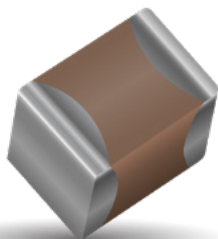


Automotive MLCC

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

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.
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.

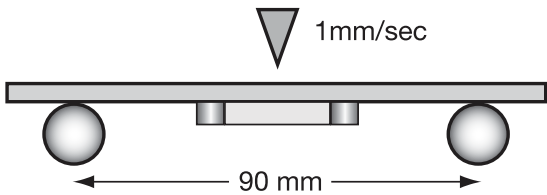
All Tests have Accept/Reject Criteria 0/1

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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	C	G	G	G	G	G	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	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	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	
82	820	C	C	C	C	G	G	G	G	G	J	J	J	J	J	N	J	J	J	J	J	J	Q	Q	N	N	N	N	N	N	N	
100	101	C	C	C	C	G	G	G	G	G	J	J	J	J	J	N	J	J	J	J	J	J	Q	Q	N	N	N	N	N	N	N	
120	121					G	G	G			J	J	J	J	J	N	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	
150	151					G	G	G			J	J	J	J	J	N	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	
180	181					G	G	G			J	J	J	J	J	N	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	
220	221					G	G	G			J	J	J	J	J	N	J	J	J	J	J	J	Q	Q	N	N	N	N	P	P	P	
270	271					G	G	G			J	J	J	J	J	N	J	J	J	J	J	J	Q		N	N	N	N	P	P	P	
330	331					G	G	G			J	J	J	J	J	N	J	J	J	J	J	J	Q		N	N	N	N	P	P	P	
390	391					G	G	G			J	J	J	J	J		J	J	J	J	J	J	Q		N	N	N	N	P	P	P	
430	431					G	G				J	J	J	J	J		J	J	J	J	J	J	Q		N	N	N	N	P	P	P	
470	471					G	G				J	J	J	J	J		J	J	J	J	J	J	Q		N	N	N	N	P	P	P	
560	561					G	G				J	J	J	J			J	J	J	J	M	Q	Q		N	N	N	N	P	P	P	
680	681					G	G				J	J	J	J			J	J	J	J	M	Q	Q		N	N	N	N	P	P	P	
1,000	102					G	G				J	J	J	J			J	J	J	J	M	Q	Q		N	N	N	N	P	P	X	
1,200	122					G	G				J	J					N	N	N	N					N	N	N	N	P	P		
1,500	152					G	G				J	J					N	N	N	N					N	N	N	N	P	P		
2,200	222					G					J	J					M	M	M	M	M	M	M		N	N	N	N	P	K	K	
2,700	272					G											M	M	M	M	M	M	M							K	K	
3,300	332					G											M	M	M	M	M	M	M							K	K	
3,900	392					G											M	M	M	M	M	M	M							M	M	
4,700	472					G											P	P	P	P	P	P	P							M	M	
5,600	562					G																								M	M	
6,800	682					G																								N	N	
8,200	822					G																								P	P	
10,000	103					G																								X	X	X
12,000	123																													X		
15,000	153																													X		
18,000	183																													X		
22,000	223																													X		
27,000	273																													X		
33,000	333																													X		
39,000	393																															
47,000	473																															
56,000	563																															
68,000	683																															
82,000	823																															
100,000	104																															
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	
Case Size		0402				0603				0805							1206								1210							

