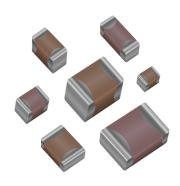
## **MLCC Tin/Lead Termination "B" (LD Series)**

## 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)

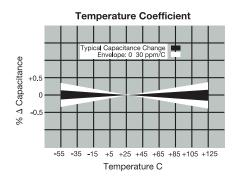
LD05	<u>5</u>	<u>A</u>	101	<u> </u>	<u>A</u>	В	2	<u>A</u>
Size LD02 - 0402 LD03 - 0603 LD04 - 0504* LD05 - 0805 LD06 - 1206 LD10 - 1210 LD12 - 1812 LD13 - 1825 LD14 - 2225 LD14 - 2225	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric COG (NPO) = A X7R = C X5R = D X8R = F	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance B = ±.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

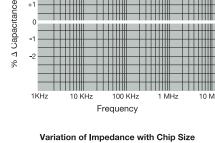
 $M = \pm 20\%$ 

\*LD04 has the same CV ranges as LD03.

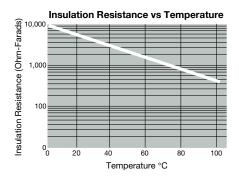
See FLEXITERM® section for CV options

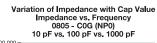
NOTE: Contact factory for availability of Tolerance Options for Specific Part Numbers. Contact factory for non-specified capacitance values.

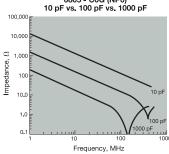


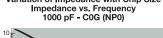


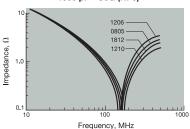
△ Capacitance vs. Frequency



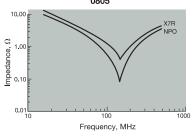








Variation of Impedance with Ceramic Formulation Impedance vs. Frequency 1000 pF - C0G (NP0) vs X7R 0805





The Important Information/Disclaimer is incorporated in these specifications 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**

