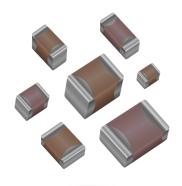
MLCC Tin/Lead Termination "B" (LD Series)

COG (NPO) - General Specifications





AVX Corporation will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the AVX Catalog Part Number. This fulfills AVX's commitment to providing a full range of products to our customers. AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

Not RoHS Compliant

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

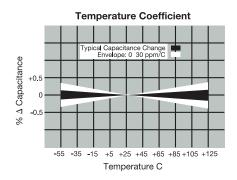
LD05	<u>5</u>	<u>A</u>	101	J	<u>A</u>	<u>B</u>	2	<u>A</u>
Size LD02 - 0402 LD03 - 0603 LD04 - 0504* LD05 - 0805 LD06 - 1206 LD10 - 1210 LD12 - 1812 LD13 - 1825 LD14 - 2225 LD20 - 2220	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric COG (NPO) = A X7R = C X5R = D X8R = F	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance $B = \pm .10 \text{ pF} (<10 \text{ pF})$ $C = \pm .25 \text{ pF} (<10 \text{ pF})$ $D = \pm .50 \text{ pF} (<10 \text{ pF})$ $F = \pm 1\% (\ge 10 \text{ pF})$ $G = \pm 2\% (\ge 10 \text{ pF})$ $J = \pm 5\%$ $K = \pm 10\%$ $M = \pm 20\%$	Failure Rate A = Not Applicable 4 = Automotive	Terminations B = 5% min lead X = FLEXITERM® with 5% min lead** **X7R only	Packaging 2 = 7" Reel 4 = 13" Reel Contact Factory For Multiples*	Special Code A = Std. Product

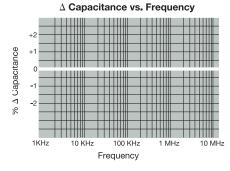
*LD04 has the same CV ranges as LD03.

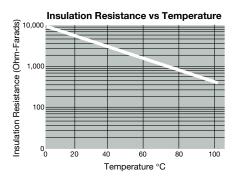
See FLEXITERM® section for CV options

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.

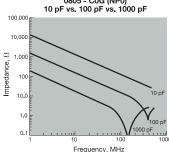
Contact factory for non-specified capacitance values.

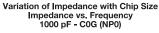


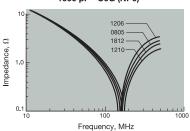




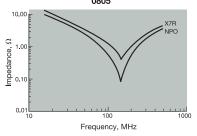
Variation of Impedance with Cap Value Impedance vs. Frequency 0805 - COG (NPO) 10 pF vs. 100 pF vs. 1000 pF







Variation of Impedance with Ceramic Formulation Impedance vs. Frequency 1000 pF - COG (NPO) vs X7R 0805





The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.





Parame	ter/Test	NP0 Specification Limits	Measuring Conditions
Operating Tem	perature Range	-55°C to +125°C	Temperature Cycle Chamber
Capac	itance	Within specified tolerance	Freq.: 1.0 MHz ± 10% for cap ≤ 1000 pF
(2	<30 pF: Q≥ 400+20 x Cap Value ≥30 pF: Q≥ 1000	1.0 kHz ± 10% for cap > 1000 pF Voltage: 1.0Vrms ± .2V
Insulation	Resistance	100,000ΜΩ or 1000ΜΩ - μF, whichever is less	Charge device with rated voltage for 60 ± 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.
	Appearance	No defects	Deflection: 2mm
Resistance to Flexure	Capacitance Variation	±5% or ±.5 pF, whichever is greater	Test Time: 30 seconds 7 1mm/sec
Stresses	Q	Meets Initial Values (As Above)	
	Insulation Resistance	≥ Initial Value x 0.3	90 mm
Solder	rability	≥ 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
	Appearance	No defects, <25% leaching of either end terminal	
	Capacitance Variation	≤ ±2.5% or ±.25 pF, whichever is greater	Dia during in contrasting allows a 00000 for 00
Resistance to Solder Heat	Q	Meets Initial Values (As Above)	Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 ± 2
Solder Fleat	Insulation Resistance	Meets Initial Values (As Above)	hours before measuring electrical properties.
	Dielectric Strength	Meets Initial Values (As Above)	
	Appearance	No visual defects	Step 1: -55°C ± 2° 30 ± 3 minutes
	Capacitance Variation	≤ ±2.5% or ±.25 pF, whichever is greater	Step 2: Room Temp ≤ 3 minutes
Thermal Shock	Q	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 hours at room temperature
	Appearance	No visual defects	
	Capacitance Variation	≤ ±3.0% or ± .3 pF, whichever is greater	Charge device with twice rated voltage in test chamber set at 125°C ± 2°C
Load Life	Q	≥ 30 pF: Q≥ 350 ≥10 pF, <30 pF: Q≥ 275 +5C/2 <10 pF: Q≥ 200 +10C	for 1000 hours (+48, -0). Remove from test chamber and stabilize at room
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	temperature for 24 hours before measuring.
	Dielectric Strength	Meets Initial Values (As Above)	
	Appearance	No visual defects	
	Capacitance Variation	≤ ±5.0% or ± .5 pF, whichever is greater	Store in a test chamber set at 85°C ± 2°C/ 85% ±
Load Humidity	Q	≥ 30 pF: Q≥ 350 ≥10 pF, <30 pF: Q≥ 275 +5C/2 <10 pF: Q≥ 200 +10C	5% relative humidity for 1000 hours (+48, -0) with rated voltage applied.
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from chamber and stabilize at room temperature for 24 ± 2 hours before measuring.
	Dielectric Strength	Meets Initial Values (As Above)	

