### **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 Term	Soft Term
0603	>2mm	>5
0805	>2mm	>5
1206	>2mm	>5

 b) Temperature Cycle testing FLEXITERM<sup>®</sup> has the ability to withstand at least 1000 cycles between -55°C and +125°C

# **Automotive MLCC - NP0**



### **Capacitance Range**

120 150	10pF	25V							1206				1	1812				
120 150	10nE	20V	50V	100V	25V	50V	100V	25V	50V	100V	200V	500V	25V	50V	100V	200V	50V	100V
150	TOPT	G	G	G	J	J	L	J	J	J	J	J						
	12	G	G	G	J	J	L	J	J	J	J	J						
	15	G	G	G	J	J	J	J	J	J	J	J						
180	18	G	G	G	J	J	J	J	J	J	J							
220	22	G	G	G	J	J	J	J	J	J	J							
270	27	G	G	G	J	J	J	J	J	J	J							
330	33	G	G	G	J	J	J	J	J	J	J							
390	39	G	G	G	J	J	J	J	J	J	J							
470	47	G	G	G	J	J	J	J	J	J	J							
510	51	G	G	G	J	J	J	J	J	J	J							
560	56	G	G	G	J	J	J	J	J	J	J							
680	68	G	G	G	J	J	J	J	J	J	J							
820	82	G	G	G	J	J	J	J	J	J	J				_			
101	100	G	G	G	J	J	J	J	J	J	J							
121	120	G	G	G	J	J	J	J	J	J	J							
151	150	G	G	G	J	J	J	J	J	J	J							
181	180	G	G	G	J	J	J	J	J	J	J							
221	220	G	G	G	J	J	J	J	J	J	J							
271	270	G	G	G	J	J	J	J	J	J	J							
331	330	G	G	G	J	J	J	J	J	J	J							
391	390	G	G		J	J	J	J	J	J	J							
471	470	G	G		J	J	J	J	J	J	J							
561	560				J	J	J	J	J	J	J							
681	680				J	J	J	J	J	J	J							
821	820				J	J	J	J	J	J	J							
	1000				J	J	J	J	J	J	J		J	J	J	J		
	1200							J	J	J	J		J	J	M	М		
	1500							J	М	М	M		J	J	M	М		
	1800							J	M	М	М		J	J	М	M		
	2200							J	М	М	М		J	J	M	М		
	2700							J	М				J	J	M			
	3300							J	М				J	J	P		K	K
	3900								I	_			J	J	P		K	K
	4700									_			J	J	P		K	K
103	10nF	25V	50V	100V	25V	50V	100V	25V	50V	100V	200V	500V	25V	50V	100V	200V	50V	100V
		25V		1000	25V		1000	257	500		2000	500V	25V			2000		
			0603			0805				1206				1	210		18	312
Lette		А	C		E	G	J		K	М	Ν	P		Q	Х	Y	Z	
Max		0.33	0.5		0.71	0.90	0.94		.02	1.27	1.40	1.52		.78	2.29	2.54	2.7	
Thickn	ness	(0.013)	(0.02	22) (0	.028)	(0.035)	(0.037	') (O.	040)	(0.050)	(0.055)	(0.06				(0.100) (0.110)		
				PA	APER						. ,	FN	/BOSSE	D		. ,		

