

For 600V to 5000V Applications

NP0 (C0G) Dielectric Performance Characteristics

Capacitance Range	10 pF to 0.100 μ F (25°C, 1.0 $\pm$ 0.2 Vrms at 1kHz, for $\leq$ 1000 pF use 1 MHz)
Capacitance Tolerances	$\pm$ 5%, $\pm$ 10%, $\pm$ 20%
Dissipation Factor	0.1% max. (+25°C, 1.0 $\pm$ 0.2 Vrms, 1kHz, for $\leq$ 1000 pF use 1 MHz)
Operating Temperature Range	-55°C to +125°C
Temperature Characteristic	0 $\pm$ 30 ppm/°C (0VDC)
Voltage Ratings	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
Insulation Resistance (+25°C, at 500 VDC)	100K M Ω min. or 1000 M Ω - μ F min., whichever is less
Insulation Resistance (+125°C, at 500 VDC)	10K M Ω min. or 100 M Ω - μ F min., whichever is less
Dielectric Strength	Minimum 120% rated voltage for 5 seconds at 50 mA max. current

NP0 (C0G) CAPACITANCE RANGE – PREFERRED SIZES ARE SHADED

Case Size		0805							1206							1210							1808							1812						
Soldering		Reflow/Wave							Reflow/Wave							Reflow Only							Reflow Only							Reflow Only						
(L) Length	mm (in.)	2.10 ±0.20 (0.085 ±0.008)							3.30 ±0.30 (0.130 ±0.012)							3.30 ±0.40 (0.130 ±0.016)							4.60 ±0.50 (0.181 ±0.020)							4.60 ±0.50 (0.177 ±0.012)						
(W) Width	mm (in.)	1.25 ±0.20 (0.049 ±0.008)							1.60 ±0.30 ±0.10 (0.063 ±0.012/-0.004)							2.50 ±0.30 (0.098 ±0.012)							2.90 ±0.30 (0.079 ±0.008)							3.20 ±0.30 (0.126 ±0.008)						
(T) Thickness	mm (in.)	1.35 (0.053)							1.80 (0.071)							2.80 (0.110)							2.20 (0.087)							2.80 (0.100)						
(t) Terminal	min	0.50 ±0.20 (0.020 ±0.008)							0.60 ±0.20 (0.024 ±0.008)							0.75 ±0.35 (0.030 ±0.014)							0.75 ±0.35 (0.030 ±0.014)							0.75 ±0.35 (0.030 ±0.014)						
Voltage(V)		600	630	1000	600	630	1000	1500	2000	600	630	1000	1500	2000	3000	600	630	1000	1500	2000	2500	3000	4000	600	630	1000	1500	2000	2500	3000	4000					
Cap (pF)	.5 0R5		A	C																																
	1.0 1R0		A	C																																
	1.2 1R2		A	C																																
	1.5 1R5	A	A	C		X	X	X	X	X	X	X	X	X																						
	1.8 1R8	A	A	C		X	X	X	X	X	X	X	X	X																						
	2.2 2R2	A	A	C		X	X	X	X	X	X	X	X	X																						
	2.7 2R7	A	A	C		X	X	X	X	X	X	X	X	X																						
	3.3 3R3	A	A	C		X	X	X	X	X	X	X	X	X																						
	3.9 3R9	A	A	C		X	X	X	X	X	X	X	X	X																						
	4.7 4R7	A	A	C		X	X	X	X	X	X	X	X	X																						
	5.6 5R6	A	A	C		X	X	X	X	X	X	X	X	X																						
	6.8 6R8	A	A	C		X	X	X	X	X	X	X	X	X																						
	8.2 8R2	A	A	C		X	X	X	X	X	X	X	X	X																						
	10 100	A	A	C		X	X	X	X	X	X	X	X	X																						
	12 120	A	A	C		X	X	X	X	X	X	X	X	X																						
	15 150	A	A	C		X	X	X	X	X	X	X	X	X																						
	18 180	A	A	C		X	X	X	X	X	X	X	X	X																						
	22 220	A	A	C		X	X	X	X	X	X	X	X	X																						
	27 270	A	A	C		X	X	X	X	X	X	X	X	X																						
	33 330	A	A	C		X	X	X	D	M	C	M	M	D																						
	39 390	A	A	C		X	X	X	D	M	C	M	M	D																						
	47 470	A	A	C		X	X	M	D	M	C	M	M	D																						
	56 560	A	A	C		X	X	M	C	C	C	M	M	C																						
	68 680	A	A	C		X	X	M	C	C	C	M	M	C																						
	82 820	X	X	X	X	X	X	C	C	C	C	C	C	C																						
	100 101	X	X	X	X	X	X	C	C	C	C	M	M	C																						
	120 121	C	C	C	C	X	X	C	C	M	C	C	C	C																						
	150 151	C	C	C	C	X	X	C	C	M	C	C	C	C																						
	180 181	C	C	C	C	X	X																													
	220 221	C	C	C	C	X	X																													
	270 271	C	C	C	C	C	M																													
	330 331	C	C	C	C	C	M																													
	390 391	C	C	C	C	C	M																													
	470 471	C	C	C	C	C	M																													
	560 561	C	C	C	C	C																														
	680 681	C	C	C	C	C																														
	750 751	C	C	C	C	C																														
	820 821	C	C	C	C	C																														
	1000 102																																			
	1200 122	C	C	C	C																															
	1500 152	C	C	C	C	E																														
	1800 182	C	C	C	C																															
	2200 222	C	C	C	C																															
	2700 272																																			
	3300 332																																			
	3900 392																																			
	4700 472																																			
	5600 562																																			
	6800 682																																			
	8200 822																																			
Cap (µF)	0.010 103																																			
	0.012 123																																			
	0.015 153																																			
	0.018 183																																			
	0.022 223																				</															

