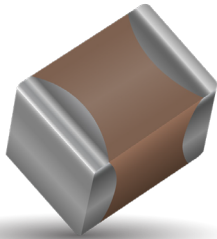# Automotive MLCC
General Specifications

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

FLEXITERM FEATURES

a) Bend Test
   The capacitor is soldered to the PC Board as shown:

1mm/sec

90 mm
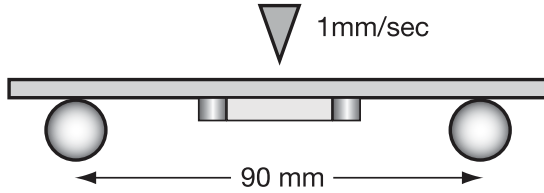
Typical bend test results are shown below:

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	0402 25	0402 50	0402 100	0603 25	0603 50	0603 100	0603 200	0603 250	0805 25	0805 50	0805 100	0805 200	0805 250	0805 500	0805 630	1206 25	1206 50	1206 100	1206 200	1206 250	1206 500	1206 630	1206 1000	1210 50	1210 100	1210 200	1210 250	1210 500	1210 630	1210 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	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	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	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	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	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	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	Q	Q	J	J	J	J	J	J	J
47	470	C	C		G	G	G	G	G	J	J	J	J	J			J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J
56	560	C	C		G	G	G	G		J	J	J	J	N			J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J
68	680	C	C		G	G	G	G		J	J	J	J	N			J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J
82	820	C	C		G	G	G	G		J	J	J	J	N			J	J	J	J	J	J	Q	Q	N	N	N	N	N	N	N
100	101	C	C		G	G	G	G		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	N			J	J	J	J	J	J	Q	Q	N	N	N	P	P	P	X
150	151				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q	Q	N	N	N	P	P	P	X
180	181				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q	Q	N	N	N	P	P	P	X
220	221				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q	Q	N	N	N	P	P	P	X
270	271				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q		N	N	N	P	P	P	X
330	331				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q		N	N	N	P	P	P	X
390	391				G	G	G			J	J	J	J				J	J	J	J	J	J	Q		N	N	N	P	P	P	X
430	431				G	G				J	J	J	J				J	J	J	J	J	J	Q		N	N	N	P	P	P	X
470	471				G	G				J	J	J	J				J	J	J	J	J	J	Q		N	N	N	P	P	P	X
560	561				G	G				J	J	J					J	J	J	J	M	Q	Q		N	N	N	P	P	P	
680	681				G	G				J	J	J					J	J	J	J	M	Q	Q		N	N	N	P	P	P	
1,000	102				G	G				J	J	J					J	J	J	J	M	Q	Q		N	N	N	P	X		
1,200	122				G	G				J	J						N	N	N	N					N	N	N	P	P		
1,500	152				G	G				J	J						N	N	N	N					N	N	N	P	P		
2,200	222				G					J	J						J	J	J	J	J	J	J		N	N	N	P	K	K	
2,700	272				G												J	J	J	J	J	J	J						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																														

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 (A–J)   EMBOSSED (K–Z)

TDS-SMDMLCC-0005 | Rev 3

– SURFACE MOUNT CERAMIC CAPACITOR PRODUCTS –

Automotive MLCC - X7R

Capacitance Range

KYOCERA AVX

Dimensions

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)

Capacitance vs. WVDC

WVDC	Cap	0402 6.3V	0402 16V	0402 25V	0402 50V	0603 10V	0603 16V	0603 25V	0603 50V	0603 100V	0603 200V	0603 250V	0805 6.3V	0805 10V	0805 16V	0805 25V	0805 50V	0805 100V	0805 200V	0805 250V	1206 16V	1206 25V	1206 50V	1206 100V	1206 200V	1206 250V	1206 500V	1210 16V	1210 25V	1210 50V	1210 100V	1210 200V	1210 250V	1812 50V	1812 100V	2220 25V	2220 50V	2220 100V	2220 200V	2220 250V	2220 500V
101	100																																	M	Q						
221	220		C	C	C	G	G	G	G	G	G																							M	Q						
271	270		C	C	C	G	G	G	G	G	G																							M	Q						
331	330		C	C	C	G	G	G	G	G	G																							M	Q						
391	390		C	C	C	G	G	G	G	G	G																							M	Q						
471	470		C	C	C	G	G	G	G	G	G																							M	Q						
561	560		C	C	C	G	G	G	G	G	G																							M	Q						
681	680		C	C	C	G	G	G	G	G	G																							M	Q						
821	820		C	C	C	G	G	G	G	G	G																							M	Q						
102	1000		C	C	C	G	G	G	G	G	G	G			J	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	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	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	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	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	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	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	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	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	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	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	J	K	K	K	K			M	Q	K	K				
103	0.01		C	C	C	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K			M	Q	K	K				
123	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	Q	Q		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	Q	Q		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	Q	Q		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	M	Q	Q		K	K	K	K			M	Q	K	K				
473	0.047					G	G	G	G	J					J	J	J	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	K			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	K			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	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	Q			K	K				X
124	0.12					G	J	J							J	J	N	N			J	J	M	M	Q	Q		K	K	K	P	Q	Q			M	M				
154	0.15					G	J	J							M	N	N	N			J	J	M	M	Q	Q		K	K	K	P	Q	Q			M	M				
224	0.22					G	J	J							M	N	N	N			J	M	M	Q	Q	Q		M	M	M	P	Q	Q			M	M				
334	0.33														N	N	N	N			J	M	P	Q				P	P	P	Q	Z	Z			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	C													N	N	N	N			M	Q	Q	Q				P	Q	Q	Z					X	X				
155	1.5														N	N	N				Q	Q	Q	Q				P	Q	Z	Z					X	X				
225	2.2														N	N	N				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												P	P	Q						Q							Z	Z	Z						Z	Z	Z			
226	22																											Z								Z					

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 (A–J)					EMBOSSED (K–Z)							

– SURFACE MOUNT CERAMIC CAPACITOR PRODUCTS –

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							

TDS-SMDMLCC-0005 | Rev 3

– SURFACE MOUNT CERAMIC CAPACITOR PRODUCTS –

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

KYOCERA AVX:

08051C221J4T4A   06031A100B4T2A   06031A100C4T2A   06031A100D4T2A   06031A100J4T2A   06031A100K4T2A
06031A101F4T2A   06031A101J4T2A   06031A101J4T4A   06031A101K4T2A   06031A120F4T2A   06031A120G4T2A
06031A121F4T2A   06031A121G4T2A   06031A121G4T4A   06031A121J4T2A   06031A150F4T2A   06031A150J4T2A
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