C0G (NP0) - Capacitance Range



PREFERRED SIZES ARE SHADED

						1													
SIZE			LD02			LD	03				LD05					LD0	6		
Solderi	ing	Re	flow/Wa	ive		Reflow	//Wave			Re	flow/Wa	ve				Reflow/\	Vave		
Packag	j ing mm		All Pape .00 ± 0.1				aper ± 0.15				er/Embos .01 ± 0.2				Pa	aper/Eml 3.20 ± 0			
(L) Length	(in.)	(0.0	040 ± 0.0	04)		(0.063 :	± 0.006)			(0.0	79 ± 0.0	08)			(0.126 ± 0	(800.0		
W) Width	mm (in.)	(0.0	.50 ± 0.1)20 ± 0.0	04)		(0.032:	± 0.15 ± 0.006)			(0.0	.25 ± 0.2 149 ± 0.0	08)			(1.60 ± 0 0.063 ± 0	(800.0		
(t) Terminal	mm (in.)		.25 ± 0.1 010 ± 0.0				± 0.15 ± 0.006)				.50 ± 0.2 020 ± 0.0				(0.50 ± 0 0.020 ± 0			
Con	WVDC	16	25	50	16	25	50	100	16	25	50	100	200	16	25	50	100	200	500
Cap (pF)	0.5 1.0	C C	C C	C	G G	G G	G G	G G	J	J	J	J	J	J	J	J	J	J	J
	1.2 1.5	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	J J
	1.8	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	2.2 2.7	C C	C C	C	G	G G	G G	G G	J	J	J	J	J	J	J	J	J	J	J
	3.3 3.9	00	CC	C	G	G G	G G	9 9	ر ا	J	J	٦	J	J	J	ے ۔	J	J	J
	4.7	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	5.6 6.8	C	C	C	G	G G	G G	G	J J	J	J	J	J J	J	J	J	J	J	J
	8.2 10	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
	12	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	15 18	C C	C	C	G	G G	G G	G	J	J	J	J	J J	J	J	J	J	J	J
	22	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	27 33	C C	C	C	G	G G	G G	G	J	J	J	J	J J	J	J	J	J	J	J
	39 47	C C	C	C	G	G G	G G	G G	J	J J	J	J	J J	J	J	J	J J	J	J
	56	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	68 82	C	C C C G C C G			G G	G G	G G	J J	J	٦	J	J J	J	J	J	ر ا	J	つっ
	100 120		C C C G C C C G C C C G			G G	G G	G G	J	J	J	J	J J	J	J	J	J	J	J J
	150	С	C C C G C C G C C G			G	G	G	J	J	J	J	J	J	J	J	J	J	Ĵ
	180 220	C C	C C	C	G	G G	G G	G G	J J	J	J	J	J	J	J	J	J	J	J M
	270 330	C C	C C	C	G	G G	G G	G	J	J J	J	J	M M	J	J	J	J	J	M M
	390	С	С	С	G	G	G	G	J	J	J	J	М	J	J	J	J	J	М
	470 560	С	С	С	G	G G	G G		J	J	J	J	M M	J	J	J	J	J	M M
	680 820				G G	G G	G G		J J	J J	J	J		J	J	J	J J	J M	Р
	1000				G	G	G		J	J	J	J		J	J	J	J	Q	
	1200 1500					G			J	J	J			J	J	J	J M	Q Q	
	1800 2200								ے ر	J	J			J	J	M M	M P		
	2700								J	J	N			J	J	М	Р		
	3300 3900								J	J				J	J	M M	P P		
	4700 5600								J	J		$\vdash \vdash \vdash$		J	J	M M	Р		
	6800													М	М	.,,			
Сар	8200 0.010											\vdash		M M	M M				
(pF)	0.012 0.015																		
	0.018			_		€ -W-	_												
	0.022 0.027		V				ÎT _												
	0.033 0.039					٠	1												
	0.047					_													
	0.068 0.082					ı													
	0.1	16 25 50 16 25 5			En	100	16	25	EN	100	200	16	25	50	100	200	500		
	WVDC SIZE					100	16	ے	50 LD05	100	Δ U	ΙĎ	ے ا	50 LD0		200	j aw		
Letter	Α	C E G J			K	М		N	P)	Х	Y		Z	1			
Max.	0.33 (0.013)	0.5	0.56 0.71			0	.94 037)	1.02 (0.040)	1.27		.40	1.52 (0.060)	1.7	78	2.29 (0.090)	2.54		2.79	
Thickness			0.56 0.71 (0.022) (0.028) PAPER										(0.0			(0.10)		0.110)	