			L DOG				<b>=</b>										l		
SIZI	E		LD02			LD	03				LD05					LD0	6		
Solder	ing	Re	eflow/W	ave		Reflov	v/Wave			Re	eflow/Wa	ive				Reflow/\	Wave		
Packag	ging mm		All Pape				aper ± 0.15				er/Embo 2.01 ± 0.2				Pa	aper/Eml			
(L) Length	(in.)	(0.0	040 ± 0.0	004)		(0.063	± 0.006)			(0.	079 ± 0.0	08)			(	0.126 ± (	0.008)		
W) Width	mm (in.)	(0.0	0.50 ± 0.1 020 ± 0.0	004)		(0.032	± 0.15 ± 0.006)			(0.	.25 ± 0.2 049 ± 0.0	08)			(	1.60 ± 0 0.063 ± 0	(800.0		
(t) Terminal	mm (in.)		0.25 ± 0.1 010 ± 0.0				± 0.15 ± 0.006)				0.50 ± 0.2 020 ± 0.0				(	0.50 ± 0 0.020 ± 0			
Сар	WVDC 0.5	16 C	25 C	50 C	16 G	25 G	50 G	100 G	16 J	25 J	50 J	100 J	200 J	16 J	25 J	50 J	100 J	200 J	500 J
(pF)	1.0	С	С	С	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	G	J	J	J	J	J	J	J	J	J	J	J
	1.8 2.2	C C	C	C	G G	G G	G G	G G	J J	J	J	J	J	J	J	J	J	J	J J
	2.7	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	3.3 3.9	C	C	C	G G	G G	G G	G G	J	J	J	J	J	J	J	J	J	J	J J
	4.7 5.6	C C	C	C	G G	G G	G G	G	J J	J	J	J	J	J	J	J	J	J	J J
	6.8	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	8.2 10	C C	C	C	G G	G G	G G	G	J	J	J	J	J	J	J	J	J	J	J J
	12 15	C C	C	C	G G	G G	G G	G G	J J	J J	J	J	J	J J	J	J	J J	J	J J
	18	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	22 27	C C	C	C	G G	G G	G G	G	J J	J	J	J	J	J	J	J	J	J	J J
	33 39	C C	C	C	G G	G G	G G	G G	J J	J	J	J	J	J	J	J	J	J	J J
	47	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	56 68	C C	C	C	G G	G G	G G	G	J	J	J	J	J	J	J	J	J	J	J J
	82 100	C C	C	C	G G	G G	G G	G	J J	J	J	J	J	J	J	J	J	J	J J
	120	С	С	С	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J
	150 180	C	C	C	G G	G G	G	G	J J	J	J	J	J	J	J	J	J	J	J J
	220 270	C C	C	C	G G	G G	G G	G G	J J	J	J	J	J M	J	J	J J	J J	J	M M
	330	С	С	С	G	G	G	G	J	J	J	J	М	J	J	J	J	J	М
	390 470	C C	C	C	G G	G G	G G	G	J	J	J	J	M M	J	J	J	J	J	M M
	560 680				G G	G G	G G		J	J	J	J	М	J	J	J	J	J	M P
	820 1000				G G	G G	G		J	J	J	J		J	J	J	J	М	
	1200				G	G	G		J	J	J	J		J	J	J	J	Q Q	
	1500 1800								J J	J	J			J	J	J M	M M	Q	
	2200 2700								J J	J J	N N			J J	J	M M	P P		
	3300								J	J	IN			J	J	М	Р		
	3900 4700								J	J				J	J	M M	P P		
	5600 6800													J M	J M	М			
Сар	8200											-		М	M				
(pF)	0.010 0.012													M	M				
	0.015 0.018		+	l . <i>&gt;</i>	 	I <b>~</b> W~	' –											$\vdash$	
	0.022 0.027		~				<b>1</b>												
	0.033		† (		) -	الل	1 −												
	0.039 0.047																		
	0.068 0.082		Ī		<b>1</b>		. –												
	0.1																		
	WVDC SIZE	16	25 <b>LD02</b>	50	16	25	50 0 <b>3</b>	100	16	25	50 LD05	100	200	16	25	50 <b>LD0</b>	100	200	500
Letter	A			E	G	LL	J	K	М		N N	P		)	X	Y	,	Z	1
Max.	0.33	0.5		0.71	0.90	C	0.94	1.02	1.27	,	1.40	1.52	1.7	78	2.29	2.54		2.79	
Thickness	(0.013)	(0.0	22)	(0.028)	(0.035	5) (0.	.037)	(0.040)	(0.05	0) (0	).055)	(0.060)	(0.0	,	(0.090)	(0.10	0) (	0.110)	
l				PAPER								ΕM	BOSSED						

