

High Voltage MLC Chips

For 600V to 5000V Applications

NPO (C0G) Dielectric Performance Characteristics

Capacitance Range	10 pF to 0.100 µF (25°C, 1.0 ±0.2 Vrms at 1kHz, for ≤ 1000 pF use 1 MHz)
Capacitance Tolerances	±5%, ±10%, ±20%
Dissipation Factor	0.1% max. (+25°C, 1.0 ±0.2 Vrms, 1kHz, for ≤ 1000 pF use 1 MHz)
Operating Temperature Range	-55°C to +125°C
Temperature Characteristic	0 ±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 MΩ min. or 1000 MΩ - µF min., whichever is less
Insulation Resistance (+125°C, at 500 VDC)	10K MΩ min. or 100 MΩ - µF min., whichever is less
Dielectric Strength	Minimum 120% rated voltage for 5 seconds at 50 mA max. current

NPO (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	2.10 ±0.20 (0.085 ±0.008)			3.30 ±0.30 (0.130 ±0.012)					3.30 ±0.40 (0.130 ±0.016)					4.80 ±0.50 (0.181 ±0.020)					4.80 ±0.50 (0.177 ±0.012)															
(W) Width	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	1.35 (0.053)			1.80 (0.071)					2.80 (0.110)					2.20 (0.087)					2.80 (0.100)															
(t) Terminal	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																																	
1.0	1R0			A C C																														
1.2	1R2			A C C																														
1.5	1R5			A C C																														
1.8	1R8			A A C C X X X X X X																														
2.2	2R2			A A C C X X X X X X																														
2.7	2R7			A A C C X X X X X X																														
3.3	3R3			A A C C X X X X X X																														
3.9	3R9			A A C C X X X X X X																														
4.7	4R7			A A C C X X X X X X																														
5.6	5R6			A A C C X X X X X X																														
6.8	6R8			A A C C X X X X X X																														
8.2	8R2			A A C C X X X X X X																														
10	100			A A C C X X X X X X																														
12	120			A A C C X X X X X X																														
15	150			A A C C X X X X X X																														
18	180			A A C C X X X X X X																														
22	220			A A C C X X X X X X																														
27	270			A A C C X X X X X X																														
33	330			A A C C X X X D M																														
39	390			A A C C X X X D M																														
47	470			A A C C X X X D M																														
56	560			A A C C X X M C C																														
68	680			A A C C X X M C C																														
82	820			A A C C X X C C C																														
100	100			X X X X X C C C																														
120	120			C C C X X X C C C																														
150	150			C C C X X X C C C																														
180	180			C C C X X X C C C																														
220	220			C C C X X X C C C																														
270	270			C C C C M E E E E E																														
330	330			C C C C M E E E E E																														
390	390			C C C C M E E E E E																														
470	470			C C C C M E E E E E																														
560	560			C C C C M E E E E E																														
680	680			C C C C M E E E E E																														
750	750			C C C C M E E E E E																														
820	820			C C C C M E E E E E																														
1000	1000			C C C C M E E E E E																														
1200	1200			C C C C M E E E E E																														
1500	1500			C C C C M E E E E E																														
1800	1800			C C C C M E E E E E																														
2200	2200			C C C C M E E E E E																														
2700	2700			C C C C M E E E E E																														
3300	3300			C C C C M E E E E E																														
3900	3900			C C C C M E E E E E																														
4700	4700			C C C C M E E E E E																														
5600	5600			C C C C M E E E E E																														
6800	6800			C C C C M E E E E E																														
8200	8200			C C C C M E E E E E																														
Cap (µF) 0.010	103																																	
0.012	123																																	
0.015	153																																	
0.018	183																																	
0.022	223																																	
0.027	273																																	
0.033	333																																	
0.047	473																																	
0.056	563																																	
0.068	683																																	
0.100	104																																	
0.12	124																																	
0.15	154																																	
0.18	184																																	
0.22	224																																	
0.27	274																																	
0.33	334																																	
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				
Case Size	0805			1206					1210					1808					1812															