= Under Development

# Automotive MLCC - X7R



### **Capacitance Range**

			0402 0603				0805				1206					1210				18	812	22	20						
			16V	25V	50V	16V	25V	50V	100V	200V	16V	25V	50V	100V	200V	16V	25V	50V	100V	200V	500V	16V	25V	50V	100V	50V	100V	25V	50V
221	Cap .:	22																											
271		27																											
331		33																											
391		39																											
471		47																											
561		56																											
681		68																											
821		82																											
102		1				G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
182		.8				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
222		2.2				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
332		3.3				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
472		1.7				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
103		10				G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	K	K	K	K	K	K		
123		12				G	G	G			J	J	J	M		J	J	J	J	J		K	K	K	K	K	K		
153		15				G	G	G			J	J	J	M		J	J	J	J	J		K	K	K	K	K	K		
183		18				G	G	G			J	J	J	М		J	J	J	J	J		K	K	K	K	K	K		
223		22				G	G	G			J	J	J	M		J	J	J	J	J		K	K	K	K	K	K		
273		27				G	G	G			J	J	J	M		J	J	J	J	J		K	K	K	K	K	K		
333		33				G	G	G			J	J	J	М		J	J	J	J	J		K	K	K	K	K	K		
473		47				G	G	G			J	J	J	M		J	J	J	M	J		K	K	K	K	K	K		
563		56				G	G	G			J	J	J	M		J	J	J	M	J		K	K	K	M	K	K		
683		68				G	G	G			J	J	J	М		J	J	J	М	J		K	K	K	M	K	K		
823		82				G	G	G			J	J	J	M		J	J	J	М	J		K	K	K	M	K	K		
104		00				G	G	G			J	J	M	М		J	J	J	М	J		K	K	K	M	K	K		
124 154		20 50									J	J	M			J	J	M	M			K	K	K	P	K	K		
											M	N	M			J	J	M	M			K	K	K	P	K	K		
224 334		20 30					<u> </u>	<u> </u>			M	N	M			J	M	M	Q		<u> </u>	M	P	M	P	M	M		
334 474		30 70					<u> </u>	<u> </u>			N	N	M			J	M	P	Q			P	P	P	Q	X	X		
684		70 80					<u> </u>	<u> </u>			N	N	IVI			M	M		Q		<u> </u>	P	P		Q	X	X	$\vdash$	
105						<u> </u>	<u> </u>	<u> </u>			N	N	<u> </u>			M	Q	Q	Q			P		Q	X	X	X	$\vdash$	
105		1					-				IN	IN				Q	Q	Q	Q			P	Q	Z	Z	X	X	$\vdash$	
225		2.2														Q	Q					X	Z	Z	Z	Z	Z	$\vdash$	
335		2.2 3.3				<u> </u>	<u> </u>	<u> </u>			<u> </u>					Q	Q					X		Z	2	Z	2	$\vdash$	
475		3.3 1.7										<u> </u>										X	Z 7	Z		Z			
106		+. <i>1</i> 10				<u> </u>	<u> </u>	<u> </u>			<u> </u>	<u> </u>				<u> </u>						~	2	2	<u> </u>	2			Z
226		22									——																	Z	2
220	4	<u> </u>	16V	25V	50V	16V	25V	50V	100V	2001/	16V	25V	50V	100V	2001/	16V	251/	50V	1001/	200V	5001/	16V	25V	50V	100V	50V	100V	25V	50V
		-			JUV	107			1000	2007	100			1000	2000	107	201			2007	3000	107			1000				
	0402 0603							0603			0805						12	06			1210				1812 2220			20	

