# 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	<u>A</u>	104	K	4	Ţ	2	A T
<b>Size</b> 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 $B = \pm 0.1 pF (<10 pF)^*$ $C = \pm 0.25 pF (<10 pF)^*$ $D = \pm 0.5 pF (<10 pF)^*$ $F = \pm 1\%^*$ $G = \pm 2\%^*$ $J = \pm 5\% (<=1 \mu F)$ $K = \pm 10\%$ $M = \pm 20\%$ *NPO only	NOTE: Conta	Terminations T = Plated Ni and Sn Z = FLEXITERM®** U = Conductive Epo **X7R X8R only y for availability of Tol ct factory for non-spe case size available in	4 = 13" Reel v erance Options for cified capacitance	

#### **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

KUCERE The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

Downloaded from Arrow.com.

### **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<sup>®</sup> has the ability to withstand at least 1000 cycles between -55°C and +125°C KUCERA The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

TDS-SMDMLCC-0005 | Rev 4

Downloaded from Arrow.com.

# Automotive MLCC-NP0



### **Capacitance Range**

Case	Size		0402				0603		0805					1206							1210										
Length (L)	mm (in)	1	.00 ± 0.10	)		(0	1.60 ± 0.15 063 ± 0.00	5					2.01 ± 0.2 079 ± 0.0	)						3.20	± 0.20 ± 0.008)						(0	3.20 ± 0.2 .126 ± 0.0	0		
Width (W)	(in.) mm (in.)	0	.50 ± 0.10 020 ± 0.00	)			063 ± 0.00 0.81 ± 0.15 032 ± 0.00	5					079 ± 0.0 1.25 ± 0.2 049 ± 0.0	)	_					1.60	± 0.008) ± 0.20 ± 0.008)							2.50 ± 0.2 098 ± 0.0	0		
Terminal (t)	mm (in.)	0 (0.0	.25 ± 0.15 010 ± 0.00	5 )6)		(0.	0.35 ± 0.15 014 ± 0.00	5 )6)				(0.	0.50 ± 0.2 020 ± 0.0	5						0.50 (0.020	± 0.25 ± 0.010)						(0.	0.50 ± 0.2 .020 ± 0.0	5 10)		
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	С	С	С	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	С	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 10	5R0 100	C C	C 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	120	c	c	c	G	G	G	G	G	J	J	J	J	J	5	5	J	J	J	J	J	J	Q	Q	J	J	J	J	J	J	J
15	150	С	С	С	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	С	С	С	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 27	220 270	C C	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	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	С	С		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	С	С		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	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
82 100	820 101	C C	C C		G	G	G	G		J	J	J	J	N N			J	J	J	J	J	J	Q Q	Q Q	N	N N	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	Р	Р	Р	х
180	181				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q	Q	N	N	N	Р	Р	Р	х
220	221				G	G	G			J	J	J	J	N			J	J	J	J	J	J	Q	Q	N	N	N N	P	P	P	X
270 330	271 331				G	G	G			J	J	J	J	N N			J	J	J	J	J	J	Q Q		N	N N	N	P	P	P	X 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	Р	Р	Р	Х
470	471				G	G				J	J	J	J				J	J	J	J	J	J	Q		N	N	N	Р	Р	Р	х
560 680	561 681				G	G				J	J	J					J	J	J	J	M	Q	Q		N N	N N	N N	P	P	P P	
1,000	102				G	G				J	J	J					J	J	J	J	M	Q	Q		N	N	N	P	P	x	
1,200	122				G	G				J	J						N	N	N	N					N	N	N	Р	Р		
1,500	152				G	G				J	J						N	N	N	N					N	N	N	Р	Р		
2,200	222				G					J	J						J	J	J	J	J	J	J		N	N	N	Р	к к	K	
2,700 3,300	272 332				G												J	M	J	J	J	J	J						к	к к	
3,900	392				G												M	M	M	M	M	M	M						M	M	
4,700	472				G												Р	Р	Р	Р	Р	Р	Р						М	м	
5,600	562				G																								M	M	
6,800 8,200	682 822				G																								N P	N P	
10,000	103				G																							x	Х	X	
12,000	123																											x			
15,000	153																											х			
18,000	183																			<u> </u>								X		—	
22,000 27,000	223 273																											X X		<u> </u>	
33,000	333																											x			1
39,000	393																														
47,000	473																														
56,000	563												L							<u> </u>		<u> </u>								—	
68,000 82,000	683 823																				-				<u> </u>			<u> </u>		<u> </u>	
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							12	206							1210			

Letter	А	С	E	G	J	К	М	Ν	Р	Q	Х	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										

KUCERE KWXC The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

Downloaded from Arrow.com.