C0G (NP0) - Capacitance Range



PREFERRED SIZES ARE SHADED

	_ [
SIZ				LD10 Reflow On	lv				LD12 Reflow Or	ılı			LD13 Reflow Only			LD14 Reflow Only	
Packag				er/Embo	<u> </u>				I Emboss				All Embossed			All Embossed	
(L) Length	mm		- ;	3.20 + 0.2	0				1.50 ± 0.3	0			4.50 ± 0.30			5.72 ± 0.25	
	(in.) mm			126 ± 0.0 2.50 ± 0.2					177 ± 0.0 3.20 ± 0.2				(0.177 ± 0.012) 6.40 ± 0.40)	(0.225 ± 0.010) 6.35 ± 0.25)
W) Width	(in.) mm			098 ± 0.0					126 ± 0.0				0.252 ± 0.016 0.61 ± 0.36)	(0.250 ± 0.010) 0.64 ± 0.39)
(t) Terminal	(in.)		(0.	020 ± 0.0	10)			(0.	024 ± 0.0	14)			(0.024 ± 0.014)			0.025 ± 0.015)	
Сар	WVDC 0.5	25	50	100	200	500	25	50	100	200	500	50	100	200	50	100	200
(pF)	1.0																
	1.2 1.5																
	1.8 2.2															>	√ \//
	2.7														_ <_\		777
	3.3 3.9																
	4.7 5.6														_ `	$\overline{}$	
	6.8															t	
	8.2 10					J						-					
	12 15					J											
	18					J						1					
	22 27					J											
	33					J											
	39 47					J											
	56 68					J											
	82					J											
	100 120					J											
	150					J											
	180 220					J											
	270 330					J											
	390					М											
	470 560	J	J	J	J	M M											
	680 820	J	J	J	J	M M											
	1000	J	J	J	J	М	K	K	K	K	М	М	М	М	М	М	P
	1200 1500	J	J	J	M M	M M	K K	K	K K	K K	M M	M M	M M	M M	M M	M M	P P
	1800	J	J	J	M		K	K	K	K	M P	M	M	M	M	M	P P
	2200 2700	J	J	J	Q Q		K K	K	K K	K P	Q	M M	M M	M M	M M	M M	Р
	3300 3900	J	J	J M			K K	K K	K K	P P	Q Q	M M	M M	M M	M M	M M	P P
	4700	Ĵ	J	М			K	K	K	P P	Q	М	M M	М	M M	M M	P P
	5600 6800	J	J				K K	K K	M M	X	X	M M	М	M M	М	М	Р
Сар	8200 0.010	J	J				K K	M	M M			M M	M M		M M	M M	P P
(pF)	0.012	J	J				K	М				М	М		М	М	Р
	0.015 0.018			 			M	M				M P	M M		M M	M M	Y
	0.022 0.027						M M	M M				P P			M P	Y Y	Y Y
	0.033						М	М				Р			Р		
	0.039 0.047						M M	M M				P P			P P		
	0.068 0.082						M M	M M							P Q		
	0.1														Q		
SIZ	WVDC	25	50	100 LD10	200	500	25	50	100 LD12	200	500	50	100 LD13	200	50	100 LD14	200
Letter	_ A	C		E	G	J		K	M		N	P	Q >	(Y	Z	1	
Max.	0.33	0.5		0.71	0.90	0.9		1.02	1.27		.40		1.78 2.5		2.79	1	
Thickness	(0.013)	(0.022) (0.028) (0.035) (0.					37)	(0.040)	(0.050	0) (0.	055)		0.070) (0.0	90) (0.100	(0.110)		
				PAPER								EMBOSS	ED				

X8R - General Specifications





AVX Corporation will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the AVX Catalog Part Number. This fulfills AVX's commitment to providing a full range of products to our customers. AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

Not RoHS Compliant

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

LD05	<u>5</u>	F	101	<u>J</u>	<u>A</u>	<u>B</u>	2	<u>A</u>
Size LD02 - 0402 LD03 - 0603 LD04 - 0504* LD05 - 0805 LD06 - 1206 LD10 - 1210 LD12 - 1812 LD13 - 1825 LD14 - 2225 LD20 - 2220	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric X8R = F	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance B = ±.10 pF (<10pF) C = ±.25 pF (<10pF) D = ±.50 pF (<10pF) F = ±1% (≥ 10 pF) G = ±2% (≥ 10 pF) J = ±5% K = ±10% M = ±20%	Failure Rate A = Not Applicable	Terminations B = 5% min lead X = FLEXITERM® with 5% min lead** **X7R only	Packaging 2 = 7" Reel 4 = 13" Reel Contact Factory For Multiples*	Special Code A = Std. Product

LD04 has the same CV ranges as LD03.