## C0G (NP0) - Capacitance Range

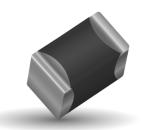


#### **PREFERRED SIZES ARE SHADED**

SIZ	F			LD10					LD12				LD13			LD14	
Solder			F	Reflow On	ly			R	Reflow Or	nly			Reflow Only			Reflow Only	
Packa	ging		Pap	er/Embo	ssed			Al	l Emboss	sed			All Embossed			All Embossed	
(L) Length	mm (in.)			3.20 + 0.2 126 ± 0.0					1.50 ± 0.3 177 ± 0.0				4.50 ± 0.30 (0.177 ± 0.012	)		5.72 ± 0.25 (0.225 ± 0.010	)
W) Width	mm		2	2.50 ± 0.2 098 ± 0.0	0			3	3.20 ± 0.2 126 ± 0.0	20			6.40 ± 0.40			6.35 ± 0.25 (0.250 ± 0.010	,
(t) Terminal	(in.) mm		(	0.50 ± 0.2	5			(	0.61 ± 0.3	36			0.61 ± 0.36	•		0.64 ± 0.39	
(9)	(in.) WVDC	25	(0. 50	020 ± 0.0 100	10) 200	500	25	50	024 ± 0.0 100	200	500	50	(0.024 ± 0.014 100	200	50	0.025 ± 0.015 100	200
Cap	0.5 1.0																
(pF)	1.2																
	1.5 1.8																
	2.2																₩.
	2.7 3.3																) <u>T</u> T
	3.9 4.7														_		1
	5.6														_	a-t	
	6.8 8.2																İ
	10 12					J											
	15					J											
	18 22					J											
	27 33					J											
	39					J											
	47 56					J											
	68					J											
	82 100					J											
	120 150					J J											
	180					J											
	220 270					J											
	330 390					J M											
	470					М											
	560 680	J	J	J	J	M M											
	820	J	J	J	J	M M	1/	I/	V	I/	N4	M	M	M	M	M	D
	1000 1200	J	J	J	J M	M	K	K	K K	K K	M M	M M	M M	M M	M M	M M	P P
	1500 1800	J J	J	J	M M	М	K	K	K K	K K	M M	M M	M	M M	M M	M M	P P
	2200	J	J	J	Q		K	K	K	K	Р	M	М	М	М	М	P
	2700 3300	J	J	J	Q		K	K	K K	P P	Q	M M	M M	M M	M M	M M	P P
	3900 4700	J J	J	M M			K K	K	K K	P P	Q Q	M M	M M	M M	M M	M M	P P
	5600	J	J				K	K	М	Р	X	М	М	М	М	М	Р
	6800 8200	J	J				K K	K M	M M	Х		M M	M M	M	M M	M M	P P
Cap (pF)	0.010 0.012	J	J				K K	M M	М			M M	M M		M M	M M	P P
V /	0.015						М	М				М	М		М	М	Υ
	0.018 0.022						M M	M M				P P	М		M M	M Y	Y
	0.027 0.033						M	M M				P P			P P	Y	Y
	0.039						М	М				Р			Р		
	0.047						M	M				Р			P P		
	0.082						М	M					1		Q Q		
	WVDC	25	50	100	200	500	25	50	100	200	500	50	100	200	50	100	200
SIZ	E			LD10					LD12				LD13			LD14	
Letter	Α	С		Е	G	J		K	М		N	Р		X Y	Z		
Max. Thickness	0.33 (0.013)	(0.02		0.71	0.90 (0.035)	(0.03		1.02 (0.040)	1.27		.40 055)	1.52 (0.060)		29 2.54 090) (0.100			
	(0.010)	(0.02	,	PAPER	(0.000)	(0.0.	,	(0.040)	(3.000	, (0.		EMBOS	, ,	(0.700	(3.110)	-	

### 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> </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
	itance on Factor	Within specified tolerance ≤ 2.5% for ≥ 50V DC rating ≤ 3.5% for 25V DC and 16V DC rating	Freq.: 1.0 k Voltage: 1.0	
Insulation	Resistance	100,000ΜΩ or 1000ΜΩ - 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 r	mm —
Solder	rability	≥ 95% of each terminal should be covered with fresh solder	Dip device in eutection for 5.0 ± 0.5	
	Appearance	No defects, <25% leaching of either end terminal		
	Capacitance Variation	≤ ±7.5%	Die desire in contration	I I + 06000 f 60
Resistance to Solder Heat	Dissipation Factor	Meets Initial Values (As Above)	Dip device in eutectic s seconds. Store at room	temperature for 24 ± 2
Coluct Float	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	and measure after om temperature
	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)	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.