TDS-SMDMLCC-0005 | Rev 4

# Automotive MLCC - X7R



### **Capacitance Range**

	Size		04						0603				0805 Reflow/Wave						1206							10				812				220							
	Idering		Reflow						Reflow/V															eflow/Wa						Reflor					w Only ± 0.3			Reflo			
(L) Length	mm (in.)		1 ± (0.04 ±					(	1.6 ± 0. 0.063 ± 0							2.01 (0.079 :	± 0.2 ± 0.008)							3.2 ± 0.2 126 ± 0.0						3.2 (0.126 :	± 0.2 ± 0.008)			(0.1 0.0	77 ± 112)			5.7 (0.224	± 0.5 ± 0.02)		
(W) Width	mm (in.)		0.5 ± (0.02 ±					(	0.81 ± 0 0.032 ± 0							1.25 (0.049 :								1.6 ± 0.2 063 ± 0.0							± 0.2 ± 0.008)			3.2 : (0.1 0.0	± 0.2 26 ± 108)			5 ± (0.197	: 0.4 ± 0.016)		
(t) Terminal	mm (in.)		0.25 ± (0.01 ±						0.35 ± 0 0.014 ± 0							0.5 ± (0.02 :								0.5 ± 0.2 1.02 ± 0.0						0.5 ± (0.02 :				(0.0	± 0.36 124 ± 114)			0.64 (0.025	± 0.39 ± 0.015)		
v	VVDC	6.3V	16V	25V	50V	10V	16V	25	50V	100V	200V	250V	6.3V	10V	16V	25V	50V	100V	200V	250V	16V	25V	50V	100V	200V	250V	500V	16V	25V	50V	100V	200V	250V	50V	100V	25V	50V	100V	200V	250V	500V
101	100																															м	Q						$\square$		
221	220		С	C	c	G	G	G	G	G	G	-	<u> </u>																			M	Q			<u> </u>			$\vdash$		
271 331	270 330		C C	C C	C C	G	G	G	G	G	G																					M	Q						$\vdash$		
391	390		c	С	c	G	G	G	G	G	G	-	-																			M	Q						$\vdash$		
471	470		С	c	c	G	G	G	G	G	G																					M	Q								
561	560		С	С	С	G	G	G	G	G	G																					м	Q								
681	680		С	С	С	G	G	G	G	G	G																					м	Q								
821	820		С	С	С	G	G	G	G	G	G																					м	Q								
102	1000		С	С	С	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	к	к	м	Q	к	к				$\square$		
122	1220		С	С	С	G	G	G	G	G	G	G	-		J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	к	к	M	Q	к	к	<u> </u>			$\vdash$		
152 182	1500 1800		C C	C C	C C	G	G	G	G	G	G	G	-		J	J	J	J	J	J	J	J	J	J	J	J	J	к к	к к	к к	ĸ	M	Q	к к	к к				$\vdash$	<u> </u>	
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	ĸ	ĸ	ĸ	ĸ	M	Q	ĸ	ĸ	-			$\vdash$		
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	ĸ	ĸ	ĸ	ĸ	M	Q	ĸ	ĸ					-	
332	3300		С	С	С	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	к	к	м	Q	к	к						
392	3900		С	С	С	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	к	к	м	Q	к	к						
472	4700		С	С	С	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	к	к	м	Q	к	к						
562	5600		С	С	С	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	К	к	К	к	м	Q	к	К				$\square$	$\square$	
682	6800		С	С	С	G	G	G	G	G	G	G			J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	к	к	м	Q	к	к				$\square$		
822	8200		C	С	c	G	G	G	G	G	G	G	-		J	J	J	J	J	J	J	J	J	J	J	J	J	к	к	К	к	M	Q	к	к				$\vdash$		
103 123	Cap 0.01 (uF) 0.012		C C	С	С	G	G	G	G	G	G	G	-		J	J	J	J	J	J	J	J	J	J J	J	J	J	к к	к к	к к	к к	M	Q	к к	к к	-			$\vdash$		
153	0.012		c			G	G	G	G	G					J	J	J	J	J	N	J	J	J	J	J	J		ĸ	ĸ	ĸ	ĸ	M	Q	ĸ	ĸ				$\vdash$	$ \neg $	
183	0.018		С			G	G	G	G	G					J	J	J	J	N	N	J	J	J	J	J	J		к	к	к	к	M	Q	к	к					$ \rightarrow$	
223	0.022		С			G	G	G	G	G		1			J	J	J	J	N	N	J	J	J	J	Q	Q		к	к	к	к	м	Q	к	к						
273	0.027		С			G	G	G	G	J					J	J	J	J	N	N	J	J	J	J	Q	Q		к	к	к	к	м	Q	к	к						
333	0.033		С			G	G	G	G	J					J	J	J	N	N	N	J	J	J	J	Q	Q		К	К	К	к	м	Q	К	К						
393	0.039					G	G	G	G	J					J	J	J	N	N	N	J	J	J	J	Q	Q		к	к	к	к	м	Q	к	к						
473	0.047					G	G	G	G	J					J	J	J	N	N	N	J	J	J	м	Q	Q		к	к	к	к	M	Q	к	ĸ	-			$\vdash$	<u> </u>	
563 683	0.056					G	G	G	G	J					J	J	J	N N		$\left  - \right $	J	J	J	M	Q	Q		к к	к к	к к	M	M	Q	к к	к к				$\vdash$		
823	0.068					G	G	G	G	J		+			J	J	J	N			J	J	J	M	Q	Q		ĸ	ĸ	ĸ	M	Q	Q	ĸ	ĸ	-			$\vdash$		-
104	0.082					G	G	G	G	J		1			J	J	J	N			J	J	J	M	Q	Q		ĸ	ĸ	ĸ	M	Q	Q	ĸ	ĸ	-			$\vdash$		х
124	0.12					G	J	J		1		1	1		J	J	N	N			J	J	M	M	Q	Q		к	к	к	P	Q	Q	к	к						
154	0.15					G	J	J							м	N	N	N			J	J	м	м	Q	Q		к	к	к	Р	Q	Q	к	к						
224	0.22					G	J	J							м	N	N	N			J	м	м	Q	Q	Q		м	м	м	Р	Q	Q	м	м						
334	0.33														N	N	N	N			J	м	Р	Q				Р	Р	Р	Q	Z	Z	х	х				$\square$		
474	0.47														N	N	N	N			м	м	Р	Q				Р	Ρ	Р	Q			х	х				$\square$		
684	0.68							+	+						N	N	N	N			M	Q	Q	Q				P	P	Q	x			x	X	-			$\square$		
105 155	1.5	С				-		+	+	+					N	N N	N N	N			M Q	Q	Q	Q				P	Q	Q Z	Z			X X	X X		Z	Z	X Z	X Z	$ \square$
225	2.2		$\vdash$			-	+	+	+	+	-	+			N	N	N				Q	Q	Q	Q				Z	Q Z	Z	Z			z	z	-	Z	Z		- 2	-
335	3.3						+	+	+	+		+	1								Q	Q	Q	4				X	Z	Z	Z			Z	~	-	Z	Z	$\vdash$		-
475	4.7					1	1	1	1	1	1	1	1								Q	Q	Q					x	z	z	z			z	İ –	1	z	z			$\neg$
106	10						1	1	1	1	1	1	Р	P							Q							Z	z	Z				Z	1	z	Z	z			$\neg$
226	22																																			Z					
	VVDC	6.3V	16V	25V	50V	10V	16V	25\	_	100V	200V	250V	6.3V	10V	16V	25V	50V		200V	250V	16V	25V	50V	100V	200V	250V	500V	16V	25V	50V	100V	200V	250V	50V	100V	25V	50V	100V		250V	500V
	Size			0402					0603							_	08	05	_			_		1206						12	10		_	18	812		_	22	220		