See FLEXITERM® section for CV options

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





Parame	ter/Test	X8R Specification Limits	Measuring (Conditions
Operating Tem	perature Range	-55°C to +150°C	Temperature C	ycle Chamber
Capac	itance	Within specified tolerance	1 O I	-U- + 100/
Dissipation	on Factor	≤ 2.5% for ≥ 50V DC rating ≤ 3.5% for 25V DC and 16V DC rating	Freq.: 1.0 k Voltage: 1.0	
Insulation	Resistance	100,000MΩ or 1000MΩ - μF, whichever is less	Charge device with 120 ± 5 secs @ roo	
Dielectric	Strength	No breakdown or visual defects	Charge device with 250 1-5 seconds, w/charge limited to 50 Note: Charge device with for 500V	and discharge current) mA (max) n 150% of rated voltage
	Appearance	No defects	Deflectio	n: 2mm
Resistance to	Capacitance Variation	≤ ±12%	Test Time: 3	-
Flexure Stresses	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	≥ Initial Value x 0.3	90 r	mm —
Solder	ability	≥ 95% of each terminal should be covered with fresh solder	Dip device in eutection for 5.0 ± 0.5	solder at 230 ± 5°C 5 seconds
	Appearance	No defects, <25% leaching of either end terminal		
	Capacitance Variation	≤ ±7.5%	Bio desire in content	+ 0
Resistance to Solder Heat	Dissipation Factor	Meets Initial Values (As Above)	Dip device in eutectic s seconds. Store at room	temperature for 24 ± 2
	Insulation Resistance	Meets Initial Values (As Above)	hours before measuring	g electrical 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 24 ± 2 hours at ro	
	Appearance	No visual defects		
	Capacitance Variation	≤ ±12.5%	Charge device with 1.5 r test chamber set	rated voltage (≤ 10V) in
Load Life	Dissipation Factor	≤ Initial Value x 2.0 (See Above)	for 1000 hou	
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from test chamb temperature for 24 ± 2 h	
	Dielectric Strength	Meets Initial Values (As Above)		
	Appearance	No visual defects		
	Capacitance Variation	≤ ±12.5%	Store in a test chamber s 5% relative humidi	
Load	Dissipation Factor	≤ Initial Value x 2.0 (See Above)	(+48, -0) with rated	
Humidity	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from chamber temperature an	d humidity for
	Dielectric Strength	Meets Initial Values (As Above)	24 ± 2 hours bef	ore measuring.

X8R - Capacitance Range

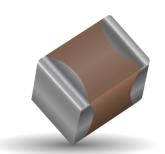


	SIZ	ΖE			LDC)3			L	D05			LD06	
		WVD	C	2	5V	50V			25V		50V	25V		50V
271	Cap	270			3	G								
331	(pF)	330		(3	G			J		J			
471		470		(3	G			J		J			
681		680		(3	G			J		J			
102		1000		(3	G			J		J	J		J
152		1500			3	G			J		J	J		J
182		1800			3	G			J		J	J		J
222		2200			3	G			J		۲	J		J
272		2700			3	G			J		۲	J		J
332		3300		(3	G			J		J	J		J
392		3900		(3	G			J		J	J		J
472		4700		(3	G			J		J	J		J
562		5600		(3	G			J		J	J		J
682		6800			3	G			J		J	J		J
822	Cap	8200		1	3	G			J		J	J		J
103	(µF)	0.01			3	G			J		J	J		J
123		0.012			3	G			J		J	J		J
153		0.015		1	3	G			J		J	J		J
183		0.018			3	G			J		J	J		J
223		0.022			3	G			J		J	J		J
273		0.027			3	G			J		J	J		J
333		0.033			3	G			J		J	J		J
393		0.039			3	G			J		J	J		J
473		0.047			3	G			J		J	J		J
563		0.056			3				N		N	М		М
683		0.068			3				N		N	М		М
823		0.082							N		N	М		М
104		0.1							N		N	М		М
124		0.12			ĺ				N		N	М		М
154		0.15							N		N	М		М
184		0.18							N			М		М
224		0.22							N			М		М
274		0.27										М		М
334		0.33										М		М
394		0.39		İ								M		
474		0.47										M		
684		0.68												
824	0.82			İ										
105														
		WVD		2	5V	50V			25V		50V	25V		50V
	SIZ				LDC					D05			LD06	
						1 1/								
Letter	er A C E		G	J	K	M	1	N	P	Q	X	Y	Z	

	Letter	Α	С	E	G	J	K	М	N	Р	Q	Х	Υ	Z
	Мах.	0.33	0.56	0.71	0.90	0.94	1.02	1.27	1.40	1.52	1.78	2.29	2.54	2.79
Т	hickness	(0.013)	(0.022)	(0.028)	(0.035)	(0.037)	(0.040)	(0.050)	(0.055)	(0.060)	(0.070)	(0.090)	(0.100)	(0.110)
				PAPER						EMB	OSSED			

X7R - General Specifications





AVX Corporation will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the AVX Catalog Part Number. This fulfills AVX's commitment to providing a full range of products to our customers. AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

Not RoHS Compliant

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

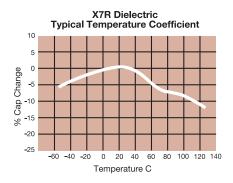
LD05	<u>5</u>	<u>c</u>	101]	<u>A</u>	<u>B</u>	<u>2</u>	<u>A</u>
Size LD03 - 0603 LD04 - 0504* LD05 - 0805 LD06 - 1206 LD10 - 1210 LD12 - 1812 LD13 - 1825 LD14 - 2225 LD20 - 2220	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric X7R = C	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance $B = \pm .10 \text{ pF} (<10 \text{ pF})$ $C = \pm .25 \text{ pF} (<10 \text{ pF})$ $D = \pm .50 \text{ pF} (<10 \text{ pF})$ $F = \pm 1\% (\ge 10 \text{ pF})$ $G = \pm 2\% (\ge 10 \text{ pF})$ $J = \pm 5\%$ $K = \pm 10\%$ $M = \pm 20\%$	Failure Rate A = Not Applicable	Terminations B = 5% min lead X = FLEXITERM® with 5% min lead** **X7R only	Packaging 2 = 7" Reel 4 = 13" Reel Contact Factory For Multiples*	Special Code A = Std. Product

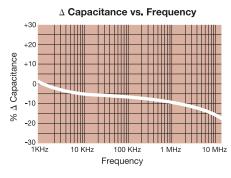
^{*}LD04 has the same CV ranges as LD03.