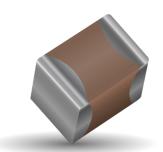


	SIZ	ZE			LDO	)3		L	.D05				LD06	
		WVD	C	2	5V	50V		25V		50	v	25V		50V
271	Cap	270			G	G								
331	(pF)	330		1	G	G		J		J				
471		470		1	G	G		J		J				
681		680		1	G	G		J		J				
102		1000			G	G		J		J		J		J
152		1500			G	G		J		J		J		J
182		1800			G	G		J		J		J		J
222		2200			G	G		J		J		J		J
272		2700			G	G		J		J		J		J
332		3300			G	G		J		J		J		J
392		3900			G	G		J		Ų		J		J
472		4700		1	G	G		J		Ų		J		J
562		5600		1	G	G		J		Ų		J		J
682		6800		1	G	G		J		Ų		J		J
822	Cap	8200		1	G	G		J		Ų		J		J
103	(µF)	0.01			G	G		J				J		J
123	1 " 1	0.012			G	G		J		J		J		J
153		0.015		1	G	G		J		Ų		J		J
183		0.018		1	G	G		J		,		J		J
223		0.022			G	G		J				J		J
273		0.027			G	G		J		J		J		J
333		0.033			G	G		J		,		J		J
393		0.039			G	G		J				J		J
473		0.047			G	G		J				J		J
563		0.056			G			N		١		М		М
683		0.068			G			N		N		М		М
823		0.082						N		N		М		М
104		0.1						N		N		М		М
124		0.12						N		N		М		М
154		0.15		1	i			N		N		М		М
184		0.18						N				М		М
224		0.22						N				М		М
274		0.27		1								М		М
334		0.33	-	İ								M		M
394		0.39	-	i –					$\neg$			M		
474		0.47	-	İ					$\neg$			M		
684		0.68		İ					$\neg$					
824		0.82	-											
105		-	i –					$\neg$						
	05 1 WVDC				5V	50V		25V		50	V	25V		50V
	SIZ			1	LD				.D05	- 30		LD06		
Letter	A	C	E	G	J	K	M	N	P		Q	X	Υ	Z

Letter	Α	С	E	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						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** 

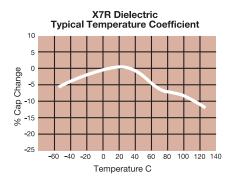
#### PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

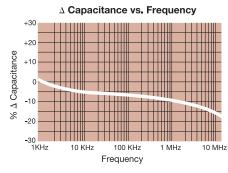
<u>LD05</u>	5	<u>c</u>	101	J	<u>A</u>	В	2	<u>A</u>
Size LD03 - 0603 LD04 - 0504* LD05 - 0805 LD06 - 1206 LD10 - 1210 LD12 - 1812 LD13 - 1825	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1	Dielectric X7R = C	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance $B = \pm .10 \text{ pF} (<10 \text{ pF})$ $C = \pm .25 \text{ pF} (<10 \text{ pF})$ $D = \pm .50 \text{ pF} (<10 \text{ pF})$ $F = \pm 1\% (\ge 10 \text{ pF})$ $G = \pm 2\% (\ge 10 \text{ pF})$ $J = \pm 5\%$	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
LD14 - 2225 LD20 - 2220	200V = 2 500V = 7			K = ±10% M = ±20%				

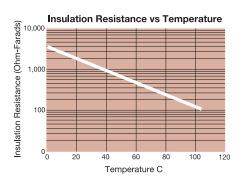
<sup>\*</sup>LD04 has the same CV ranges as LD03.

See FLEXITERM® section for CV options

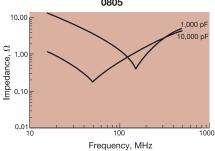
Contact factory for availability of Tolerance Options for Specific Part Numbers. Contact factory for non-specified capacitance values.



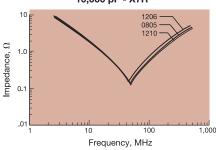




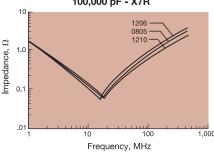
Variation of Impedance with Cap Value Impedance vs. Frequency 1,000 pF vs. 10,000 pF - X7R 0805