Letter	A	С	E	G	J	K	М	N	Р	Q	Х	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)	(0.04)	(0.05)	(0.055)	(0.060)	(0.07)	(0.09)	(0.1)	(0.11)
						EMB	OSSED						

KUCERE KWXC The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

Downloaded from Arrow.com.

## Automotive MLCC - X8R



### **Capacitance Range**

	SIZE			0603			0805		12	06		
	Soldering	J		Reflow/Wave			Reflow/Wave		Reflow	/Wave		
WVDC	W	VDC	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		М	М		
683		0.068	G			N	N		М	М		
823		0.082				N	N		М	М		
104		0.1				N	N		М	М		
124		0.12				N	N		М	М		
154		0.15				N	N		М	М		
184		0.18				N			М	М		
224		0.22				N			М	М		
274		0.27							М	М		
334		0.33							М	М		
394		0.39							М	М		
474		0.47							М	Q		
684		0.68							Q	Q		
824		0.82							Q	Q		
105		1							Q	Q		
WVDC		/DC	25V	50V	100V	25V	50V	100V	25V 50V			
	SIZE			0603			0805		12	06		

Letter	А	С	E	G	J	К	М	Ν	Р	Q	Х	Y	Z
Max. Thickness	0.33 (0.013)	0.56 (0.022)	0.71 (0.028)	0.90	0.94	1.02	1.27 (0.050)	1.40	1.52	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)
		(0:022)	PAPER	(0.000)	(0.007)	(0.0.0)	(0.000)	(0.000)	· /	DSSED	(0.020)	(01100)	(01110)

KUCERE KWXC The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at www.kyocera-avx.com/disclaimer/ by reference and should be reviewed in full before placing any order.

Downloaded from Arrow.com.

TDS-SMDMLCC-0005 | Rev 4