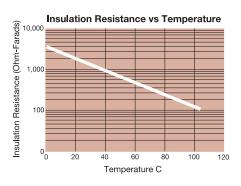
See FLEXITERM® section for CV options

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.

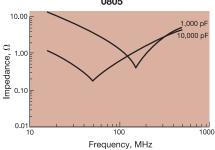
Contact factory for non-specified capacitance values.

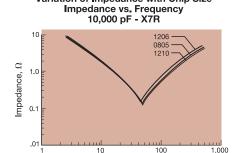






Variation of Impedance with Cap Value Impedance vs. Frequency 1,000 pF vs. 10,000 pF - X7R 0805





Frequency, MHz

Variation of Impedance with Chip Size

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

10 100 1206 0805 1210

11 10 100 1,000 Frequency, MHz





Parame	ter/Test	X7R Specification Limits	Measuring (Conditions
Operating Tem	perature Range	-55°C to +125°C	Temperature C	ycle Chamber
Capac	itance	Within specified tolerance		
Dissipati	on Factor	\leq 10% for \geq 50V DC rating \leq 12.5% for 25V DC rating \leq 12.5% for 25V and 16V DC rating \leq 12.5% for \leq 10V DC rating	Freq.: 1.0 k Voltage: 1.0'	
Insulation	Resistance	100,000MΩ or 1000MΩ - μF, whichever is less	Charge device with 120 ± 5 secs @ roo	
Dielectric	: Strength	No breakdown or visual defects	Charge device with 250 1-5 seconds, w/charge limited to 50 Note: Charge device with for 500V	and discharge current mA (max) n 150% of rated voltage
	Appearance	No defects	Deflectio	n: 2mm
Resistance to	Capacitance Variation	≤ ±12%	Test Time: 3	30 seconds 7 1mm/sec
Flexure Stresses	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	≥ Initial Value x 0.3	90 n	mm
Solder	ability	≥ 95% of each terminal should be covered with fresh solder	Dip device in eutectic for 5.0 ± 0.5	
	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 s seconds. Store at room	temperature for 24 ± 2
	Insulation Resistance	Meets Initial Values (As Above)	hours before measuring	g electrical 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 24 ± 2 hours at ro	
	Appearance	No visual defects		
	Capacitance Variation	≤ ±12.5%	Charge device with 1.5 r	
Load Life	Dissipation Factor	≤ Initial Value x 2.0 (See Above)	test chamber set for 1000 hou	
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from test chamb temperature for 24 ± 2 ho	
	Dielectric Strength	Meets Initial Values (As Above)		
	Appearance	No visual defects		
	Capacitance Variation	≤ ±12.5%	Store in a test chamber s 5% relative humidi	
Load Humidity	Dissipation Factor	≤ Initial Value x 2.0 (See Above)	(+48, -0) with rated	l voltage applied.
riumanty	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from chamber temperature an	d humidity for
	Dielectric Strength	Meets Initial Values (As Above)	24 ± 2 hours bef	ore measuring.