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



Size		0402				0603				0805				1206				1210				1812				2220											
Soldering		Reflow/Wave				Reflow/Wave				Reflow/Wave				Reflow/Wave				Reflow Only				Reflow Only				Reflow Only											
(L) Length	mm (in.)	1 ± 0.1 (0.04 ± 0.004)				1.6 ± 0.15 (0.063 ± 0.006)				2.01 ± 0.2 (0.079 ± 0.008)				3.2 ± 0.2 (0.126 ± 0.008)				3.2 ± 0.2 (0.126 ± 0.008)				4.5 ± 0.3 (0.177 ± 0.012)				5.7 ± 0.5 (0.224 ± 0.02)											
(W) Width	mm (in.)	0.5 ± 0.1 (0.02 ± 0.004)				0.81 ± 0.15 (0.032 ± 0.006)				1.25 ± 0.2 (0.049 ± 0.008)				1.6 ± 0.2 (0.063 ± 0.008)				2.5 ± 0.2 (0.098 ± 0.008)				3.2 ± 0.2 (0.126 ± 0.008)				5 ± 0.4 (0.197 ± 0.016)											
(t) Terminal	mm (in.)	0.25 ± 0.15 (0.01 ± 0.006)				0.35 ± 0.15 (0.014 ± 0.006)				0.5 ± 0.25 (0.02 ± 0.01)				0.5 ± 0.25 (0.02 ± 0.01)				0.5 ± 0.25 (0.02 ± 0.01)				0.61 ± 0.36 (0.024 ± 0.014)				0.64 ± 0.39 (0.025 ± 0.015)											
WVDC		16V	25V	50V	10V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	50V	100V	25V	50V	100V	200V	250V	500V
101	100																																				
221	220	C	C	C	G	G	G	G	G	G																											
271	270	C	C	C	G	G	G	G	G	G																											
331	330	C	C	C	G	G	G	G	G	G																											
391	390	C	C	C	G	G	G	G	G	G																											
471	470	C	C	C	G	G	G	G	G	G																											
561	560	C	C	C	G	G	G	G	G	G																											
681	680	C	C	C	G	G	G	G	G	G																											
821	820	C	C	C	G	G	G	G	G	G																											
102	1000	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
122	1220	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
152	1500	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
182	1800	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
222	2200	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
272	2700	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
332	3300	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
392	3900	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
472	4700	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
562	5600	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
682	6800	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
822	8200	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
103	Cap 0.01	C	C	C	G	G	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
123	(uF) 0.012	C			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
153	0.015	C			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
183	0.018	C			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
223	0.022	C			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
273	0.027	C			G	G	G	G	J			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
333	0.033	C			G	G	G	G	J			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
393	0.039				G	G	G	G	J			J	J	J	N	N	N	J	J	J	J	J	J	K	K	K	K	M	Q	K	K						
473	0.047				G	G	G	G	J			J	J	J	N	N	N	J	J	J	M	Q	Q	K	K	K	K	M	Q	K	K						
563	0.056				G	G	G	G	J			J	J	J	N			J	J	J	M	Q	Q	K	K	K	M	M	Q	K	K						
683	0.068				G	G	G	G	J			J	J	J	N			J	J	J	M	Q	Q	K	K	K	M	M	Q	K	K						
823	0.082				G	G	G	G	J			J	J	J	N			J	J	J	M	Q	Q	K	K	K	M	Q	K	K							
104	0.1				G	G	G	G	J			J	J	J	N			J	J	J	M	Q	Q	K	K	K	M	Q	K	K						X	
124	0.12				G	J	J					J	J	J	N			J	J	M	M	Q	Q	K	K	K	P	Q	Q	K	K						
154	0.15				G	J	J					M	N	N	N			J	J	M	M	Q	Q	K	K	K	P	Q	Q	K	K						
224	0.22				G	J	J					M	N	N	N			J	M	M	Q	Q	Q	M	M	M	P	Q	Q	K	M	M					
334	0.33											N	N	N	N			J	M	P	Q	Q		P	P	P	Q	Z	Z	X	X						
474	0.47											N	N	N	N			M	M	P	Q	Q		P	P	P	Q		X	X							
684	0.68											N	N	N	N			M	Q	Q	Q	Q		P	P	Q	X		X	X							
105	1											N	N	N	N			M	Q	Q	Q	Q		P	Q	Q	Z		X	X	Z	X					
155	1.5											N	N	N				Q	Q	Q	Q	Q		P	Q	Z	Z		X	X	Z	Z	Z	Z			
225	2.2											N	N	N				Q	Q	Q	Q	Q		Z	Z	Z	Z		Z	Z							
335	3.3																	Q	Q	Q				X	Z	Z	Z		Z	Z							
475	4.7																	Q	Q	Q				X	Z	Z	Z		Z	Z							
106	10																							Z	Z	Z			Z								
226	22																							Z					Z								
WVDC		16V	25V	50V	10V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	25V	50V	100V	200V	250V	500V				
Size		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 (0.04)	1.27 (0.05)	1.40 (0.055)	1.52 (0.060)	1.78 (0.07)	2.29 (0.09)	2.54 (0.1)	2.79 (0.11)
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							