### **Automotive MLCC**

### **General Specifications**



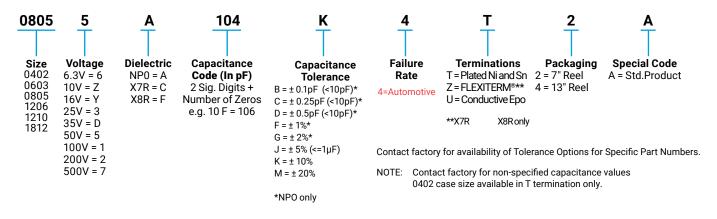


#### **GENERAL DESCRIPTION**

AVX Corporation 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.

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**



#### 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

## **Automotive MLCC**

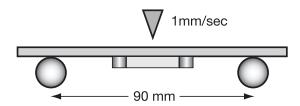
### **NP0/X7R Dielectric**



#### **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**

SIZ	ZE	04	02		06	03		0805						1206							
Solde		Reflow	//Wave		Reflow	//Wave			Re	eflow/Wa	ive				Reflov	//Wave					
WV		25V	50V	25V	50V	100V	200V	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V	500V			
0R5	0.5	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
1R0	1.0	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
1R2	1.2	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
1R5	1.5	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
1R8	1.8	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
2R2	2.2	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
2R7	2.7	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
3R3	3.3	C	C	G G	G G	G	G G	J	J	J	N	N	J	J	J	J	J	J			
3R9	3.9				G	G		J	J	J	N	N	J	J	J	J	J	J			
4R7 5R6	4.7 5.6	C	C C	G G		G G	G G	J	J	J	N N	N N	J	J	J	J	J	J			
6R8	6.8	C	C	G	G G	G	G	J	J	J	N	N	J	J	J	J	J	J			
8R2	8.2	С	C	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
100	10.0	С	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	С	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	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
330	33	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
390	39	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
470	47	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J	J	J			
510	51	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J					
560	56	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J					
680	68	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J					
820	82	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J					
101	100	С	С	G	G	G	G	J	J	J	N	N	J	J	J	J					
121	120			G	G	G		J	J	J	N	N	J	J	J	J					
151	150			G	G	G		J	J	J	N	N	J	J	J	J					
181	180			G	G	G		J	J	J	N	N	J	J	J	J					
221	220			G	G	G		J	J	J	N	N	J	J	J	J					
271	270			G	G	G		J	J	J	N	N	J	J	J	J					
331	330			G	G	G		J	J	J	N	N	J	J	J	J					
391	390			G G	G G			J	J	J			J	J	J	J					
471 561	470 560			G	G			J	J	J			J	J	J	J					
681	680			G	G			J	J	J			J	J	J	J		$\vdash$			
821	820			G	G			J	J	J			J	J	J	J		$\vdash$			
102	1000							J	J	J			J	J	J	J					
122	1200							3	3	3			3	3	J	3					
152	1500																	$\vdash$			
182	1800														<u> </u>			$\dagger$			
222	2200																				
272	2700																				
	3300																				
392	3900																				
	4700																				
	10nF																				
WV	DC	25V	50V	25V	50V	100V	200V	25V	50V	100V	200V	250V	25V	50V	100V	200V	250V	500V			
Siz		04	02		06	03				0805			1206								
		<b>-</b>											1200								

Letter	А	С	Е	G	J	K	М	N	Р	Q	Х	Υ	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						EMBO	SSED			

