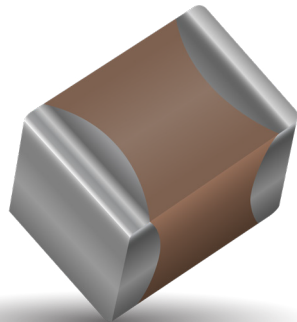


High Voltage MLC Chips

For 600V to 5000V Applications



High value, low leakage and small size are difficult parameters to obtain in capacitors for high voltage systems. AVX special high voltage MLC chip capacitors meet these performance characteristics and are designed for applications such as snubbers in high frequency power converters, resonators in SMPS, and high voltage coupling/dc blocking. These high voltage chip designs exhibit low ESRs at high frequencies.

Larger physical sizes than normally encountered chips are used to make high voltage MLC chip products. Special precautions must be taken in applying these chips in surface mount assemblies. The temperature gradient during heating or cooling cycles should not exceed 4°C per second. The preheat temperature must be within 50°C of the peak temperature reached by the ceramic bodies through the soldering process. Chip sizes 1210 and larger should be reflow soldered only. Capacitors may require protective surface coating to prevent external arcing.

For 1825, 2225 and 3640 sizes, AVX offers leaded version in either thru-hole or SMT configurations (for details see section on high voltage leaded MLC chips)

NEW 630V RANGE

HOW TO ORDER

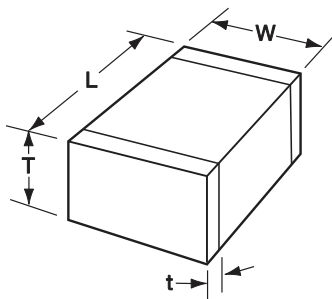
1808	A	A	271	M	A	1	2	A
AVX Style	Voltage	Temperature Coefficient	Capacitance Code (2 significant digits + no. of zeros) Examples:	Capacitance Tolerance COG: J = ±5% K = ±10% M = ±20% X7R: K = ±10% M = ±20% Z = +80%, -20%	Test Level A = Standard	Termination* 1 = Pd/Ag T = Plated Ni and Sn (RoHS Compliant)	Packaging** 1 or 2 = 7" Reel 3 or 4 = 13" Reel	Special Code A = Standard
0805	600V/630V = C	NPO (COG) = A	10 pF = 100					
1206	1000V = A	X7R = C	100 pF = 101					
1210	1500V = S		1,000 pF = 102					
1808	2000V = G		22,000 pF = 223					
1812	2500V = W		220,000 pF = 224					
1825	3000V = H		1 μF = 105					
2220	4000V = J							
2225	5000V = K							
3640								

*Note: Terminations with 5% minimum lead (Pb) is available, see pages 100 and 101 for LD style. Leaded terminations are available, see pages 102-106.

Notes: Capacitors with X7R dielectrics are not intended for applications across AC supply mains or AC line filtering with polarity reversal. Contact plant for recommendations. Contact factory for availability of Termination and Tolerance options for Specific Part Numbers.

**The 3640 Style is not available on 7" Reels.

*** AVX offers nonstandard chip sizes. Contact factory for details.



DIMENSIONS

MILLIMETERS (INCHES)

SIZE	0805	1206	1210*	1808*	1812*	1825*	2220*	2225*	3640*
(L) Length	2.10 ± 0.20 (0.083 ± 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 (0.181 ± 0.020)	4.60 ± 0.50 (0.181 ± 0.020)	5.70 ± 0.50 (0.224 ± 0.020)	5.72 ± 0.25 (0.225 ± 0.010)	9.14 ± 0.25 (0.360 ± 0.010)
(W) Width	1.25 ± 0.20 (0.049 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	2.50 ± 0.30 (0.098 ± 0.012)	2.00 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.30 (0.126 ± 0.012)	6.30 ± 0.40 (0.248 ± 0.016)	5.00 ± 0.40 (0.197 ± 0.016)	6.35 ± 0.25 (0.250 ± 0.010)	10.2 ± 0.25 (0.400 ± 0.010)
(T) Thickness Max.	1.35 (0.053)	1.80 (0.071)	2.80 (0.110)	2.20 (0.087)	2.80 (0.110)	3.40 (0.134)	3.40 (0.134)	2.54 (0.100)	2.54 (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)	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)

*Reflow Soldering Only



The Important Information/Disclaimer is incorporated in these specifications by reference and should be reviewed in full before placing any order.

