

# Automotive MLCC

## Automotive

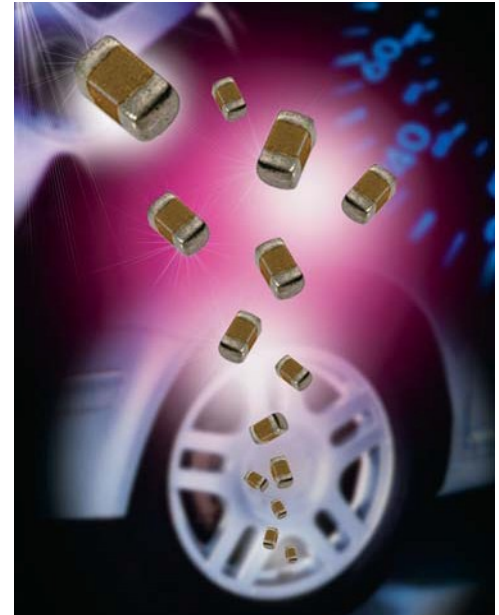
### GENERAL DESCRIPTION

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.
- NPO 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	NPO = A	2 Significant	F = ±1% (≥10pF)*	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	Digits + Number of Zeros	G = ±2% (≥10pF)*				
0805	25V = 3	X8R = F	e.g. 10µF = 106	J = ±5% (≤1µF)		**X7R & X8R only		
1206	50V = 5			K = ±10%				
1210	100V = 1			M = ±20%				
1812	200V = 2 500V = 7							

Contact factory for availability of Tolerance Options for Specific PartNumbers.

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 NPO followed by lot by lot reliability testing.

All Tests have Accept/Reject Criteria 0/1

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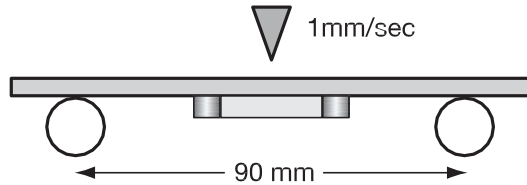
## NP0/X7R Dielectric

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### 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

# Automotive MLCC - NP0

## Capacitance Range

Soldering	0402		0603				0805					1206					
	Reflow/Wave		Reflow/Wave				Reflow/Wave					Reflow/Wave					
	25V	50V	25V	50V	100V	200V	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V	500V
100 10pF	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
120 12	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
150 15	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
180 18	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
220 22	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
270 27	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
330 33	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
390 39	C	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
470 47			G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
510 51			G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
560 56			G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
680 68			G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
820 82			G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
101 100			G	G	G	G	J	J	J	N	N	J	J	J	J	J	J
121 120			G	G	G		J	J	J	N	N	J	J	J	J	J	J
151 150			G	G	G		J	J	J	N	N	J	J	J	J	J	J
181 180			G	G	G		J	J	J	N	N	J	J	J	J	J	J
221 220			G	G	G		J	J	J	N	N	J	J	J	J	J	J
271 270			G	G	G		J	J	J	N	N	J	J	J	J	J	J
331 330			G	G	G		J	J	J	N	N	J	J	J	J	J	J
391 390			G	G			J	J	J			J	J	J	J	J	J
471 470			G	G			J	J	J			J	J	J	J	J	J
561 560			G	G			J	J	J			J	J	J	J	J	J
681 680			G	G			J	J	J			J	J	J	J	J	J
821 820							J	J	J			J	J	J	J	J	J
102 1000							J	J	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	200V	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V	500V
	<b>0402</b>		<b>0603</b>				<b>0805</b>					<b>1206</b>					

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 - X7R

## Capacitance Range

Soldering	0402			0603						0805						1206						1210				1812		2220						
	Reflow/Wave			Reflow/Wave						Reflow/Wave						Reflow/Wave						Reflow Only				Reflow Only		Reflow Only						
	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	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
182		1800	C	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
222		2200	C	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
332		3300	C	C	C	C	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K			
472		4700	C	C	C	C	G	G	G	G	G	G	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	K	K	K	K	K	K	K			
123	(μF)	0.012	C				G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
153		0.015	C				G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
183		0.018	C				G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
223		0.022	C				G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
273		0.027	C				G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
333		0.033	C				G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K	K				
473		0.047					G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	M	M	K	K	K	K	K	K				
563		0.056					G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	M	M	K	K	K	M	K	K				
683		0.068					G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	M	M	K	K	K	M	K	K				
823		0.082					G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	M	M	K	K	K	M	K	K				
104		0.1					G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	M	M	K	K	K	M	K	K				
124		0.12					G						J	J	J	J	J	J	J	J	J	M	M	K	K	K	P	K	K					
154		0.15					G						J	J	J	J	J	J	J	J	J	M	M	K	K	K	P	K	K					
224		0.22					G	G	J				M	N	M	N	N	N	N	N	N	J	M	M	Q	Q	M	P	M	M				
334		0.33											M	N	M	N	N	N	N	N	N	J	M	M	Q	Q	M	P	M	M				
474		0.47					J	J	J				N	N	M	N	N	N	N	N	N	M	M	P	Q	Q	X	X	X					
684		0.68											N	N	N	N	N	N	N	N	N	M	Q	Q	Q	X	X	X						
105		1					J	J					N	N	N	N	N	N	N	N	N	M	Q	Q	Q	X	X	X			Z	Z		
155		1.5											N	N	N	N	N	N	N	N	N	M	Q	Q	Q	X	X	X			Z	Z		
225		2.2											N	N	N	N	N	N	N	N	N	Q	Q	Q	X	X	X			Z	Z			
335		3.3											N	N	N	N	N	N	N	N	N	Q	Q	Q	X	X	X			Z	Z			
475		4.7											N	N	N	N	N	N	N	N	N	Q	Q	Q	X	X	X			Z	Z			
106		10											N	N	N	N	N	N	N	N	N	Q	Q	Q	X	X	X			Z	Z			
226		22											N	N	N	N	N	N	N	N	N	Q	Q	Q	X	X	X			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
			<b>0402</b>			<b>0603</b>						<b>0805</b>						<b>1206</b>						<b>1210</b>				<b>1812</b>		<b>2220</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					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	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	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			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	N	M	M
224	0.22			N		M	M
274	0.27					M	M
334	0.33					M	M
394	0.39					M	M
474	0.47					M	
684	0.68						
824	0.82						
105	1						
SIZE	WVDC	25V	50V	25V	50V	25V	50V
		<b>0603</b>		<b>0805</b>		<b>1206</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							