

Automotive MLCC



Automotive

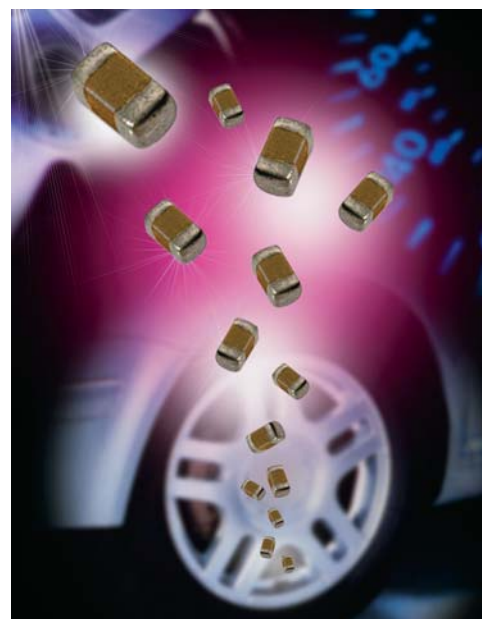
GENERAL DESCRIPTION

AVX Corporation has supported the Automotive Industry requirements for Multilayer Ceramic Capacitors consistently for more than 10 years. Products have been developed and tested specifically for automotive applications and all manufacturing facilities are QS9000 and VDA 6.4 approved.

As part of our sustained investment in capacity and state of the art technology, we are now transitioning from the established Pd/Ag electrode system to a Base Metal Electrode system (BME).

AVX is using AECQ200 as the qualification vehicle for this transition. A detailed qualification package is available on request and contains results on a range of part numbers including:

- X7R dielectric components containing BME electrode and copper terminations with a Ni/Sn plated overcoat.
- X7R dielectric components, BME electrode with epoxy finish for conductive glue mounting.
- X7R dielectric components BME electrode and soft terminations with a Ni/Sn plated overcoat.
- NP0 dielectric components containing Pd/Ag electrode and silver termination with a Ni/Sn plated overcoat.



HOW TO ORDER

0805	5	A	104	K	4	T	2	A
Size	Voltage	Dielectric	Capacitance Code (In pF)	Capacitance Tolerance	Failure Rate	Terminations	Packaging	Special Code
0402	10V = Z	NP0 = A	2 Significant	F = $\pm 1\%$	4 = Automotive	T = Plated Ni and Sn	2 = 7" Reel	A = Std. Product
0603	16V = Y	X7R = C	Digits + Number	($\geq 10\text{pF}$)*		Z = FLEXITERM®**	4 = 13" Reel	
0805	25V = 3	X8R = F	of Zeros	G = $\pm 2\%$		U = Conductive Epoxy**		
1206	50V = 5		e.g. 10 μF = 106	($\geq 10\text{pF}$)*				
1210	100V = 1			J = $\pm 5\%$				
1812	200V = 2			($\leq 1\mu\text{F}$)				
	500V = 7			K = $\pm 10\%$				
				M = $\pm 20\%$				

*NP0 only

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

NOTE: Contact factory for non-specified capacitance values.
0402 case size available in T termination only.

COMMERCIAL VS AUTOMOTIVE MLCC PROCESS COMPARISON

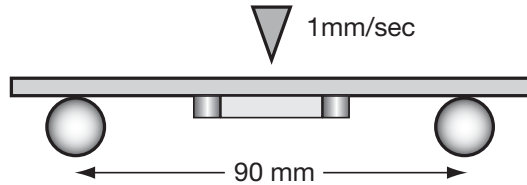
	Commercial	Automotive
Administrative	Standard Part Numbers. No restriction on who purchases these parts.	Specific Automotive Part Number. Used to control supply of product to Automotive customers.
Design	Minimum ceramic thickness of 0.020"	Minimum Ceramic thickness of 0.029" (0.74mm) on all X7R product.
Dicing	Side & End Margins = 0.003" min	Side & End Margins = 0.004" min Cover Layers = 0.005" min
Lot Qualification (Destructive Physical Analysis - DPA)	As per EIA RS469	Increased sample plan – stricter criteria.
Visual/Cosmetic Quality	Standard process and inspection	100% inspection
Application Robustness	Standard sampling for accelerated wave solder on X7R dielectrics	Increased sampling for accelerated wave solder on X7R and NP0 followed by lot by lot reliability testing.