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

NOTE: Contact factory for non-specified capacitance values



High Voltage MLC Chips

For 600V to 5000V Applications

NPO (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 (0.050)										
(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 1R8								1.8 1R8									2.2 2R2									2.7 2R7								
Cap (pF)	3.3 3R3								3.9 3R9									4.7 4R7									5.6 5R6								
Cap (pF)	6.8 6R8								8.2 8R2									10 100	E	E	G	E	F	E	F	F	12 120	E	E	G	E	F	E	F	F
Cap (pF)	15 150	E	E	G	E	F	E	F	F	18 180	E	E	G	E	F	E	F	F	22 220	E	E	G	E	F	E	F	F								
Cap (pF)	27 270	E	E	G	E	F	E	F	F	33 330	E	E	G	E	F	E	F	F	39 390	E	E	G	E	F	E	F	F								
Cap (pF)	47 470	E	E	G	E	F	E	F	F	56 560	E	E	G	E	F	E	F	F	68 680	E	E	G	E	F	E	F	F								
Cap (pF)	82 820	E	E	G	E	F	E	F	F	100 101	E	E	G	E	F	E	F	F	120 121	E	E	G	E	F	E	F	F								
Cap (pF)	150 151	E	E	G	E	F	E	F	F	180 181	E	E	G	E	F	E	F	F	220 221	E	E	G	E	F	E	F	F								
Cap (pF)	270 271	E	E	G	E	F	E	F	F	330 331	E	E	G	E	F	E	F	F	390 391	E	E	G	E	F	E	F	F								
Cap (pF)	470 471	E	E	G	E	F	E	F	F	560 561	E	E	G	E	F	E	F	F	680 681	E	E	G	E	F	E	F	F								
Cap (pF)	750 751	E	E	G	E	F	E	F	F	820 821	E	E	G	E	F	E	F	F	1000 102	E	E	G	E	F	E	F	F								
Cap (pF)	1200 122	E	E	G	E	F	E	F	F	1500 152	E	E	G	E	F	E	F	F	1800 182	E	E	G	E	F	E	F	F								
Cap (pF)	2200 222	E	E	G	E	F	E	F	F	2700 272	E	E	G	E	F	E	F	F	3300 332	E	E	G	E	F	E	F	F								
Cap (pF)	3900 392	E	E	G	E	F	E	F	F	4700 472	E	E	G	E	F	E	F	F	5600 562	F	F	G	G	G	G	G	G								
Cap (pF)	6800 682	F	F	G	G	G	G	G	G	8200 822	F	F	G	G	G	G	G	G	0.010 103	F	F	G													
Cap (pF)	0.012 123	F	F	G					0.015 153	F	F							0.018 183	F	F															
Cap (pF)	0.022 223	F	F						0.027 227	F	F							0.033 333	F	F															
Cap (pF)	0.039 393	G	G						0.047 473	G	G							0.056 563	G	G															
Cap (pF)	0.068 683	G	G						0.100 104	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										

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

X7R Dielectric Performance Characteristics

Capacitance Range	10 pF to 0.82 µF (25°C, 1.0 ±0.2 Vrms at 1kHz)
Capacitance Tolerances	±10%; ±20%; +80%, -20%
Dissipation Factor	2.5% max. (+25°C, 1.0 ±0.2 Vrms, 1kHz)
Operating Temperature Range	-55°C to +125°C
Temperature Characteristic	±15% (0VDC)
Voltage Ratings	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
Insulation Resistance (+25°C, at 500VDC)	100K MΩ min. or 1000 MΩ - µF min., whichever is less
Insulation Resistance (+125°C, at 500VDC)	10K MΩ min. or 100 MΩ - µF 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																														
	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)																														
Cap (pF)	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 (µF)	100	101	120	121	150	151	180	181	220	221	270	271	330	331	390	391	470	471	560	561	680	681	750	751	820	821	1000	102	1200	122	1500	152	1800	182	2200	222	2700	272	3300	332	3900	392	4700	472	5600	562	6800	682	8200	822
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