X7R - Capacitance Range



PREFERRED SIZES ARE SHADED

						<u> </u>																	1			
SIZE	E		LD02					LD03	3						LD05	;						LD	06			
Solder	ing	Ref	flow/W	ave			Ref	low/W	/ave					Ref	low/W	ave						Reflow	/Wave	•		
Packad	ging	Α	II Pap	er			A	II Par	er				F	aper	/Emb	osse	d				Pa	per/Er	nbos	sed		
(L) Length	mm		00 ± 0.					60 ± 0							01 ± 0.							3.20 ±				
() - 3	(in.) mm		40 ± 0. 50 ± 0.					63 ± 0 81 ± 0							79 ± 0. 25 ± 0.						(0.126 ± 1.60		8)		
W) Width	(in.)		30 ± 0. 20 ± 0.					32 ± 0							49 ± 0.						(0.063 ±		8)		
(t) Terminal	mm	0.:	25 ± 0.	.15			0.3	35 ± 0	.15					0.	50 ± 0.	.25						0.50 ±	0.25			
WVD	(in.)	(0.0°	10 ± 0.	006) 50	6.2	10	(0.0 ⁻	14 ± 0		100	200	6.2	10	(0.0	20 ± 0.		100	200	6.2	10	(16	0.020 ±		0) 100	200	500
Cap	100	10	25	50	6.3	10	10	25	50	100	200	6.3	10	16	25	50	100	200	6.3	10	10	25	50	100	200	500
(pF)	150																									
4 /	220			С								İ	İ	İ		İ			İ							i i
	330			С					G	G	G		J	J	J	J	J	J								K
	470			С					G	G	G		J	J	J	J	J	J								K
	680			С					G	G	G		J	J	J	J	J	J							—	K
	1000 1500			C					G	G G	G		J	J	J	J	J	J		J	J	J	J	J	J	K
	2200			C		G							J	J	J	J	J	J		J	J	J	J	J	J	M
·	3300		С	C		G							J	J	J	J	J	J		J	J	J	J	J	J	M
	4700		С	С		G							J	J	J	J	J	J		J	J	J	J	J	J	М
	6800	С	С			G				G			J	J	J	J	J	J		J	J	J	J	J	J	P
Cap	0.010	С	С						G	G			J	J	J	J	J	J		J	J	J	J	J	J	Р
(μF)	0.015 0.022	C						G	G				J J	J	J	J	J	J		J J	J	J	J	J	M	
-	0.022	C						G	G				J	J	J	J	N	IN		J	J	J	J	J	M	\vdash
	0.033	U					G	G	G				J	J	J	J	N			J	J	J	J	J	M	
	0.068						G	G	G				J	J	J	J	N			J	J	J	J	J	Р	i i
	0.10		C*			G	G	G	G				J	J	J	J	N			J	J	J	J	Р	Р	
	0.15				G	G							J	J	J	N	N			J	J	J	J	Q		
	0.22				G	G							J	J	N	N	N			J	J	J	J P	Q		
	0.33 0.47							J*					N N	N	N N	N N	N N			J M	J	M M	P	Q		
	0.47							J					N	N	N	IN	IN			M	M	Q	Q	Q		
·	1.0					J*	J*						N	N	N*					M	М	Q	Q	Q		
	1.5																			Р	Q	Q			İ	İ
	2.2				J*										P*					Q	Q	Q				
	3.3																									
	4.7											P*	P*	P*						Q*	Q*	Q*				
-	10 22					-					-	P	P					<u> </u>	0*	Q*	Q*	Q		-	\vdash	\vdash
	47																		ų ,							
	100																									
	WVDC	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	500
	SIZE		LD02					LD03	3						LD05							LD	06			
Letter	Α		С		Е		G		.1		K	1	ИΙ	N	Т	Р		Q		Х		Υ		Z		
Max.	0.33		0.56		0.71					.02		27	1.4		1.5	2	1.78		2.29	+	2.54		2.79			
Thickness	(0.013)										040)		050)	(0.0	-	(0.06		(0.07)		(0.090		0.100).110)		
	(0.0.0)		0.022) (0.028) (0.035) (0.037) PAPER			(5.0	/	(5.0		,0.0			MBOS		-/ '	(3.0)	/ (, _ (

= Under Development

X7R - Capacitance Range

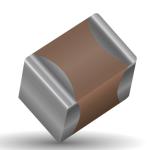


PREFERRED SIZES ARE SHADED

SIZI	E				LD10					LD	12		LD'	13		LD	20		LD	14
Solder	ing			F	Reflow Only					Reflov	v Only		Reflow	Only		Reflo	w Only		Reflov	w Only
Packag	ging		,	Pap	er/Embos	sed				All Emb	ossed		All Emb	ossed		All Eml	bossed		All Emi	bossed
(L) Length	mm				3.20 + 0.20					4.50 ±			4.50 ±				± 0.50			± 0.25
(=) ====	(in.)				126 ± 0.00 2.50 ± 0.20	8)				(0.177 ± 3.20 ±			(0.177 ± 6.40 ±				± 0.020) ± 0.40			± 0.010) ± 0.25
W) Width	mm (in.)				098 ± 0.20	8)				(0.126 ±			(0.252 ±				± 0.40 ± 0.016)			± 0.23 ± 0.010)
(t) Terminal	mm				0.50 ± 0.25	->				0.61 ±			0.61 ±				± 0.39		0.64 ±	± 0.39
WVD	(in.)	10	16	25	020 ± 0.01	0) 100	200	500	50	(0.024 ±	200	500	(0.024 ±	0.014) 100	25	(0.025 :	± 0.015) 100	200	(0.025 ±	± 0.015) 100
Cap	100	10	10	25	30	100	200	300	30	100	200	300	30	100	25	30	100	200	30	100
(pF)	150																_1		W_	•
	220															_ <	<u> </u>		ر ک	T I
	330 470))	-الر	Ψ'
	680																	<u> </u>		
	1000															T		4 t		1
	1500	J	J	J	J	J	J	М										1 .		
	2200 3300	J J	J	J	J	J	J	M												
	4700	J	J	J	J	J	J	M												
	6800	Ĵ	Ĵ	J	J	Ĵ	J	M												
Сар	0.010	J	J	J	J	J	J	М	K	K	K	K	М	М		Х	Х	Х	М	Р
(μF)	0.015	J	J	J	J	J	J	P	K	K	K	P	M	М		X	X	X	M	P P
-	0.022	J J	J	J	J	J	J	Q	K	K K	K	X	M	M M		X	X	X	M M	P
	0.047	Ĵ	Ĵ	Ĵ	Ĵ	Ĵ	Ĵ	٧ -	K	K	ĸ	Z	M	M		X	x	X	M	P
	0.068	J	J	J	J	J	М		K	K	K	Z	М	М		X	X	Х	М	Р
	0.10	J	J	J	J	J	M		K	K	K	Z	M	М		X	X	X	М	P
	0.15 0.22	J	J	J	J	M P	Z Z		K K	K K	P P		M M	M M		X	X	X X	M M	P P
	0.22	J	J	J	J	Q			K	M	X		M	M		X	X	X	M	P
	0.47	М	М	М	М	Q			K	Р			М	М		X	Х	Х	М	Р
	0.68	M	M	P	X	X			М	Q			М	P		X	X		М	Р
	1.0 1.5	N N	N N	P Z	X Z	Z Z			M Z	X Z			M M	Р		X	X		M M	P X
	2.2	X	X	Z	Z	Z			Z	Z			IVI			x	ı x		M	^
	3.3	Х	Х	Z	Z				Z							X	Z			
	4.7	X	X	Z	Z				Z							X	Z			
	10 22	Z 	Z	Z	Z			+							Z	Z	Z			\vdash
	47																			
	100																			
6177	WVDC	10	16	25	50 LD10	100	200	500	50	100	200	500	50	100	25	50	100	200	50	100
SIZI	-	LDIU								LD	12		LD'	3		LD	20		LD	14
Letter	Α	C E G J K							М	1	1	Р	Q		X	Υ	Z			
Max.	0.33	0.5		0.71	0.90	0.		1.02	1.27	1.4		1.52	1.78	- 1	29	2.54	2.79			
Thickness	(0.013)	(0.0	(0.022) (0.028) (0.035) (0.037) (0.0) (0.0)55) ((0.060)	(0.070	(0.0	090) ((0.100)	(0.110	0)		
				PAPER								EMBC	DSSED							