120920

# **Automotive MLCC - X7R**



## **Capacitance Range**

s	ize		0402					0603						08	05						1206						12	210			18	312			2	220		
Solo	dering	R	eflow/W	ave			Re	eflow/W	ave					Reflow	/Wave					Re	flow/W	ave					Reflo	w Only			Reflo	w Only			Refle	ow Only		
(L) Length	mm (in.)	(0	1 ± 0.1 .04 ± 0.0					1.6 ± 0.1 063 ± 0.						2.01 (0.079 :							3.2 ± 0. 26 ± 0.						(0.126		)			± 0.3 ± 0.012)				7 ± 0.5 4 ± 0.02)	)	
(W) Width	mm (in.)		0.5 ± 0. .02 ± 0.0					0.81 ± 0. 032 ± 0.						1.25 (0.049 :		)					1.6 ± 0. 163 ± 0.						2.5 (0.098	± 0.2 ± 0.008	)			± 0.2 ± 0.008)				± 0.4 7 ± 0.016	)	
(t) Terminal	mm (in.)		0.25 ± 0. .01 ± 0.0					0.35 ± 0. 014 ± 0.						0.5 ± (0.02 :							0.5 ± 0.2 .02 ± 0.				0.5 ± 0.25 (0.02 ± 0.01)				0.61 ± 0.36 (0.024 ± 0.014)					± 0.39 5 ± 0.015	)			
W	VDC	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	200V	250V	50V	100V	25V	50V	100V	200V	250V	500V
101	100																												М	Q								
221	220	С	С	С	G	G	G	G	G	G	_						_						-		-				М	Q		<u> </u>	-	-				$\perp$
271 331	270 330	C	C	C	G	G	G	G	G	G			_									-	-		+	-			M	Q		-	-	-	_			$\vdash\vdash$
391	390	С	С	С	G	G	G	G	G	G												1				1			M	0			1					$\vdash$
471	470	С	С	С	G	G	G	G	G	G												<del>                                     </del>							M	Q			1					$\vdash$
561	560	_	С	С	G	G	G	G	G	G																			М	Q								М
681	680	С	С	С	G	G	G	G	G	G													İ						М	Q				i –				
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	K	K	K	М	Q	К	К						Ш
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	K	K	K	K	M	Q	K	K	-	$\vdash$	<u> </u>	-	_	$\vdash$
152 182	1500 1800	С	С	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		$\vdash$	-	-		$\vdash$
222	2200	С	С	С	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		$\vdash$	<u> </u>	<del>                                     </del>		$\vdash$
272	2700	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						М
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						П
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	K	K	K	К	М	Q	К	K						
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	K	K	K	K	М	Q	К	K						
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	K	K	K	М	Q	К	K						ш
682 822	6800 8200	С	С	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		├	_			$\vdash$
103	Cap 0.01	С	С	С	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		<del>                                     </del>				$\vdash$
123	(uF) 0.012	С	-		G	G	G	G	G	1		J	J	J	N	N	N	J	J	J	J	J	J	-	K	K	K	К	М	Q	K	K						$\vdash$
153	0.015	С			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J		К	К	К	К	М	Q	К	К						П
183	0.018	С			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J		K	К	K	K	М	Q	K	K						
223	0.022	С			G	G	G	G	G			J	J	J	N	N	N	J	J	J	J	J	J		K	K	K	K	М	Q	K	K						
273	0.027	С		_	G	G	G	G	J	-		J	J	J	N	N	N	J	J	J	J	J	J	<u> </u>	K	K	K	K	М	Q	K	K		_	_			Ш
333 393	0.033	С			G	G	G	G	J	_	-	J	J	J	N N	N N	N N	J	J	J	J	J	J		K	K	K	K	M	Q	K	K						$\vdash$
473	0.039				G	G	G	G	J	-		J	J	J	N	N	N	J	J	J	M	M	M		K	K	K	K	M	Q	K	K						$\vdash$
563	0.056				G	G	G	G	J		<u> </u>	J	J	J	N		-	J	J	J	М	М	М		К	K	К	М	М	Q	К	К		$\vdash$		<u> </u>		М
683	0.068				G	G	G	G	J			J	J	J	N			J	J	J	М	М	М		К	К	К	М	М	Q	К	К						
823	0.082				G	G	G	G	J			J	J	J	N			J	J	J	М	М	М		K	K	K	М	Q	Q	К	К						
104	0.1				G	G	G	G	J			J	J	J	N	_		J	J	J	М	Р	Р		K	K	K	М	Q	Q	К	К						Х
124	0.12		-	-	G	J	J	-	-	1	-	J	J	N	N	$\vdash$	-	J	J	M	M	Q	Q	-	K	K	K	P P	Q	Q	K	K	-	$\vdash$	<u> </u>	-	_	$\vdash$
154 224	0.15		$\vdash$	-	G	J	J		$\vdash$	-	-	M	N N	N N	N N	$\vdash$	-	J	M	M	Q	Q	Q		K M	K	K M	P	Q	Q	M	K M		$\vdash$	<del></del>	<del>                                     </del>		$\vdash$
334	0.22					1	3	1	<del>                                     </del>		<del>                                     </del>	N	N	N	N	$\vdash$	<del>                                     </del>	J	M	P	Q	Ų	ų		P	P	P	Q	Z	Z	X	X	1	<del>                                     </del>		1		$\vdash$
474	0.47				<u> </u>					1		N	N	N	N			М	М	P	Q				P	P	P	Q			X	Х						М
684	0.68											N	N	N	N			М	Q	Q	Q				Р	Р	Q	Х			Х	Х						
105	1											N	N	N	N			М	Q	Q	Q				Р	Q	Q	Z			Х	Х		Z	Z	Х	Х	
155	1.5											N	N					Q	Q	Q	Q				Р	Q	Z	Z			Х	Х		Z	Z	Z	Z	
225	2.2	-	<u> </u>	_	-	_	-	-	-	-	-	N	N	<u> </u>	<u> </u>	-	-	Q	Q	Q	Q	-	-	_	Z	Z	Z	Z	<u> </u>		Z	Z		Z	Z		_	$\vdash \vdash$
335 475	3.3 4.7	-	$\vdash$	-	+	-	$\vdash$	+	$\vdash$	1	-	-	-	<u> </u>	$\vdash$	1	-	Q	Q	Q Q	$\vdash$	$\vdash$	-	-	X	Z	Z	Z			Z		+-	Z	Z			$\vdash\vdash$
106	10	-	$\vdash$	-	+	-	<del>                                     </del>	+	<del>                                     </del>	1	<u> </u>	1	<u> </u>	$\vdash$	$\vdash$	$\vdash$	$\vdash$	ų	ų	ų	<u> </u>	$\vdash$	$\vdash$	1	Z	Z	Z				Z		Z	Z	Z		<u> </u>	$\vdash\vdash$
226	22				t		t	1	t		t					$\vdash$						t	t		Ť							1	Z		_			$\vdash$
W	VDC .	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	200V	250V	50V	100V	25V	50V	100V	200V	250V	500V
s	ize		0402					0603						08	05						1206						12	10			18	312			2	220		

Letter	A	С	Е	G	J	K	М	N	Р	Q	X	Υ	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)		
			DADER			EMBOSSED									

# **Automotive MLCC - X8R**



## **Capacitance Range**

	SIZE			0603			0805		1206			
	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		M	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	1	/DC	25V	50V	100V	25V	50V	100V	25V 50V			
	SIZE			0603			0805		1206			

Letter	Α	С	Е	G	J	K	М	N	Р	Q	Χ	Υ	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									

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