Variation of Impedance with Chip Size Impedance vs. Frequency 10,000 pF - X7R



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







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	0 seconds 7 1mm/sec
Flexure Stresses	Dissipation Factor	Meets Initial Values (As Above)		
	Insulation Resistance	≥ Initial Value x 0.3	90 n	
Solder	rability	≥ 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	ated voltage (≤ 10V) in
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	
numany	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	ina	Α	II Pap	er			A	II Par	er				F	Paper	/Emb	osse	d				Pai	per/Er	nbos	sed		
(L) Length	mm	1.0	00 ± 0.	10			1.0	60 ± 0	.15					2.0	01 ± 0.	.20						3.20 ±	0.20			
( ) - 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.						(	1.00 ± 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 <sup>-</sup>	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	300
(pF)	150																									
(F-)	220			С																						i i
	330			С			G G						J	J	J	J	J	J								K
	470			С		G C					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		J	J	J	J	J	J		J	J	J	J	J	J	K
	2200			C			G   G						J	J	J	J	J	J		J	J	J	J	J	J	M
	3300		С	C					G	G			J	J	J	J	J	J		J	J	J	J	J	J	М
	4700		С	С					G	G		İ	J	J	J	J	J	J	ĺ	J	J	J	J	J	J	M
	6800	С	С						G	G			J	J	J	J	J	J		J	J	J	J	J	J	Р
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	$\vdash$
	0.047	U					G	G	G				J	J	Ĵ	Ĵ	N			J	Ĵ	Ĵ	J	Ĵ	M	
	0.068						G	G	G				J	J	J	J	N			J	J	J	J	J	Р	
	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 N	J N	N N	N N	N N			J	J	J M	J P	Q	<u> </u>	
	0.33							J*					N	N	N	N	N			J M	M	M	P	Q		
	0.68												N	N	N	14	14			M	M	Q	Q	Q		
	1.0					J*	J*						N	N	N*					М	М	Q	Q	Q		
	1.5											İ							İ	Р	Q	Q			'	l l
	2.2				J*										P*					Q	Q	Q				
	3.3												Dit	Dit						O.t.	O.t.	O.t.				
	4.7 10											p*	P*	P*						Q* Q*	Q* Q*	Q* Q				
-	22											F"	F						0*	Ų"	Ų"	Ų			$\vdash$	
	47																		٧ .							
	100																									
	WVDC	16	25	50	6.3					100	200	6.3	10	16	25	50	100	200	6.3	10	16	25	50	100	200	500
	SIZE		LD02			LD03								LD05							LD	U6				
Letter	Α		С		Е	- G   I				K	1	И	N	Т	Р		Q		Х		Υ		Z			
Max.	0.33		0.56		 0.71	G J 0.90 0.94				.02		27	1.4		1.5	2	1.78		2.29		2.54	+	<u>-</u> 2.79			
Thickness	(0.013)		0.00		1.028)		.035)		.037)		040)		050)	(0.0	-	(0.06		(0.07)		(0.090	0) (	0.100		2.75 ).110)		
	(0.010)				APER		.555)		.507)	(5.0	- 10/	(0.0	, , ,	,0.0			MBOS		-)   '	(3.030	·/ [ (	5.100	, _ (c	,,,,,	-	