X5R - General Specifications





AVX Corporation will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the AVX Catalog Part Number. This fulfills AVX's commitment to providing a full range of products to our customers. AVX has provided in the following pages a full range of values that we are currently offering in this special "B" termination. Please contact the factory if you require additional information on our MLCC Tin/Lead Termination "B" products.

Not RoHS Compliant

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

LD05	<u>5</u>	D	101	Ţ	<u>A</u>	<u>B</u>	2	<u>A</u>
Size LD02 - 0402 LD03 - 0603 LD04 - 0504* LD05 - 0805 LD06 - 1206 LD10 - 1210 LD12 - 1812 LD13 - 1825 LD14 - 2225 LD20 - 2220	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric X5R = D	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance $B = \pm .10 \text{ pF} (<10 \text{pF})$ $C = \pm .25 \text{ pF} (<10 \text{pF})$ $D = \pm .50 \text{ pF} (<10 \text{pF})$ $F = \pm 1\% (\ge 10 \text{ pF})$ $G = \pm 2\% (\ge 10 \text{ pF})$ $J = \pm 5\%$ $K = \pm 10\%$ $M = \pm 20\%$	Failure Rate A = Not Applicable	Terminations B = 5% min lead X = FLEXITERM® with 5% min lead** **X7R only	Packaging 2 = 7" Reel 4 = 13" Reel Contact Factory For Multiples*	Special Code A = Std. Product

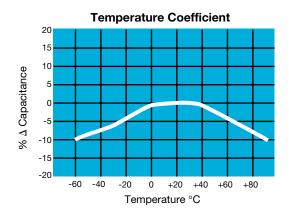
^{*}LD04 has the same CV ranges as LD03.

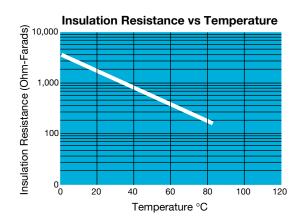
See FLEXITERM® section for CV options

NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers.

Contact factory for non-specified capacitance values.

TYPICAL ELECTRICAL CHARACTERISTICS





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Parame	ter/Test	X5R Specification Limits	Measuring Conditions								
Operating Tem		-55°C to +85°C	Temperature Cycle Chamber								
Capac	itance	Within specified tolerance									
Dissipation	on Factor	≤ 2.5% for ≥ 50V DC rating ≤ 3.0% for 25V, 35V DC rating ≤ 12.5% Max. for 16V DC rating and lower Contact Factory for DF by PN	Freq.: 1.0 kHz ± 10% Voltage: 1.0Vrms ± .2V For Cap > 10 μF, 0.5Vrms @ 120Hz								
Insulation	Resistance	10,000MΩ or 500MΩ - 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)								
	Appearance	No defects	Deflection: 2mm								
Resistance to	Capacitance Variation	≤ ±12%	Test Time: 3	30 seconds 7 1mm/sec							
Flexure Stresses	Dissipation Factor	Meets Initial Values (As Above)									
	Insulation Resistance	≥ Initial Value x 0.3	90 mm								
Solder	ability	≥ 95% of each terminal should be covered with fresh solder	Dip device in eutection for 5.0 ± 0.								
	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 solder at 260°C for 60 seconds. Store at room temperature for 24 ± 2								
00.00.1.000	Insulation Resistance	Meets Initial Values (As Above)	hours before measurin	g electrical 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: +85°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								
	Appearance	No visual defects		v . l							
	Capacitance Variation	≤ ±12.5%	Charge device with 1.5X rated voltage in test chamber set at 85°C ± 2°C for 1000 hours (+48,-0). Note: Contact factory for *optional specification part numbers that are tested at < 1.5X rated voltage.								
Load Life	Dissipation Factor	≤ Initial Value x 2.0 (See Above)									
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from test chamb	· ·							
	Dielectric Strength	Meets Initial Values (As Above)	temperature for 24 ± 2 h	ours before measuring.							
	Appearance	No visual defects									
	Capacitance Variation	≤ ±12.5%	Store in a test chamber s 5% relative humidi								
Load Humidity	Dissipation Factor	≤ Initial Value x 2.0 (See Above)	(+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature and humidity for 24 ± 2 hours before measuring.								
riumuity	Insulation Resistance	≥ Initial Value x 0.3 (See Above)									
	Dielectric Strength	Meets Initial Values (As Above)									