High Voltage MLC Chips

For 600V to 5000V Applications



NP0 (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 (0 VDC)
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

NP0 (C0G) CAPACITANCE RANGE – PREFERRED SIZES ARE SHADED

Case Size Soldering	0805				1206					1210						1808						1812										
	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)						4.60 ± 0.50 (0.181 ± 0.020)						4.60 ± 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 (0.04 ± 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	X																	
	1.8	1R8	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	2.2	2R2	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	2.7	2R7	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	3.3	3R3	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	3.9	3R9	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	4.7	4R7	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	5.6	5R6	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	6.8	6R8	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	8.2	8R2	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	10	100	A	A	C	X	X	X	X	X	X	X	X	X	X																	
	12	120	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	15	150	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	18	180	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	22	220	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	27	270	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	33	330	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	39	390	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	47	470	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	56	560	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	68	680	A	A	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	82	820	X	X	X	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	100	101	X	X	X	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	120	121	C	C	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	150	151	C	C	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	180	181	C	C	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	220	221	C	C	C	X	X	X	X	X	X	X	X	X	X	C	M	M	D	M	F	C	C	C	C	C	C	C	C	C	C	E
	270	271	C	C	C	C	M	E	E	E	E	E	E	E	E	G	C	F	C	F	F	F	F	F	F	F	F	F	F	F	F	E
	330	331	C	C	C	C	M	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	390	391	C	C	C	C	M	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	470	471	C	C	C	C	M	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	560	561	C	C	C	C	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	680	681	C	C	C	C	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	750	751	C	C	C	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	820	821	C	C	C	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	1000	102	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	1200	122	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	1500	152	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	1800	182	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	2200	222	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	2700	272	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	3300	332	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	3900	392	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	4700	472	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	5600	562	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	6800	682	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	8200	822	C	C	E	E	E	E	E	E	E	E	E	E	E		C	F	F	F	F	F	F	F	F	F	F	F	F	F	F	E
	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																								</						

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	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	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	3.40 (0.134)								3.40 (0.134)								3.40 (0.100)								2.54 (0.100)										
(t) Terminal	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)	1.5	1R5							1.5	1R5								1.5	1R5								1.5	1R5							
	1.8	1R8							1.8	1R8								1.8	1R8								1.8	1R8							
	2.2	2R2							2.2	2R2								2.2	2R2								2.2	2R2							
	2.7	2R7							2.7	2R7								2.7	2R7								2.7	2R7							
	3.3	3R3							3.3	3R3								3.3	3R3								3.3	3R3							
	3.9	3R9							3.9	3R9								3.9	3R9								3.9	3R9							
	4.7	4R7							4.7	4R7								4.7	4R7								4.7	4R7							
	5.6	5R6							5.6	5R6								5.6	5R6								5.6	5R6							
	6.8	6R8							6.8	6R8								6.8	6R8								6.8	6R8							
	8.2	8R2							8.2	8R2								8.2	8R2								8.2	8R2							
	10	100	E	E	G	E	F	E	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	E	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	E	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	E	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	E	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	E	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	E	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	E	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	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F					G		
	56	560	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F					G		
	68	680	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F					G		
	82	820	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F					G		
	100	101	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	120	121	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	150	151	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	180	181	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	G	G						G		
	220	221	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	G	G						G		
	270	271	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	330	331	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	390	391	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	470	471	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	560	561	E	E	G	E	F	E	F	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G						G		
	680	681	E	E	G	E	F	F	G		E	E	E	E	E	F	F			E	E	E	E	E	E								G		
	750	751	E	E	G	E	F	F	G		E	E	E	E	F	F				E	E	E	E	E	E								G		
	820	821	E	E	G	E	F	F	G		E	E	E	E	F	F				E	E	E	E	F	E								G		
	1000	102	E	E	G	E	F	F	G		E	E	E	E	F	F				E	E	E	E	E	E								G		
	1200	122	E	E	G	E	F	G	G		E	E	E	E	G	G				E	E	E	E	F	F								G		
	1500	152	E	E	G	F	G	G	G		E	E	E	F	F	G	G				E	E	E	E	F	F							G		
	1800	182	E	E	G	F	G	G	G		E	E	E	F	F	G	G				E	E	E	E	G	G							G		
	2200	222	E	E	G	G	G		G		E	E	E	G	G					E	E	E	E	E									G		
	2700	272	E	E	G	G	G		G		E	E	E	G	G					E	E	E	F	F									G		
	3300	332	E	E	G	G	G		G		E	E	E	G	G					E	E	E	F	F									G		
	3900	392	E	E	G	G	G		G		E	E	E	G	G					E	E	E	G	G									G		
	4700	472	E	E	G	G	G		G		E	E	E	G	G					F	F	F	G	G									G		
	5600	562	F	F	G	G	G		G		F	F	F	G	G					F	F	F	G	G									G		
	6800	682	F	F	G	G	G		G		F	F	F	G	G					F	F	F	G	G									G		
	8200	822	G	G	G		G		G		G	G	G							G	G	G											G		
	Cap (µF)	0.010	103	F	E	G					7	7	7							G	G	G											G		
		0.012	123		E	G														G	G												G		
		0.015	153		E															G	G												G		
		0.018	183		E															G	G												G		
		0.022	223		E															G	G												G		
		0.027	273		F																													G	
		0.033	333		F																													G	
		0.039	393		G																													G	
		0.047	473		G																													G	
		0.056	563		G																													G	
		0.068	683		G																													G	
		0.100	104																																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										

