



# Automotive MLCC

## General Specifications



### GENERAL DESCRIPTION

KYOCERA AVX has supported the Automotive Industry requirements for Multilayer Ceramic Capacitors consistently for more than 25 years. Products have been developed and tested specifically for automotive applications and all manufacturing facilities are QS9000 and VDA 6.4 approved.

KYOCERA 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.

### HOW TO ORDER

0805	5	A	104	K	4	T	2	A
<b>Size</b> 0402 0603 0805 1206 1210 1812	<b>Voltage</b> 6.3V = 6 10V = Z 16V = Y 25V = 3 35V = D 50V = 5 100V = 1 200V = 2 500V = 7	<b>Dielectric</b> NP0 = A X7R = C X8R = F	<b>Capacitance Code (In pF)</b> 2 Sig. Digits + Number of Zeros e.g. 10 F = 106	<b>Capacitance Tolerance</b> B = ± 0.1pF (<10pF)* C = ± 0.25pF (<10pF)* D = ± 0.5pF (<10pF)* F = ± 1%* G = ± 2%* J = ± 5% (<=1µF) K = ± 10% M = ± 20%	<b>Failure Rate</b> 4=Automotive	<b>Terminations</b> T = Plated Ni and Sn Z = FLEXITERM®** U = Conductive Epo  **X7R X8R only	<b>Packaging</b> 2 = 7" Reel 4 = 13" Reel	<b>Special Code</b> A = Std.Product

\*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
<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>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	Soft Term
0603	>2mm	>5
0805	>2mm	>5
1206	>2mm	>5

- a) Temperature Cycle testing  
FLEXITERM® has the ability to withstand at least 1000 cycles between -55°C and +125°C

# Automotive MLCC-NP0

## Capacitance Range



Case Size		0402					0603					0805					1206					1210											
Length (L)	mm (in.)	1.00 ± 0.10 (0.040 ± 0.004)					1.60 ± 0.15 (0.063 ± 0.006)					2.01 ± 0.20 0.079 ± 0.008					3.20 ± 0.20 (0.126 ± 0.008)					3.20 ± 0.20 (0.126 ± 0.008)											
Width (W)	mm (in.)	0.50 ± 0.10 (0.020 ± 0.004)					0.81 ± 0.15 (0.032 ± 0.006)					1.25 ± 0.20 (0.049 ± 0.008)					1.60 ± 0.20 (0.063 ± 0.008)					2.50 ± 0.20 (0.098 ± 0.008)											
Terminal (t)	mm (in.)	0.25 ± 0.15 (0.010 ± 0.006)					0.35 ± 0.15 (0.014 ± 0.006)					0.50 ± 0.25 (0.020 ± 0.010)					0.50 ± 0.25 (0.020 ± 0.010)					0.50 ± 0.25 (0.020 ± 0.010)											
CAP	CAP Code	25	50	100	25	50	100	200	250	25	50	100	200	250	500	630	25	50	100	200	250	500	630	1000	50	100	200	250	500	630	1000		
0.5	0R5	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
1	1R0	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
5	5R0	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
10	100	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
12	120	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
15	150	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
18	180	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
22	220	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
27	270	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
33	330	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
39	390	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
47	470	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
56	560	C	C	C	G	G	G	G	G	J	J	J	J	J	N		J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
68	680	C	C	C	G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J		
82	820	C	C	C	G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	N	N	N		
100	101	C	C	C	G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	N	N	N		
120	121				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
150	151				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
180	181				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
220	221				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
270	271				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
330	331				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
390	391				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
430	431				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
470	471				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	X	
560	561				G	G	G	G	G	J	J	J	J	N		J	J	J	J	M	Q	Q	Q	Q	N	N	N	N	P	P	P		
680	681				G	G	G	G	G	J	J	J	J	N		J	J	J	J	M	Q	Q	Q	Q	N	N	N	N	P	P	P		
1,000	102				G	G	G	G	G	J	J	J	J	N		J	J	J	J	M	Q	Q	Q	Q	N	N	N	N	P	P	P	X	
1,200	122				G	G	G	G	G	J	J	J	J	N		N	N	N	N						N	N	N	N	P	P	P		
1,500	152				G	G	G	G	G	J	J	J	J	N		N	N	N	N						N	N	N	N	P	P	P		
2,200	222				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	J	J	N	N	N	N	P	K	K		
2,700	272				G	G	G	G	G	J	J	J	J	N		J	J	J	J	J	J	J	J	J	J	N	N	N	N	P	K	K	
3,300	332				G	G	G	G	G	J	J	J	J	N		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M		
3,900	392				G	G	G	G	G	J	J	J	J	N		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M		
4,700	472				G	G	G	G	G	J	J	J	J	N		P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
5,600	562				G	G	G	G	G	J	J	J	J	N																			
6,800	682				G	G	G	G	G	J	J	J	J	N																			
8,200	822				G	G	G	G	G	J	J	J	J	N																			
10,000	103				G	G	G	G	G	J	J	J	J	N																			
12,000	123																																
15,000	153																																
18,000	183																																
22,000	223																																
27,000	273																																
33,000	333																																
39,000	393																																
47,000	473																																
56,000	563																																
68,000	683																																
82,000	823																																
100,000	104																																

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	WVDC		25V	50V	100V	25V	50V	100V	25V	50V
472	pF	4700	G	G	G	J	J	J	J	J
562		5600	G	G	G	J	J	J	J	J
682		6800	G	G	G	J	J	J	J	J
822		8200	G	G	G	J	J	J	J	J
103	uF	0.01	G	G	G	J	J	J	J	J
123		0.012	G	G		J	J	N	J	J
153		0.015	G	G		J	J	N	J	J
183		0.018	G	G		J	J	N	J	J
223		0.022	G	G		J	J	N	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	M
474		0.47							M	Q
684		0.68							Q	Q
824		0.82							Q	Q
105		1							Q	Q
WVDC	WVDC		25V	50V	100V	25V	50V	100V	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							

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