= Under Development



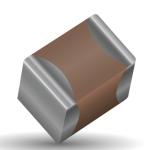


#### **PREFERRED SIZES ARE SHADED**

SIZE					LD10					LD	12		LD	13		LD	20		LD	14
Solder	ina			R	eflow Onl	v				Reflov	v Only		Reflox	w Only		Refloy	w Only		Reflov	v Only
Packac	-				er/Embos	<u> </u>				All Emi				bossed			bossed			oossed
	mm				3.20 + 0.20					4.50				± 0.30			± 0.50		5.72	
(L) Length	(in.)				126 ± 0.00					(0.177 :				± 0.012)			± 0.020)		(0.225 ±	
W) Width	mm				2.50 ± 0.20					3.20 :				± 0.40			± 0.40		6.35	
	(in.) mm				098 ± 0.00					0.126 :				± 0.016) ± 0.36		(0.197 :			(0.250 ± 0.64 ±	
(t) Terminal	(in.)			(0.0	020 ± 0.01	10)				(0.024 :	0.014)		(0.024 :	± 0.014)		(0.025 :	± 0.015)		(0.025 ±	± 0.015)
WVD		10	16	25	50	100	200	500	50	100	200	500	50	100	25	50	100	200	50	100
Cap (pF)	100 150																' >	·	W_	
(pi )	220															*	<u> </u>			
	330															┌ `			1).	ŢT 1
	470																_	1		_
	680															┡		الحرا		
	1000 1500	J	J	J	J	J	J	М										Tt		
	2200	J	J	Ĵ	Ĵ	J	J	M									1	I		
	3300	J	J	J	J	J	J	М												
	4700	J	J	J	J	J	J	M												
0	6800 0.010	J J	J	J	J	J	J	M	K	K	K	K	М	М		Х	X	Х	М	Р
Cap (µF)	0.010	J	J	J	J	J	J	P	K	K	K	P	M	M		X	X	×	M	P
(μ.)	0.022	Ĵ	Ĵ	Ĵ	Ĵ	Ĵ	Ĵ	Q	ĸ	K	K	P	M	M		X	x	x	M	P
	0.033	J	J	J	J	J	J	Q	K	K	K	Х	М	М		Х	Х	Х	М	Р
	0.047	J	J	J	J	J	J		K	K	K	Z	M	М		X	X	X	М	Р
	0.068	J J	J	J	J	J	M M		K	K	K	Z	M	M M		X	X	X	M M	P P
	0.10	J	J	J	J	M	Z		K	K	P		M	M		x	l x	x	M	P
	0.22	J	J	J	J	Р	Z		K	K	Р		М	М		X	X	Х	М	Р
	0.33	J	J	J	٦	Q			K	М	X		М	М		X	X	Х	М	Р
	0.47	M	M	M P	M	Q			K	P			M	M P		X	X	Х	M	P P
	0.68	M N	M N	P	X	Z		+	M	Q X			M M	P		X	X		M M	P
	1.5	N	N	Z	Z	Z			Z	Ž			M			X	x		M	X
	2.2	Χ	X	Z	Z	Z			Z	Z						X	X		М	
	3.3	X	X	Z	Z				Z Z							X	Z			
	4.7 10	X Z	X Z	Z	Z Z				Z							X Z	Z Z			
	22	Z Z Z Z						+							Z					$\vdash$
	47																			
	100	10	10	0.5	- 50	100	000	500	- 50	100	000	500	- 50	100	0.5	- 50	100	000	50	100
SIZE	WVDC	10	16	25	50 <b>LD10</b>	100	200	500	50	100 <b>LD</b>	200	500	50 LD	100 <b>13</b>	25	50 LD	100	200	50 <b>LD</b>	100 1.4
SIZE			EDIO							LD	14		LD	13		LD	20		LD	1-7
Letter	Α	C		Е	G			K	M 1.27		1	Р	Q		X	Υ	Z			
Max.	0.33		0.56 0.71 0.90 0.94 1.0								40	1.52	1.78		29	2.54	2.79			
Thickness	(0.013)	(0.0		0.028)	(0.035	) (0.0	37)	(0.040)	(0.050	0.0)	)55) (	0.060)	(0.070	0.0)	090)   (	(0.100)	(0.110	0)		
				PAPER								EMBO	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>	<u>2</u>	<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	<b>Dielectric</b> X5R = D	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

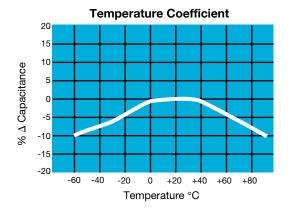
<sup>\*</sup>LD04 has the same CV ranges as LD03.

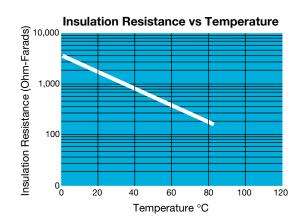
See FLEXITERM® section for CV options

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

Contact factory for non-specified capacitance values.