High Voltage MLC Chips

For 600V to 5000V Applications

X7R CAPACITANCE RANGE PREFERRED SIZES ARE SHADED

Case Size	1825								2220								2225								3640										
Soldering	Reflow Only								Reflow Only								Reflow Only								Reflow Only										
(L) Length mm (in.)	4.60 ±0.50 (0.181 ±0.020)								5.70 ±0.50 (0.224 ±0.020)								5.70 ±0.50 (0.225 ±0.010)								9.14 ±0.25 (0.360 ±0.010)										
(W) Width mm (in.)	6.30 ±0.40 (0.248 ±0.016)								5.00 ±0.40 (0.197 ±0.016)								6.30 ±0.40 (0.250 ±0.010)								10.2 ±0.25 (0.400 ±0.010)										
(T) Thickness mm (in.)	3.40 (0.134)								3.40 (0.134)								3.40 (0.100)								2.54 (0.100)										
(t) Terminal min max	0.75 ±0.35 (0.030 ±0.014)								0.85 ±0.35 (0.033 ±0.014)								0.85 ±0.35 (0.033 ±0.014)								0.76 (0.030) 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)	100	101							100	101								100	101								100	101							
120																																			
150																																			
180																																			
220																																			
270																																			
330																																			
390																																			
470																																			
560																																			
680																																			
750																																			
820																																			
1000	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G	F		F	F	F	F	F	F	F	F		G	G	G	G	G	G	G	G	
1200	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	G	G		F	F	F	F	F	F	F	G		G	G	G	G	G	G	G	G
1500	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	G	G		F	F	F	F	F	F	F	G		G	G	G	G	G	G	G	G
1800	F	F	F	F	F	F	F	G	F	F	F	F	F	F	F	G	G		F	F	F	F	F	F	F	G		G	G	G	G	G	G	G	G
2200	F	F	F	F	F	F	F		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F			G	G	G	G	G	G	G	G	G
2700	F	F	F	F	F	F	F		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F			G	G	G	G	G	G	G	G	G
3300	F	F	F	F	F	F	F		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F			G	G	G	G	G	G	G	G	G
3900	F	F	F	F	F	F	F		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F			G	G	G	G	G	G	G	G	G
4700	F	F	F	F	F	F	F		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F			G	G	G	G	G	G	G	G	G
5600	F	F	F	F	F	F	F		F	F	F	F	F	F	F	G		F	F	F	F	F	F	F			G	G	G	G	G	G	G	G	G
6800	F	F	F	G	G	G	G		F	F	F	F	F	F	G	G		F	F	F	F	F	F	G		G	G	G	G	G	G	G	G	G	
8200	F	F	F	G	G	G	G		F	F	F	G	G	G	G		F	F	F	F	F	G	G		G	G	G	G	G	G	G	G	G		
Cap (µF) 0.010	F	F	F	G	G	G	G		F	F	F	G	G	G	G		F	F	F	F	F	G	G		G	G	G	G	G	G	G	G	G		
0.015	F	F	F	G	G	G	7		F	F	F	G	G	G	7		F	F	F	G	G	G	G		G	G	G	G	G	G	G	G	G		
0.018	F	F	F	G	G	7	7		F	F	F	G	G	G	7		F	F	F	G	G	G	7		G	G	G	G	G	G	G	G	G		
0.022	F	F	F	G	G				F	F	F	G	G			F	F	F	G	G	G			G	G	G	G	G	G	G	G	G			
0.027	F	F	F	G	7				F	F	F	G	G			F	F	F	G	G			G	G	G	G	G	G	G	G	G				
0.033	F	F	F	G	7				F	F	F	G	7			F	F	F	G	G			G	G	G	G									
0.039	F	F	F	G	7				F	F	F	G	7			F	F	F	G				G	G	G	G									
0.047	F	F	F	G	7				F	F	F	G	7			F	F	F	G				G	G	G	G									
0.056	F	F	F	G	7				F	F	F	G	7			F	F	F	G				G	G	G	G									
0.068	F	F	G						F	F	G					F	F	F	G				G	G	G	G									
0.082	F	F	G						F	F	G					F	F	G	7				G	G	G	G									
0.100	F	F	G						F	F	G					F	F	G	7				G	G	G	G									
0.150	F	F	7						F	F	G					F	F	G	7				G	G	G										
0.220	F	F	7						F	F	G					F	F	7					G	G	G										
0.270	F	F	7						F	F	7					F	F	7					G	G											
0.330	F	F	7						F	F	7					F	F	7					G	G											
0.390	F	F							F	F	7					F	F	7					G	G											
0.470	F	F							F	F						F	F						G	G											
0.560	G	G							G	G						F	F						G	G											
0.680	G	G							G	G						G	G						G	G											
0.820	7	7							7	7						G	G																		
1.000	7	7							7	7						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										

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

