

# Automotive MLCC

## Automotive

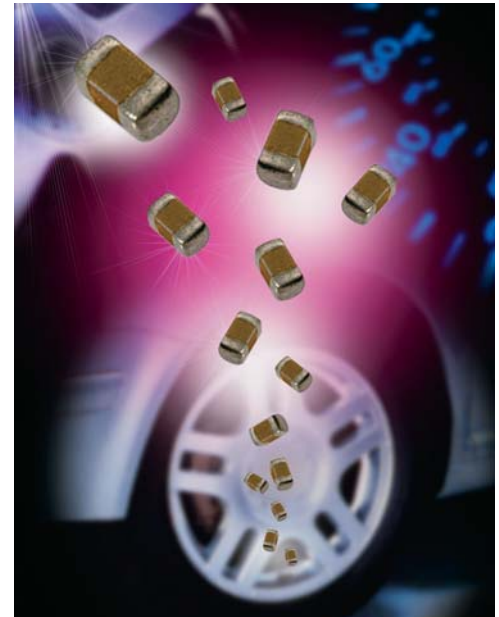
### GENERAL DESCRIPTION

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

\*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
<b>Administrative</b>	Standard Part Numbers. No restriction on who purchases these parts.	Specific Automotive Part Number. Used to control supply of product to Automotive customers.
<b>Design</b>	Minimum ceramic thickness of 0.020"	Minimum Ceramic thickness of 0.029" (0.74mm) on all X7R product.
<b>Dicing</b>	Side & End Margins = 0.003" min	Side & End Margins = 0.004" min Cover Layers = 0.003" min
<b>Lot Qualification (Destructive Physical Analysis - DPA)</b>	As per EIA RS469	Increased sample plan – stricter criteria.
<b>Visual/Cosmetic Quality</b>	Standard process and inspection	100% inspection
<b>Application Robustness</b>	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



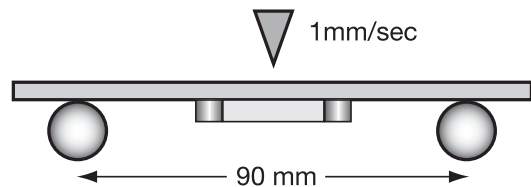
# Automotive MLCC

## NP0/X7R Dielectric

### 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  $-55^{\circ}\text{C}$  and  $+125^{\circ}\text{C}$

# Automotive MLCC - NP0

## Capacitance Range

Soldering	0402		0603			0805			1206					1210			
	Reflow/Wave		Reflow/Wave			Reflow/Wave			Reflow/Wave					Reflow Only			
	25V	50V	25V	50V	100V	25V	50V	100V	25V	50V	100V	200V	500V	25V	50V	100V	200V
100	10pF	C	C	G	G	G	J	J	J	J	J	J	J				
120	12	C	C	G	G	G	J	J	J	J	J	J	J				
150	15	C	C	G	G	G	J	J	J	J	J	J	J				
180	18	C	C	G	G	G	J	J	J	J	J	J	J				
220	22	C	C	G	G	G	J	J	J	J	J	J	J				
270	27	C	C	G	G	G	J	J	J	J	J	J	J				
330	33	C	C	G	G	G	J	J	J	J	J	J	J				
390	39	C	C	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			G	G		J	J	J	J	J	J	J				
681	680			G	G		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				
122	1200																
152	1500																
182	1800																
222	2200																
272	2700																
332	3300																
392	3900																
472	4700																
103	10nF																
	25V	50V	25V	50V	100V	25V	50V	100V	25V	50V	100V	200V	500V	25V	50V	100V	200V
	<b>0402</b>		<b>0603</b>			<b>0805</b>			<b>1206</b>					<b>1210</b>			

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					EMBOSSSED							

# Automotive MLCC - X7R

## Capacitance Range

Soldering	0402			0603						0805					1206						1210				1812		2220							
	16V	25V	50V	10V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	500V	16V	25V	50V	100V	50V	100V	25V	50V	100V		
221	Cap	220	C	C	C																													
271	(pF)	270	C	C	C																													
331		330	C	C	C																													
391		390	C	C	C																													
471		470	C	C	C																													
561		560	C	C	C																													
681		680	C	C	C																													
821		820	C	C	C																													
102		1000	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
182		1800	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
222		2200	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
332		3300	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
472		4700	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
103	Cap	0.01	C			G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
123	(µF)	0.012	C			G	G	G				J	J	J	M	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
153		0.015	C			G	G	G				J	J	J	M	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
183		0.018	C			G	G	G				J	J	J	M	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
223		0.022	C			G	G	G				J	J	J	M	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
273		0.027	C			G	G	G				J	J	J	M	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
333		0.033	C			G	G	G				J	J	J	M	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
473		0.047				G	G	G				J	J	J	M	J	J	J	J	M	J	J	J	K	K	K	K	K	K	K				
563		0.056				G	G	G				J	J	J	M					J	J	J	M	J	J	K	K	K	M	K	K			
683		0.068				G	G	G				J	J	J	M	J	J				J	J	J	M	J	J	K	K	K	M	K	K		
823		0.082				G	G	G				J	J	J	M						J	J	J	M	J	J	K	K	K	M	K	K		
104		0.01				G	G	G				J	J	M	M						J	J	J	M	J	J	K	K	K	M	K	K		
124		0.12										J	J	N	N						J	J	M	M	K	K	K	P	K	K				
154		0.15										M	N	N	N						J	J	M	M	K	K	K	P	K	K				
224		0.22			G							M	N	N	N						J	M	M	Q	M	M	M	P	M	M				
334		0.33										N	N	N	N						J	M	P	Q	P	P	P	Q	X	X				
474		0.47										N	N	N	N						M	M	P	Q	P	P	P	Q	X	X				
684		0.68										N	N	N	N						M	Q	Q	Q	P	P	Q	X	X	X				
105		1										N	N	N	N						M	Q	Q	Q	P	Q	Q	X	X	X				
155		1.5																			Q	Q	Q		P	Q	Z	Z	X	X				
225		2.2																			Q	Q	Q		X	Z	Z	Z	Z	Z				
335		3.3																			Q	Q			X	Z	Z	Z	Z					
475		4.7																			Q	Q			X	Z	Z	Z	Z					
106		10																							Z	Z						Z	Z	
226		22																														Z	Z	Z
	16V	25V	50V	10V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	500V	16V	25V	50V	100V	50V	100V	25V	50V	100V		
	0402			0603						0805					1206						1210				1812		2220							

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	
Soldering			Reflow/Wave		Reflow/Wave		Reflow/Wave	
	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					EMBOSSSED							