All Tests have Accept/Reject Criteria 0/1

FLEXITERM® FEATURES

a) Bend Test

The capacitor is soldered to the PC Board as shown:



Typical bend test results are shown below:

Style	Conventional Term	Soft Term
0603	>2mm	>5
0805	>2mm	>5
1206	>2mm	>5

b) Temperature Cycle testing

FLEXITERM® has the ability to withstand at least 1000 cycles between -55°C and +125°C

ELECTRODE AND TERMINATION OPTIONS

NP0 DIELECTRIC

**NP0 Ag/Pd Electrode
Nickel Barrier Termination
PCB Application**

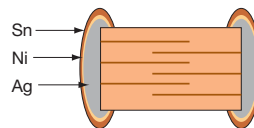


Figure 1 Termination Code T

X7R DIELECTRIC

**X7R Dielectric
PCB Application**

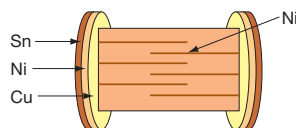


Figure 2 Termination Code T

**X7R Nickel Electrode
Soft Termination
PCB Application**

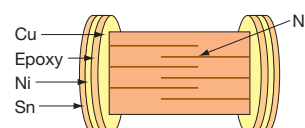


Figure 3 Termination Code Z

**Conductive Epoxy Termination
Hybrid Application**

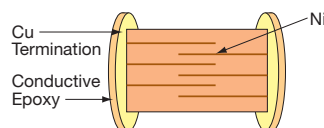


Figure 4 Termination Code U

Automotive MLCC - NP0

Capacitance Range



	0603			0805			1206					1210				1812	
	25V	50V	100V	25V	50V	100V	25V	50V	100V	200V	500V	25V	50V	100V	200V	50V	100V
100 10pF	G	G	G	J	J	J	J	J	J	J	J						
120 12	G	G	G	J	J	J	J	J	J	J	J						
150 15	G	G	G	J	J	J	J	J	J	J	J						
180 18	G	G	G	J	J	J	J	J	J	J	J						
220 22	G	G	G	J	J	J	J	J	J	J	J						
270 27	G	G	G	J	J	J	J	J	J	J	J						
330 33	G	G	G	J	J	J	J	J	J	J	J						
390 39	G	G	G	J	J	J	J	J	J	J	J						
470 47	G	G	G	J	J	J	J	J	J	J	J						
510 51	G	G	G	J	J	J	J	J	J	J	J						
560 56	G	G	G	J	J	J	J	J	J	J	J						
680 68	G	G	G	J	J	J	J	J	J	J	J						
820 82	G	G	G	J	J	J	J	J	J	J	J						
101 100	G	G	G	J	J	J	J	J	J	J	J						
121 120	G	G	G	J	J	J	J	J	J	J	J						
151 150	G	G	G	J	J	J	J	J	J	J	J						
181 180	G	G	G	J	J	J	J	J	J	J	J						
221 220	G	G	G	J	J	J	J	J	J	J	J						
271 270	G	G	G	J	J	J	J	J	J	J	J						
331 330	G	G	G	J	J	J	J	J	J	J	J						
391 390	G	G		J	J	J	J	J	J	J	J						
471 470	G	G		J	J	J	J	J	J	J	J						
561 560				J	J	J	J	J	J	J	J						
681 680				J	J	J	J	J	J	J	J						
821 820				J	J	J	J	J	J	J	J						
102 1000				J	J	J	J	J	J	J	J	J	J	J	J		
122 1200							J	J	J	J	J	J	J	M	M		
152 1500							J	M	M	M	M	J	J	M	M		
182 1800							J	M	M	M	M	J	J	M	M		
222 2200							J	M	M	M	M	J	J	M	M		
272 2700							J	M	Q			J	J	M			
332 3300							J	M	Q			J	J	P		K	K
392 3900												J	J	P		K	K
472 4700												J	J	P		K	K
103 10nF																	
	25V	50V	100V	25V	50V	100V	25V	50V	100V	200V	500V	25V	50V	100V	200V	50V	100V
	0603			0805			1206					1210				1812	

Letter	A	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	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							