#### = Under Development

Letter	A	С	E	G	J	K	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									

50

## Automotive MLCC - X8R



### **Capacitance Range**

SIZE				0603				0805		1206			
	WVDC		25V		50V		25V	50V		25V	5	0V	
C			G		G								
(p			G				J	J					
			G				J	J					
680		G				J	J						
			G				J	J		J		J	
							J	J		J		J	
							J	J		J		J	
							J	J		J		J	
							J					J	
												J	
												J	
												J	
												J	
												J	
												J	
												J	
μ)												J	
												J	
												J	
												J	
	0.033		G			_	J					J	
						_							
												J	
					G							J	
											M		
			G			_							
						_							
								IN					
												M	
						_	IN						
												M	
						_			_		-	VI	
	0.00		1										
			1			_				141			
			1					-					
			1										
			25V		50V		25V	50V		25V	5	OV	
SIZ			1 201										
					K							Z 2.79	
(0.013)													
(0013)	(0.022)	(0.028)	(0.035)	(0.037)	(0.040)	(0.050	) (0.05	5) (0.060)	(0.070)	(0.090)	(0.100)	(0.110	
(01010)	( )	PAPER	. ,						DSSED				
	C (P	WVDC       Cap     270       (pF)     330       470     680       1000     1500       1500     1800       2700     3300       2700     3300       3900     4700       5600     6800       6800     6800       Cap     0.01       (µF)     0.015       0.015     0.015       0.016     0.027       0.033     0.033       0.047     0.068       0.033     0.047       0.12     0.12       0.12     0.15       0.12     0.12       0.12     0.15       0.12     0.12       0.12     0.12       0.13     0.18       0.22     0.27       0.33     0.39       0.47     0.68       0.82     1       1     WVDC       SIZE     A	WVDC       Cap     270       (pF)     330       470     680       1000     1500       1800     2200       2700     3300       3900     4700       5600     6800       8200     6800       6800     8200       Cap     0.01       0.015     0.012       0.016     0.018       0.022     0.027       0.033     0.039       0.047     0.056       0.082     0.1       0.15     0.18       0.027     0.33       0.33     0.39       0.47     0.68       0.22     0.27       0.33     0.39       0.47     0.68       0.33     0.39       0.47     0.68       0.82     1       0.33     0.39       0.47     0.68       0.82     1       0.33     0.39       0.47     0.68 <td>WVDC     25V       Cap     270     G       (pF)     330     G       470     G     G       1000     G     G       1000     G     G       1800     G     G       2200     G     G       2700     G     G       3300     G     G       3300     G     G       3300     G     G       3300     G     G       2200     G     G       6800     G     G       6200     G     G       6200     G     G       6200     G     G       0.015     G     G       0.018     G     G       0.022     G     G       0.033     G     G       0.033     G     G       0.047     G     G       0.056     G     G       0.022     G     G <td>WVDC     25V       Cap     270     G       (pF)     330     G       470     G     680       1000     G     1       1500     G     1       2200     G     1       2700     G     1       2700     G     1       3300     G     1       2700     G     1       2700     G     1       3300     G     1       2200     G     1       3900     G     1       3900     G     1       3900     G     1       6800     G     1       6800     G     1       690.015     G     1       0.015     G     1       0.018     G     1       0.027     G     1       0.033     G     1       0.047     G     1       0.056     G     1</td><td>WVDC     25V     50V       Cap     270     G     G     G       (pF)     330     G     G     G       470     G     G     G     G       1000     G     G     G     G       1000     G     G     G     G       1500     G     G     G     G       2200     G     G     G     G       2700     G     G     G     G       3300     G     G     G     G       3300     G     G     G     G       4700     G     G     G     G       6800     G     G     G     G       6800     G     G     G     G       0.015     G     G     G     G       0.015     G     G     G     G       0.018     G     G     G     G       0.022     G     G     G&lt;</td><td>WVDC     25V     50V       Cap     270     G     G       (pF)     330     G     G       470     G     G     G       1000     G     G     G       1500     G     G     G       2200     G     G     G       2700     G     G     G       3300     G     G     G       3300     G     G     G       4700     G     G     G       5600     G     G     G       6800     G     G     G       8200     G     G     G       0.015     G     G     G       0.015     G     G     G       0.015     G     G     G       0.027     G     G     G       0.033     G     G     G       0.033     G     G     G       0.15     0.1     0.1     0.1<td>WVDC     25V     50V     25V       (pF)     330     G     G     G     J       470     G     G     G     J       1000     G     G     G     J       2200     G     G     G     J       2200     G     G     G     J       3300     G     G     G     J       3300     G     G     G     J       4700     G     G     G     J       6800     G     G     J     J       6800     G     G     J     J       6800     G     G     J     J       0.012     G     G     G     J       0.018     G     G     J     J       0.033     G&lt;</td><td>WVDC     25V     50V     25V     50V       (pF)     330     G     G     G     J     J       470     G     G     G     J     J       680     G     G     G     J     J       1000     G     G     G     J     J       1800     G     G     J     J     J       2200     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       0.015     G     G     J     J     J       0.022     G     G     J     J     J</td><td>WVDC     25V     50V     25V     50V       Cap     270     G     G     G     J     J       (pF)     330     G     G     G     J     J     J       1000     G     G     G     J     J     J     J       2200     G     G     