.36 ± 0.014)			(0.1 6. (0.2	.50 ± 0.4 77 ± 0.0 .40 ± 0.4 .52 ± 0.0	0 16) 0 16)		5. (0.2 5. (0.1	.70 ± 0.5 224 ± 0.0 .00 ± 0.4 97 ± 0.0	60 (20) (0 (16)		5. (0.2 6. (0.2	70 ± 0.40 24 ± 0.0 30 ± 0.40 48 ± 0.0 64 ± 0.3	0 16) 0 16)
(in) W) Width (in) (t) Terminal (in) WVDC Cap 100 101 (pF) 150 151 220 221 330 331 470 471	K		(0.1 2. (0.0 0. (0.0	30± 0.0 50 ± 0.3 98 ± 0.0 50 ± 0.2 20 ± 0.0 50 K	16) 0 12) 5 10) 100 K	К		16	25	3.20 : (0.126 : 0.61 : (0.024 :	± 0.016) ± 0.40 ± 0.016) ± 0.36 ± 0.014)			(0.1 6 (0.2	77 ± 0.0 40 ± 0.4 52 ± 0.0 61 ± 0.3	16) 0 16)		(0.2 5 (0.1	24 ± 0.0 .00 ± 0.4 .97 ± 0.0 .64 ± 0.3	(20) (0) (16)		(0.2 6. (0.2 0.	24 ± 0.0° 30 ± 0.4° 48 ± 0.0° 64 ± 0.3°	16) 0 16)
(in) (in) (in) (in) (in) (in) (in) (in)	K		(0.0° 0. (0.0°	98 ± 0.0 50 ± 0.2 20 ± 0.0 50 K	12) 5 10) 100 K	К		16	25	0.126 : 0.61 : (0.024 :	± 0.016) ± 0.36 ± 0.014)			(0.2	252 ± 0.0 .61 ± 0.3	16)		(0.1	97 ± 0.0	116) 19		(0.2	48 ± 0.0°	16) 9
(in) (i	K		(0.0	20 ± 0.0 50 K	10) 100 K	К		16	25	(0.024	± 0.014)					6		0.						
Cap 100 101 (pF) 150 151 220 221 330 331 470 471	K		25	K K	К	К		16	25	50	400			(U.U	24 ± 0.0	14)		(0.0	25 ± 0.0	113)				10)
(pF) 150 151 220 221 330 331 470 471		K		K							100	200	500	50	100	200	25	50	100	200	500	50	100	200
220 221 330 331 470 471		K		K																	. '	>-	✓~W.	
330 331 470 471		K		K																	L	_		×_
470 471		K			K		М														_ (7) <u> </u>
		K		K		K	М			N	N	N	N								_	\longrightarrow		
600 601		К			K	K	М			N	N	N	N									a-to		
000 001		K		K	K	K	М			N	N	N	N								l l	1 22		
1000 102	K	11	K	K	K	K	М	N	N	N	N	N	N	Х	Х	Χ		Х	Х	Х	Х	Х	Х	Χ
1500 152		K	K	K	K	K	М	Ν	N	N	N	N	N	Х	Х	Χ		Х	Х	Х	Х	Х	Х	Х
2200 222	K	K	K	K	K	K	М	N	N	N	N	N	N	Х	Х	Χ		Х	X	Х	Х	Х	Х	Х
3300 332	K	K	K	K	K	K	Р	N	N	N	N	N	N	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
4700 472	K	K	K	K	K	K	Р	N	N	N	N	N	Р	Х	Х	Χ		Х	Х	Х	Х	Х	Х	Х
6800 682	K	K	K	K	K	K	Р	N	N	N	N	N	Р	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
Cap 0.01 103	K	K	K	K	K	К	Р	N	N	N	N	N	Р	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
(μF) 0.015 153	K	K	K	K	K	К	Р	N	N	N	N	N	Р	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.022 223	K	K	K	K	K	Р	Q	N	N	N	N	N	Р	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.033 333	K	K	K	K	K	Р	Х	N	N	N	N	N	Х	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.047 473	K	K	K	K	K	Р	Х	N	N	N	N	Р	Х	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.068 683	К	К	К	К	K	Р	Х	N	N	N	N	Р	Х	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.1 104	К	К	К	K	K	Р	Х	N	N	N	Р	Р	Х	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.15 154	К	К	К	М	Р	Z	Z	N	N	N	Р	Р	Z	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.22 224	К	К	К	М	Р	Z		N	N	N	Р	Q	Z	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.33 334	К	К	К	М	Q	Z		N	N	N	Р	Х	Z	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.47 474	М	М	М	Р	Q	Z		N	N	N	Q	Х	Z	Х	Х	Х		Х	Х	Х	Х	Х	Х	Х
0.68 684	М	М	Р	Х	X	Z		Q	Q	Q	Q	Z		Х	Х	Х		Х	Х	Х	Z	Х	Х	Х
1.0 105	Р	Р	Р	Х	Z			Q	Q	Q	Х	Z		Х	Х	Х		Х	Х	Х	7	Х	Х	Х
1.5 155	N	N	Z	Z	Z				Z	Z	Z			Х	Х	Z		Х	Х	Z		Х	х	Z
2.2 225	Х	Х	Z	Z	Z				Z	Z	Z			Х	Х	Z		Х	Х	Z		Х	Х	Z
3.3 335	Х	Х	Z	Z	Z				Z	Z	Z			Х	Х			Х	Z			Х	Х	
	Z	Z	Z	Z	Z				Z	Z	Z			Х	Х			Z	Z			Х	Х	
10 106	Z	Z	Z	Z				Z	Z	Z				Z	Z			Z	Z			Z	Z	
	Z	Z	Z														Z							$\neg \neg$
	Z																						$\neg \uparrow$	
100 107																							\neg	$\neg \neg$
	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									18					1825				2220			2225		

Letter	Α	В	С	E	G	J	K	М	N	Р	Q	Х	Υ	Z	7
Max.	0.33	0.22	0.56	0.71	0.90	0.94	1.02	1.27	1.40	1.52	1.78	2.29	2.54	2.79	3.30
Thickness	(0.013)	(0.009)	(0.022)	(0.028)	(0.035)	(0.037)	(0.040)	(0.050)	(0.055)	(0.060)	(0.070)	(0.090)	(0.100)	(0.110)	(0.130)
•			PAI	PER							MBOSSEI)			

NOTE: Contact factory for non-specified capacitance values