Letter	A	C	E	F	G	X	7
Max. Thickness	0.813 (0.032)	1.448 (0.057)	1.8034 (0.071)	2.2098 (0.087)	2.794 (0.110)	0.940 (0.037)	3.30 (0.130)

NOTE: Contact factory for non-specified capacitance values



High Voltage MLC Chips

For 600V to 5000V Applications

NP0 (C0G) CAPACITANCE RANGE – PREFERRED SIZES ARE SHADED

Case Size	1825								2220								2225								3640										
Soldering	Reflow Only								Reflow Only								Reflow Only								Reflow Only										
(L) Length mm	4.60 ±0.50								5.70 ±0.50								5.70 ±0.50								9.14 ±0.25										
(L) Length (in.)	(0.181 ±0.020)								(0.224 ±0.020)								(0.225 ±0.010)								(0.360 ±0.010)										
(W) Width mm	6.30 ±0.40								5.00 ±0.40								6.30 ±0.40								10.2 ±0.25										
(W) Width (in.)	(0.248 ±0.016)								(0.197 ±0.016)								(0.250 ±0.010)								(0.400 ±0.010)										
(T) Thickness mm	3.40								3.40								3.40								2.54										
(T) Thickness (in.)	(0.134)								(0.134)								(0.100)								(0.100)										
(t) Terminal min	0.75 ±0.35								0.85 ±0.35								0.85 ±0.35								0.76 (0.030)										
(t) Terminal max	(0.030 ±0.014)								(0.033 ±0.014)								(0.033 ±0.014)								1.52 (0.060)										
Voltage (V)	600	630	1000	1500	2000	2500	3000	4000	600	630	1000	1500	2000	2500	3000	4000	5000	600	630	1000	1500	2000	2500	3000	4000	5000	600	630	1000	1500	2000	2500	3000	4000	5000
Cap (pF)	1.5 1R5																																		
	1.8 1R8																																		
	2.2 2R2																																		
	2.7 2R7																																		
	3.3 3R3																																		
	3.9 3R9																																		
	4.7 4R7																																		
	5.6 5R6																																		
	6.8 6R8																																		
	8.2 8R2																																		
	10 100	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	12 120	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	15 150	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	18 180	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	22 220	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	27 270	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	33 330	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	39 390	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
	47 470	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G								G	
	56 560	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G								G	
	68 680	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G								G	
	82 820	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G								G	
	100 101	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	120 121	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	150 151	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	180 181	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	220 221	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	270 271	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	330 331	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	390 391	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	470 471	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	560 561	E	E	G	E	F	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	G	