NOTE: Contact factory for non-specified capacitance values

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)

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% (0 VDC)
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

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	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	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 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	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
	120	121		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
	150	151		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
	180	181		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
	220	221		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
	270	271		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
	330	331		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	E	E	E	E	E
	390	391		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	E	E	E	E	E
	470	471		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	E	E	E	E	E	
	560	561		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	680	681		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	750	751		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	820	821		X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	1000	102		X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	1200	122		X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	1500	152		X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	1800	182		X	X	X	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	E	E	E	E	
	2200	222		X	X	X	C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	E	E	
	2700	272		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	E	E	
	3300	332		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	F	F	
	3900	392		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	F	F	
	4700	472		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	F	F	
	5600	562		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	G	G	
	6800	682		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	G	G	
	8200	822		C	C		C	C	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	E	G	G	
Cap (μF)	0.010	103		C	C		C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	
	0.015	153		C	C		E	E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	F	G	G	
	0.018	183		C	C		E	E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	E	E	G			
	0.022	223		C	C		E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.027	273		C	C		E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.033	333					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.039	393					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.047	473					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.056	563					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.068	683					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.082	823					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.100	104					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.150	154					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.220	224					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.270	274					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.330	334					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.390	394					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.470	474					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.560	564					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.680	684					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	0.820	824					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			
	1.000	105					E	E	E	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F	F	E	E	G			

NOTE: Contact factory for non-specified capacitance values

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)



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 mm 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																																								
Cap (pF) 120																																								
Cap (pF) 150																																								
Cap (pF) 180																																								
Cap (pF) 220																																								
Cap (pF) 270																																								
Cap (pF) 330																																								
Cap (pF) 390																																								
Cap (pF) 470																																								
Cap (pF) 560																																								
Cap (pF) 680																																								
Cap (pF) 750																																								
Cap (pF) 820																																								
Cap (pF) 1000	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 1200	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 1500	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 1800	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 2200	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 2700	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 3300	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 3900	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 4700	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 5600	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 6800	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (pF) 8200	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.010	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.015	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.018	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.022	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.027	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.033	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.039	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.047	F	F	F	P	P	P	P	P	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.056	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.068	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.082	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.100	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.150	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.220	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.270	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.330	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.390	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.470	F	F	F	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.560	G	G	G	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.680	G	G	G	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 0.820	G	G	G	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
Cap (µF) 1.000	G	G	G	G	G	G	G	G	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
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					

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

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