 = Under Development

Automotive MLCC - X7R

Capacitance Range



		0402			0603					0805					1206						1210				1812			2220	
		16V	25V	50V	16V	25V	50V	100V	200V	16V	25V	50V	100V	200V	16V	25V	50V	100V	200V	500V	16V	25V	50V	100V	50V	100V	25V	50V	
221	Cap .22																												
271	(nF) .27																												
331	.33																												
391	.39																												
471	.47																												
561	.56																												
681	.68																												
821	.82																												
102	1				G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
182	1.8				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
222	2.2				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
332	3.3				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
472	4.7				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
103	10				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
123	12				G	G	G			J	J	J	M		J	J	J	J	J			K	K	K	K	K	K		
153	15				G	G	G			J	J	J	M		J	J	J	J	J			K	K	K	K	K	K		
183	18				G	G	G			J	J	J	M		J	J	J	J	J			K	K	K	K	K	K		
223	22				G	G	G			J	J	J	M		J	J	J	J	J			K	K	K	K	K	K		
273	27				G	G	G			J	J	J	M		J	J	J	J	J			K	K	K	K	K	K		
333	33				G	G	G			J	J	J	M		J	J	J	J	J			K	K	K	K	K	K		
473	47				G	G	G			J	J	J	M		J	J	J	M	J			K	K	K	K	K	K		
563	56				G	G	G			J	J	J	M		J	J	J	M	J			K	K	K	M	K	K		
683	68				G	G	G			J	J	J	M		J	J	J	M	J			K	K	K	M	K	K		
823	82				G	G	G			J	J	J	M		J	J	J	M	J			K	K	K	M	K	K		
104	100				G	G	G			J	J	M	M		J	J	J	M	J			K	K	K	M	K	K		
124	120									J	J	M			J	J	M	M				K	K	K	P	K	K		
154	150									M	N	M			J	J	M	M				K	K	K	P	K	K		
224	220									M	N	M			J	M	M	Q				M	M	M	P	M	M		
334	330									N	N	M			J	M	P	Q				P	P	P	Q	X	X		
474	470									N	N	M			M	M	P	Q				P	P	P	Q	X	X		
684	680									N	N				M	Q	Q	Q				P	P	Q	X	X	X		
105	Cap 1									N	N				M	Q	Q	Q				P	Q	Q	X	X	X		
155	(μF) 1.5														Q	Q						P	Q	Z	Z	X	X		
225	2.2														Q	Q						X	Z	Z	Z	Z	Z		
335	3.3																					X	Z	Z		Z			
475	4.7																					X	Z	Z		Z			
106	10																											Z	
226	22																											Z	
		16V	25V	50V	16V	25V	50V	100V	200V	16V	25V	50V	100V	200V	16V	25V	50V	100V	200V	500V	16V	25V	50V	100V	50V	100V	25V	50V	
		0402			0603					0805					1206						1210				1812			2220	

 = Under Development

Letter	A	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	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							

Automotive MLCC - X8R



Capacitance Range

SIZE				0603			0805				1206		
	WVDC			25V	50V	25V	50V	25V	50V	25V	50V		
271	Cap	270		G	G								
331	(pF)	330		G	G	J	J						
471		470		G	G	J	J						
681		680		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	J			J	J		
472		4700		G	G	J	J			J	J		
562		5600		G	G	J	J			J	J		
682		6800		G	G	J	J			J	J		
822		8200		G	G	J	J			J	J		
103	Cap	0.01		G	G	J	J			J	J		
123	(μF)	0.012		G	G	J	J			J	J		
153		0.015		G	G	J	J			J	J		
183		0.018		G	G	J	J			J	J		
223		0.022		G	G	J	J			J	J		
273		0.027		G	G	J	J			J	J		
333		0.033		G	G	J	J			J	J		
393		0.039		G	G	J	J			J	J		
473		0.047		G	G	J	J			J	J		
563		0.056		G		N	N			M	M		
683		0.068		G		N	N			M	M		
823		0.082				N	N			M	M		
104		0.1				N	N			M	M		
124		0.12				N	N			M	M		
154		0.15				N	N			M	M		
184		0.18				N				M	M		
224		0.22				N				M	M		
274		0.27								M	M		
334		0.33								M	M		
394		0.39								M			
474		0.47								M			
684		0.68											
824		0.82											
105		1											
	WVDC			25V	50V	25V	50V	25V	50V	25V	50V		
SIZE				0603			0805			1206			
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
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					EMBOSS							

 = AEC-Q200 Qualified