G     J     J     J     J       3300     G     G     G     J     J     J     J       4700     G     G     G     J     J     J     J       6800     G     G     G     J     J     J     J       0.015     G     G     G     J     J     J     J       <td< td=""><td>WDC     25V     50V     25V     50V     25V     25V       Cap     270     G     G     G     G     J     J     J       470     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1800     G     G     G     G     J     J     J     J       2200     G     G     G     G     J     J     J     J       3300     G     G     G     G     J     J     J     J       4700     G     G     G     G     J     J     J     J       6800     G     G     G     G     J     J     J     J       0.011     G     G     G     J     J     J&lt;</td><td>WDC     25V     50V     25V     50V</td></td<></td></td></td>	WVDC     25V       Cap     270     G       (pF)     330     G       470     G     G       1000     G     G       1000     G     G       1800     G     G       2200     G     G       2700     G     G       3300     G     G       3300     G     G       3300     G     G       3300     G     G       2200     G     G       6800     G     G       6200     G     G       6200     G     G       6200     G     G       0.015     G     G       0.018     G     G       0.022     G     G       0.033     G     G       0.033     G     G       0.047     G     G       0.056     G     G       0.022     G     G <td>WVDC     25V       Cap     270     G       (pF)     330     G       470     G     680       1000     G     1       1500     G     1       2200     G     1       2700     G     1       2700     G     1       3300     G     1       2700     G     1       2700     G     1       3300     G     1       2200     G     1       3900     G     1       3900     G     1       3900     G     1       6800     G     1       6800     G     1       690.015     G     1       0.015     G     1       0.018     G     1       0.027     G     1       0.033     G     1       0.047     G     1       0.056     G     1</td> <td>WVDC     25V     50V       Cap     270     G     G     G       (pF)     330     G     G     G       470     G     G     G     G       1000     G     G     G     G       1000     G     G     G     G       1500     G     G     G     G       2200     G     G     G     G       2700     G     G     G     G       3300     G     G     G     G       3300     G     G     G     G       4700     G     G     G     G       6800     G     G     G     G       6800     G     G     G     G       0.015     G     G     G     G       0.015     G     G     G     G       0.018     G     G     G     G       0.022     G     G     G&lt;</td> <td>WVDC     25V     50V       Cap     270     G     G       (pF)     330     G     G       470     G     G     G       1000     G     G     G       1500     G     G     G       2200     G     G     G       2700     G     G     G       3300     G     G     G       3300     G     G     G       4700     G     G     G       5600     G     G     G       6800     G     G     G       8200     G     G     G       0.015     G     G     G       0.015     G     G     G       0.015     G     G     G       0.027     G     G     G       0.033     G     G     G       0.033     G     G     G       0.15     0.1     0.1     0.1<td>WVDC     25V     50V     25V       (pF)     330     G     G     G     J       470     G     G     G     J       1000     G     G     G     J       2200     G     G     G     J       2200     G     G     G     J       3300     G     G     G     J       3300     G     G     G     J       4700     G     G     G     J       6800     G     G     J     J       6800     G     G     J     J       6800     G     G     J     J       0.012     G     G     G     J       0.018     G     G     J     J       0.033     G&lt;</td><td>WVDC     25V     50V     25V     50V       (pF)     330     G     G     G     J     J       470     G     G     G     J     J       680     G     G     G     J     J       1000     G     G     G     J     J       1800     G     G     J     J     J       2200     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       0.015     G     G     J     J     J       0.022     G     G     J     J     J</td><td>WVDC     25V     50V     25V     50V       Cap     270     G     G     G     J     J       (pF)     330     G     G     G     J     J     J       1000     G     G     G     J     J     J     J       2200     G     G     G     J     J     J     J       3300     G     G     G     J     J     J     J       4700     G     G     G     J     J     J     J       6800     G     G     G     J     J     J     J       0.015     G     G     G     J     J     J     J       <td< td=""><td>WDC     25V     50V     25V     50V     25V     25V       Cap     270     G     G     G     G     J     J     J       470     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1800     G     G     G     G     J     J     J     J       2200     G     G     G     G     J     J     J     J       3300     G     G     G     G     J     J     J     J       4700     G     G     G     G     J     J     J     J       6800     G     G     G     G     J     J     J     J       0.011     G     G     G     J     J     J&lt;</td><td>WDC     25V     50V     25V     50V</td></td<></td></td>	WVDC     25V       Cap     270     G       (pF)     330     G       470     G     680       1000     G     1       1500     G     1       2200     G     1       2700     G     1       2700     G     1       3300     G     1       2700     G     1       2700     G     1       3300     G     1       2200     G     1       3900     G     1       3900     G     1       3900     G     1       6800     G     1       6800     G     1       690.015     G     1       0.015     G     1       0.018     G     1       0.027     G     1       0.033     G     1       0.047     G     1       0.056     G     1	WVDC     25V     50V       