X5R - Capacitance Range



PREFERRED SIZES ARE SHADED

Solder Packaging																																						
Packaging	SIZ	E			L	DO:	2			LD03					LD05					LD06					LD10							LD10 LD1						
(L) Length (mm (L) (Longth (m) (C, 040 + 0.04) (m) (0.063 + 0.006) (0.079 + 0.008) (0.126 + 0.	Solder	ring		F	Reflo	w/V	Vave				Reflo	ow/V	Vave	,		Reflow/Wave							Re	eflow	/Wa	ve				Refl	ow/V	Vave						
C Length (n) (n) (0.040 ± 0.004) (0.053 ± 0.006) (0.079 ± 0.008) (0.126 ± 0.008) (0.126 ± 0.008) (0.126 ± 0.008) (0.053 ± 0.016) (0.020 ± 0.004) (0.032 ± 0.006) (0.049 ± 0.008) (0.063 ± 0.008) (0	Packad	ging	T		All	Par	per				All	Par	oer			P	ape	r/Er	nbo	sse	d	Р	ape	r/Er	nbo	sse	d		Pa	per	/Emt	osse	ed					
W) Width (in)	(I) I ength																																					
(i) Terminal (in) (0.020 ± 0.004) (0.032 ± 0.006) (0.049 ± 0.008) (0.054 ± 0.008) (0.098 ± 0.008) (0.098 ± 0.008) (0.076 ± 0.008) (0.076 ± 0.006) (0.076 ± 0.0	(L) Length								\bot	(5)															((3)					
(t) Terminal mm (0.25 ± 0.15	W) Width							1		(5)															((1)					
WVDC	(t) Torminal	mm	1		0.25	5 ± 0).15		T		0.3	5 ± 0).15				0	.50 ±	0.2	5			0	.50 ±	0.2	5				0.5	0 ± 0	.25						
Cap 100 (ρF) 150 220 330 470 680 60 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	* *								1						L = 0	1.0											150	L.,						150	1.0	140	0.5	
(ρF) 150 220			4	6.3	10	116	25	50	4	6.3	10	16	25	35	50	6.3	10	16	25	35	50	6.3	10	16	25	35	50	4	6.3	10	16	25	35	50	6.3	10	25	50
220	•			ŀ			ł																														'	
330	(þi)							C																													'	
470 680 1000 1500 2200 0 C C C C C C C C C C C C C C C			1			1	+	_		1																		⊢'			٠	>		_	√ _V	V		
680																													7			_		_	\preceq	`\≥	_	
1000 1500																															_	$\overline{}$	7			١.	ļΤ	
1500 2200			T	+	t	T	\top	_				t				t												\vdash		(_	_)		_			_	
2200																																_						
4700 6800																																1	t					
Cap 0.010		3300	İ			İ	1	С																				Η,	ı	i i			ı	ı	ı			
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0.033	(μF)	0.015					С						G	G	G																						'	
0.047		0.022				С	С						G	G	G						N																	
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SIZE LD02 LD03 LD05 LD06 LD10 LD12 Letter A C E G J K M N P Q X Y Z Max. 0.33 0.56 0.71 0.90 0.94 1.02 1.27 1.40 1.52 1.78 2.29 2.54 2.79			Δ	6.3	10	16	5 25	50	Δ	63	10	16	25	35	50	63	10	16	25	35	50	63	10	16	25	35	50			10	16	25	35	50	6.3	10	25	50
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Letter	Α	С	Е	G	J	K	М	N	Р	Q	Х	Υ	Z			
Max.	0.33	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)	(0.022)	(0.028)	(0.035)	(0.037)	(0.040)	(0.050)	(0.055)	(0.060)	(0.070)	(0.090)	(0.100)	(0.110)			
			PAPER			EMBOSSED										

^{*}Optional Specifications - Contact factory

NOTE: Contact factory for non-specified capacitance values

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C1608X7R1E334K C2012C0G2A472J 2220J2K00562KXT KHC201E225M76N0T00 1812J2K00332KXT CCR06CG153FSV

CDR14BP471CJUR CDR31BX103AKWR CDR33BX683AKUS CGA2B2C0G1H010C CGA2B2C0G1H040C CGA2B2C0G1H050C

CGA2B2C0G1H060D CGA2B2C0G1H070D CGA2B2C0G1H120J CGA2B2C0G1H151J CGA2B2C0G1H1R5C CGA2B2C0G1H2R2C

CGA2B2C0G1H390J CGA2B2C0G1H391J CGA2B2C0G1H3R3C CGA2B2C0G1H680J CGA2B2C0G1H6R8D CGA2B2C0G1H820J