	680 681	E	E	G	E	F	F	G	E	E	E	E	E	E	F	F		E	E	E	E	E	E	E	E	G	G			G	G	G	G	G	
	750 751	E	E	G	E	F	F	G	E	E	E	E	E	E	F	F		E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	
	820 821	E	E	G	E	F	F	G	E	E	E	E	E	E	F	F		E	E	E	E	E	E	E	E	E	E	G	G			G	G	G	
	1000 102	E	E	G	E	F	F	G	E	E	E	E	E	E	F	F		E	E	E	E	E	E	E	E	E	G	G			G	G	G	G	
	1200 122	E	E	G	E	F	G	G	E	E	E	E	E	E	G	G		E	E	E	E	E	F	F		G	G			G	G	G	G		
	1500 152	E	E	G	F	G	G	G	E	E	E	F	F	G	G	G		E	E	E	E	E	F	F		G	G			G	G	G	G		
	1800 182	E	E	G	F	G	G	G	E	E	E	F	F	G	G	G		E	E	E	E	E	G	G		G	G			G	G	G	G		
	2200 222	E	E	G	G	G	G	G	E	E	E	G	G	G	G	G		E	E	E	E	E	G	G		G	G			G	G	G	G		
	2700 272	E	E	G	G	G	G	G	E	E	E	G	G	G	G	G		E	E	E	F	F	G	G		G	G			G	G	G	G		
	3300 332	E	E	G	G	G			E	E	E	G	G					E	E	E	F	F	G	G		G	G			G	G	G	G		
	3900 392	E	E	G	G	G			E	E	E	G	G					E	E	E	G	G				G	G			G	G	G	G		
	4700 472	E	E	G	G	G			E	E	E	G	G					F	F	F	G	G				G	G			G	G	G	G		
	5600 562	F	F	G	G	G			F	F	F	G	G					F	F	F	G	G				G	G			G	G	G	G		
	6800 682	F	F	G	G	G			G	G	G	G	G					F	F	F	G	G				G	G			G	G	G	G		
	8200 822	F	F	G	G	G			G	G	G	G	G					G	G	G	G	G				G	G			G	G	G	G		
Cap (µF)	0.010	103	F	F	G				G	G	G							G	G	G	G	G				G	G			G	G	G	G		
	0.012	123	F	F	G				G	G	G							G	G	G	G	G				G	G			G	G	G	G		
	0.015	153	F	F					G	G								G	G	G	G														
	0.018	183	F	F					G	G								G	G	G	G														
	0.022	223	F	F					G	G								G	G	G	G														
	0.027	227	F	F					G	G								G	G	G	G														
	0.033	333	F	F					G	G								G	G	G	G														
	0.039	393	G	G					G	G								G	G	G	G														
	0.047	473	G	G					G	G								G	G	G	G														
	0.056	563	G	G					G	G								G	G	G	G														
	0.068	683	G	G														G	G	G	G														
	0.100	104																G	G	G	G														
Voltage (V)	600	630	1000	1500	2000	2500	3000	4000	600	630	1000	1500	2000	2500	3000	4000	5000	600	630	1000	1500	2000	2500	3000	4000	5000	600	630	1000	1500	2000	2500	3000	4000	5000
Case Size	1825								2220								2225								3640										

High Voltage MLC Chips

For 600V to 5000V Applications

X7R Dielectric

Performance Characteristics

Capacitance Range	10 pF to 0.82 μ F (25°C, 1.0 $\pm$ 0.2 Vrms at 1kHz)
Capacitance Tolerances	$\pm$ 10%; $\pm$ 20%; +80%, -20%
Dissipation Factor	2.5% max. (+25°C, 1.0 $\pm$ 0.2 Vrms, 1kHz)
Operating Temperature Range	-55°C to +125°C
Temperature Characteristic	$\pm$ 15% (0VDC)
Voltage Ratings	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
Insulation Resistance (+25°C, at 500 VDC)	100K M Ω min. or 1000 M Ω - μ F min., whichever is less
Insulation Resistance (+125°C, at 500 VDC)	10K M Ω min. or 100 M Ω - μ F min., whichever is less
Dielectric Strength	Minimum 120% rated voltage for 5 seconds at 50 mA max. current