#### TYPICAL ELECTRICAL CHARACTERISTICS









Parame	ter/Test	X5R Specification Limits	Measuring Conditions								
	perature Range	-55°C to +85°C	Temperature C	ycle Chamber							
Capac	itance on Factor	Within specified tolerance ≤ 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	Deflectio								
Resistance to Flexure	Capacitance Variation	≤ ±12%	Test Time: 30 seconds  1mm/sec								
Stresses	Dissipation Factor	Meets Initial Values (As Above)									
Insulation Resistance		≥ Initial Value x 0.3	90 mm								
Solderability		≥ 95% of each terminal should be covered with fresh solder	Dip device in eutection 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 solder at 260°C for 60 seconds. Store at room temperature for 24 ± 2 hours before measuring electrical properties.								
00.00.	Insulation Resistance	Meets Initial Values (As Above)									
	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	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								
	Capacitance Variation	≤ ±12.5%									
Load Life	Dissipation Factor	≤ Initial Value x 2.0 (See Above)	specification part numl	bers that are tested at							
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from test chamb	· ·							
	Dielectric Strength	Meets Initial Values (As Above)	temperature for 24 ± 2 hours before measuring.								
	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	d voltage applied.							
Humidity	Insulation Resistance	≥ Initial Value x 0.3 (See Above)	Remove from chamber and stabilize at room temperature and humidity for 24 ± 2 hours before measuring.								
	Dielectric Strength	Meets Initial Values (As Above)									

### X5R - Capacitance Range



#### PREFERRED SIZES ARE SHADED

SIZ	E			LI	D02			LD03							LD05						LD06						LD10							LD12						
Solder	ring	Reflow/Wave					Reflow/Wave							Reflow/Wave							Reflow/Wave					Reflow/Wave														
Packa	ging	All Paper						All Paper							Paper/Embossed							Paper/Embossed					Paper/Embossed									$\neg$				
(L) Length	mm				± 0.										2.01 ± 0.20						3.20 ± 0.20					3.20 ± 0.20														
· · · ·	(in.) mm				± 0.		004) (0.063 10 0.81						5)		(0.079 ± 0.008) 1.25 ± 0.20						(0.126 ± 0.008) 1.60 ± 0.20					(0.126 ± 0.008) 2.50 ± 0.20									-					
W) Width	(in.)					004)			(0	0.032			6)			(0.0	)49 ±	0.00	08)		(0.063 ± 0.008)						(0.098 ± 0.008)													
(t) Terminal	mm				± 0.				//	0.35			د)					0.2			$0.50 \pm 0.25$ (0.020 ± 0.010)					0.50 ± 0.25 (0.020 ± 0.010)														
WVD	(in.)					006) 25	50	4		(0.014 ± 0.006) .3   10   16   25   35				50	6.3	10.0	120 ±	25	35	50	6.3	10.0	16	25	35	50	4							6.3	10	25	50			
Сар	100	Ė	0.0				00	Ė	0.0				00		0.0					00	0.0					00		0.0						0.0			-			
(pF)	150					İ		İ																								İ			1 1		ı			
	220						С																				I				ļ			Ļ		١	J			
	330						С																				_	-[-	$\nearrow$	$\geq$	$\leq$	<b>₩</b>								
	470						С																				_	<	~	$\leq$	_		J ) 🛨							
	680	_	_	_	_	_	С								-		-	Н	Ш				$\vdash$		Н	_		(	_ `	$\supset$	)	_								
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#### \*Optional Specifications - Contact factory

NOTE: Contact factory for non-specified capacitance values

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2225J2500824KXT CCR07CG103KM CGA2B2C0G1H010C CGA2B2C0G1H040C CGA2B2C0G1H050C CGA2B2C0G1H060D

CGA2B2C0G1H070D CGA2B2C0G1H151J CGA2B2C0G1H1R5C CGA2B2C0G1H2R2C CGA2B2C0G1H3R3C CGA2B2C0G1H680J

CGA4J2X7R2A104K