Cap     270     G     G     G       (pF)     330     G     G     G       470     G     G     G     G       1000     G     G     G     G       1000     G     G     G     G       1500     G     G     G     G       2200     G     G     G     G       2700     G     G     G     G       3300     G     G     G     G       3300     G     G     G     G       4700     G     G     G     G       6800     G     G     G     G       6800     G     G     G     G       0.015     G     G     G     G       0.015     G     G     G     G       0.018     G     G     G     G       0.022     G     G     G<	WVDC     25V     50V       Cap     270     G     G       (pF)     330     G     G       470     G     G     G       1000     G     G     G       1500     G     G     G       2200     G     G     G       2700     G     G     G       3300     G     G     G       3300     G     G     G       4700     G     G     G       5600     G     G     G       6800     G     G     G       8200     G     G     G       0.015     G     G     G       0.015     G     G     G       0.015     G     G     G       0.027     G     G     G       0.033     G     G     G       0.033     G     G     G       0.15     0.1     0.1     0.1 <td>WVDC     25V     50V     25V       (pF)     330     G     G     G     J       470     G     G     G     J       1000     G     G     G     J       2200     G     G     G     J       2200     G     G     G     J       3300     G     G     G     J       3300     G     G     G     J       4700     G     G     G     J       6800     G     G     J     J       6800     G     G     J     J       6800     G     G     J     J       0.012     G     G     G     J       0.018     G     G     J     J       0.033     G&lt;</td> <td>WVDC     25V     50V     25V     50V       (pF)     330     G     G     G     J     J       470     G     G     G     J     J       680     G     G     G     J     J       1000     G     G     G     J     J       1800     G     G     J     J     J       2200     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       0.015     G     G     J     J     J       0.022     G     G     J     J     J</td> <td>WVDC     25V     50V     25V     50V       Cap     270     G     G     G     J     J       (pF)     330     G     G     G     J     J     J       1000     G     G     G     J     J     J     J       2200     G     G     G     J     J     J     J       3300     G     G     G     J     J     J     J       4700     G     G     G     J     J     J     J       6800     G     G     G     J     J     J     J       0.015     G     G     G     J     J     J     J       <td< td=""><td>WDC     25V     50V     25V     50V     25V     25V       Cap     270     G     G     G     G     J     J     J       470     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1800     G     G     G     G     J     J     J     J       2200     G     G     G     G     J     J     J     J       3300     G     G     G     G     J     J     J     J       4700     G     G     G     G     J     J     J     J       6800     G     G     G     G     J     J     J     J       0.011     G     G     G     J     J     J&lt;</td><td>WDC     25V     50V     25V     50V</td></td<></td>	WVDC     25V     50V     25V       (pF)     330     G     G     G     J       470     G     G     G     J       1000     G     G     G     J       2200     G     G     G     J       2200     G     G     G     J       3300     G     G     G     J       3300     G     G     G     J       4700     G     G     G     J       6800     G     G     J     J       6800     G     G     J     J       6800     G     G     J     J       0.012     G     G     G     J       0.018     G     G     J     J       0.033     G<	WVDC     25V     50V     25V     50V       (pF)     330     G     G     G     J     J       470     G     G     G     J     J       680     G     G     G     J     J       1000     G     G     G     J     J       1800     G     G     J     J     J       2200     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       3300     G     G     G     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       6800     G     G     J     J     J       0.015     G     G     J     J     J       0.022     G     G     J     J     J	WVDC     25V     50V     25V     50V       Cap     270     G     G     G     J     J       (pF)     330     G     G     G     J     J     J       1000     G     G     G     J     J     J     J       2200     G     G     G     J     J     J     J       3300     G     G     G     J     J     J     J       4700     G     G     G     J     J     J     J       6800     G     G     G     J     J     J     J       0.015     G     G     G     J     J     J     J <td< td=""><td>WDC     25V     50V     25V     50V     25V     25V       Cap     270     G     G     G     G     J     J     J       470     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1800     G     G     G     G     J     J     J     J       2200     G     G     G     G     J     J     J     J       3300     G     G     G     G     J     J     J     J       4700     G     G     G     G     J     J     J     J       6800     G     G     G     G     J     J     J     J       0.011     G     G     G     J     J     J&lt;</td><td>WDC     25V     50V     25V     50V</td></td<>	WDC     25V     50V     25V     50V     25V     25V       Cap     270     G     G     G     G     J     J     J       470     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1000     G     G     G     G     J     J     J     J       1800     G     G     G     G     J     J     J     J       2200     G     G     G     G     J     J     J     J       3300     G     G     G     G     J     J     J     J       4700     G     G     G     G     J     J     J     J       6800     G     G     G     G     J     J     J     J       0.011     G     G     G     J     J     J<	WDC     25V     50V     25V     50V	

= AEC-Q200 Qualified