X7R CAPACITANCE RANGE – PREFERRED SIZES ARE SHADED

Case Size	0805			1206				1210				1808						1812											
Soldering	Reflow/Wave			Reflow/Wave				Reflow Only				Reflow Only						Reflow Only											
(L) Length	mm	2.10 ±0.20 (0.085 ±0.008)		3.30 ±0.30 (0.130 ±0.012)				3.30 ±0.40 (0.130 ±0.016)				4.60 ±0.50 (0.181 ±0.020)						4.60 ±0.50 (0.177 ±0.012)											
(W) Width	mm	1.25 ±0.20 (0.049 ±0.008)		1.60 ±0.30/-0.10 (0.063 ±0.012/-0.004)				2.50 ±0.30 (0.098 ±0.012)				2.00 ±0.20 (0.079 ±0.008)						3.20 ±0.30 (0.126 ±0.008)											
(T) Thickness	mm	1.35 (0.053)		1.80 (0.071)				2.80 (0.110)				2.20 (0.087)						2.80 (0.100)											
(t) Terminal	min max	0.50 ±0.20 (0.020 ±0.008)		0.60 ±0.20 (0.024 ±0.008)				0.75 ±0.35 (0.030 ±0.014)				0.75 ±0.35 (0.030 ±0.014)						0.75 ±0.35 (0.030 ±0.014)											
Voltage(V)	600	630	1000	600	630	1000	1500	2000	600	630	1000	1500	2000	600	630	1000	1500	2000	2500	3000	4000	600	630	1000	1500	2000	2500	3000	4000
Cap (pF)	100	101	X	X	X	C	C	E	E	E	E	E	E																
	120	121	X	X	X	C	C	E	E	E	E	E	E																
	150	151	X	X	X	C	C	E	E	E	E	E	E																
	180	181	X	X	X	C	C	E	E	E	E	E	E																
	220	221	X	X	X	C	C	E	E	E	E	E	E																
	270	271	X	X	X	C	C	E	E	E	E	E	E									E	E	E	E	E			
	330	331	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E			
	390	391	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E			
	470	471	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	E	F	
	560	561	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	E	F	
	680	681	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	F	F	
	750	751	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	F	F	
	820	821	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	F	F	
	1000	102	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	F	F	
	1200	122	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F		E	E	E	E	F	F	G	
	1500	152	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F		E	E	E	E	E	G	G	
	1800	182	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	F	F		E	E	E	E	E	G	G	
	2200	222	X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	F	F	F		E	E	E	E	E	G	G	
	2700	272	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	F	F			E	E	E	E	E	G	G	
	3300	332	C	C	C	C	C	E	E	E	E	E	E	E	E	E	E	F	F			E	E	E	F	F	G	G	
	3900	392	C	C	C	C	C	E						E	E	E	E	F	F			E	E	E	F	F	G	G	
	4700	472	C	C	C	C	C	E						E	E	E	E	F	F			E	E	E	F	F	G	G	
	5600	562	C	C	C	C	C	E						E	E	E	E	F	F			E	E	E	G	G			
	6800	682	C	C	C	C	C	E						E	E	E	E	F	F			E	E	E	G	G			
	8200	822	C	C	C	C	C	E						E	E	E	E	G	E	E			E	E	E	G	G		
Cap (µF)	0.010	103	C	C		C	C	E						E	E	E	E					E	E	F	G	G			
	0.015	153	C	C		E	E	E						F	F	F						E	E	F	G				
	0.018	183	C	C		E	E	E						F	F	F						E	E	G					
	0.022	223	C	C		E	E	E						F	F	F						E	E	G		G			
	0.027	273				E	E	E						F	F	F						E	E	G					
	0.033	333				E	E							F	F	F						E	E	G					
	0.039	393												F	F	F						E	E	G					
	0.047	473				E	E							F	F	F						E	E	G					
	0.056	563				E	E							F	F	F						F	F	G					
	0.068	683												F	F	G						F	F	G					
	0.082	823												F	F							F	F	G					
	0.100	104												F	F							F	F	G					
	0.150	154												G	G							G	G						
	0.220	224																				G	G						
	0.270	274																				G	G						
	0.330	334																				G	G						
	0.390	394																											
	0.470	474																											
	0.560	564																											
	0.680	684																											
	0.820	824																											
	1.000	105																											
Voltage(V)	600	630	1000	600	630	1000	1500	2000	600	630	1000	1500	2000	600	630	1000	1500	2000	2500	3000	4000	600	630	1000	1500	2000	2500	3000	4000
Case Size	0805			1206				1210				1808						1812											

Letter	A	C	E	F	G	X	7
Max. Thickness	0.813 (0.032)	1.448 (0.057)	1.8034 (0.071)	2.2098 (0.087)	2.794 (0.110)	0.940 (0.037)	3.30 (0.130)

NOTE: Contact factory for non-specified capacitance values

For 600V to 5000V Applications

PREFERRED SIZES ARE SHADED

Letter	A	C	E	F	G	X	7
Max. Thickness	0.813 (0.032)	1.448 (0.057)	1.8034 (0.071)	2.2098 (0.087)	2.794 (0.110)	0.940 (0.037)	3.30 (0.130)

NOTE: Contact factory for non-specified capacitance values