Automotive MLCC

Automotive

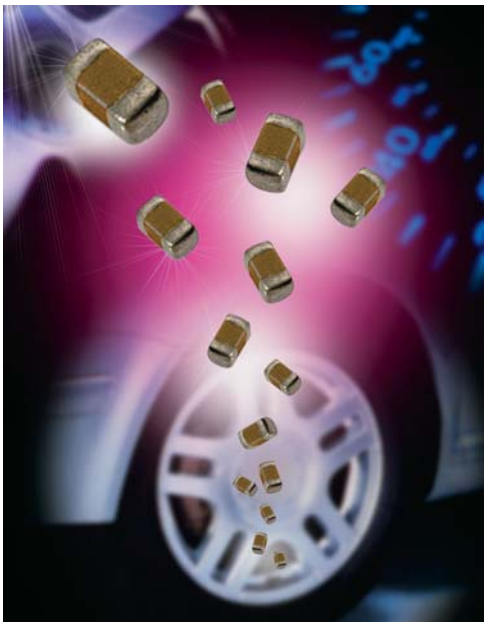
GENERAL DESCRIPTION

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 = ±1% (≥10pF)*	4 = Automotive	T = Plated Ni and Sn	2 = 7" Reel	A = Std. Product
0603	16V = Y	X7R = C	Digits + Number	G = ±2% (≥10pF)*		Z = FLEXITERM®**	4 = 13" Reel	
0805	25V = 3	X8R = F	of Zeros	J = ±5% (≤1µF)		U = Conductive Epoxy**		
1206	50V = 5		e.g. 10µF = 106	K = ±10%				
1210	100V = 1			M = ±20%				
1812	200V = 2							
	500V = 7							

**X7R & X8R only

*NPO 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.

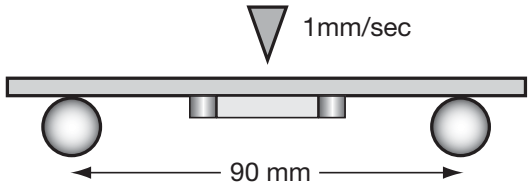
COMMERCIAL VS AUTOMOTIVE MLCC PROCESS COMPARISON

	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

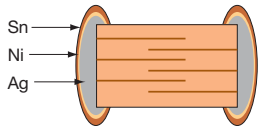


Figure 1 Termination Code T

X7R DIELECTRIC

X7R Dielectric
PCB Application

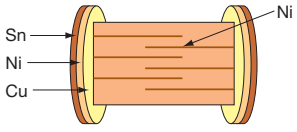


Figure 2 Termination Code T

X7R Nickel Electrode
Soft Termination
PCB Application

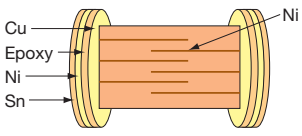


Figure 3 Termination Code Z

Conductive Epoxy Termination
Hybrid Application

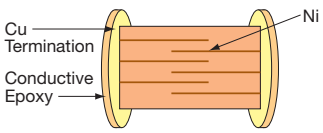


Figure 4 Termination Code U

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							
220	22	G	G	G	J	J	J	J	J	J	J							
270	27	G	G	G	J	J	J	J	J	J	J							
330	33	G	G	G	J	J	J	J	J	J	J							
390	39	G	G	G	J	J	J	J	J	J	J							
470	47	G	G	G	J	J	J	J	J	J	J							
510	51	G	G	G	J	J	J	J	J	J	J							
560	56	G	G	G	J	J	J	J	J	J	J							
680	68	G	G	G	J	J	J	J	J	J	J							
820	82	G	G	G	J	J	J	J	J	J	J							
101	100	G	G	G	J	J	J	J	J	J	J							
121	120	G	G	G	J	J	J	J	J	J	J							
151	150	G	G	G	J	J	J	J	J	J	J							
181	180	G	G	G	J	J	J	J	J	J	J							
221	220	G	G	G	J	J	J	J	J	J	J							
271	270	G	G	G	J	J	J	J	J	J	J							
331	330	G	G	G	J	J	J	J	J	J	J							
391	390	G	G		J	J	J	J	J	J	J							
471	470	G	G		J	J	J	J	J	J	J							
561	560				J	J	J	J	J	J	J							
681	680				J	J	J	J	J	J	J							
821	820				J	J	J	J	J	J	J							
102	1000				J	J	J	J	J	J	J		J	J	J	J		
122	1200							J	J	J	J		J	J	M	M		
152	1500							J	M	M	M		J	J	M	M		
182	1800							J	M	M	M		J	J	M	M		
222	2200							J	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	K	K	K	K	K	K		
182	1.8				G	G	G	G		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	K	K	K	K	K	K		
332	3.3				G	G	G	G		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	K	K	K	K	K	K		
103	10				G	G	G	G		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
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
SIZE		0603		0805		1206	

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							

= AEC-Q200 Qualified