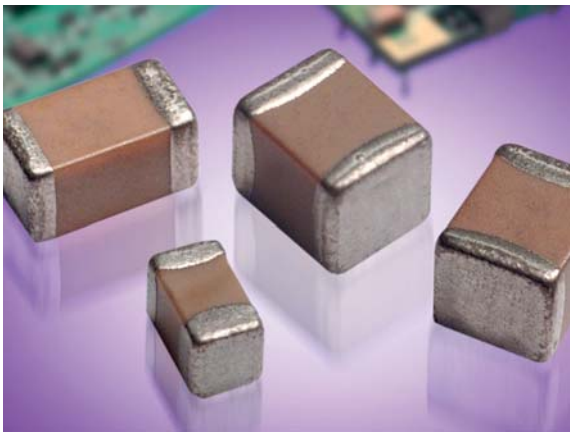
High Voltage MLC Chips

For 600V to 5000V Applications



NEW 630V RANGE

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 4ºC per second. The preheat temperature must be within 50ºC 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).

HOW TO ORDER

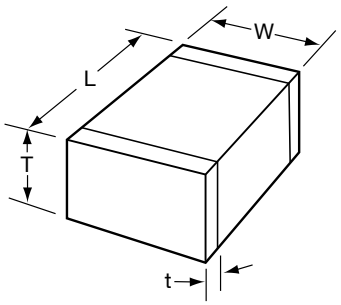
1808	A	A	271	K	A	1	2	A
AVX Style	**Voltage**	**Temperature Coefficient**	**Capacitance Code** (2 significant digits + no. of zeros)	**Capacitance Tolerance**	**Test Level**	**Termination***	**Packaging**	**Special Code**
0805	600V/630V = C	NPO (C0G) = A	Examples:	C0G: J = ±5%	A = Standard	1 = Pd/Ag	1 or 2 = 7" Reel**	A = Standard
1206	1000V = A	X7R = C	10 pF = 100	K = ±10%		T = Plated	3 or 4 = 13" Reel	
1210	1500V = S		100 pF = 101	M = ±20%		Ni and Sn		
1808	2000V = G		1,000 pF = 102	X7R: K = ±10%		(RoHS Compliant)		
1812	2500V = W		22,000 pF = 223	M = ±20%				
1825	3000V = H		220,000 pF = 224	Z = +80%, -20%				
2220	4000V = J		1 µF = 105					
2225	5000V = K							
3640								
***								

***Note:** Terminations with 5% minimum lead (Pb) is available, see pages 105 and 106 for LD style. Leaded terminations are available, see pages 107-111.

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.



RoHS COMPLIANT

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 $^{+0.30}_{-0.10}$ (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 ± 0.012)	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.	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)
max.									1.52 (0.060)

*Reflow Soldering Only

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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		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)					2.00 ± 0.20 (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 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)	1.5 1R5	A	A		X	X	X	X	X																					
	1.8 1R8	A	A		X	X	X	X	X																					
	2.2 2R2	A	A		X	X	X	X	X																					
	2.7 2R7	A	A		X	X	X	X	X								C	C	C	C	C									
	3.3 3R3	A	A		X	X	X	X	X								C	C	C	C	C									
	3.9 3R9	A	A		X	X	X	X	X								C	C	C	C	C									
	4.7 4R7	A	A		X	X	X	X	X								C	C	C	C	C									
	5.6 5R6	A	A		X	X	X	X	X								C	C	C	C	C									
	6.8 6R8	A	A		X	X	X	X	X								C	C	C	C	C									
	8.2 8R2	A	A		X	X	X	X	X								C	C	C	C	C									
	10 100	A	A	A	X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	12 120	A	A	A	X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	15 150	A	A	A	X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	18 180	A	A	A	X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	22 220	A	A	A	X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	27 270	A	A	A	X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	33 330	A	A	A	X	X	X	D	D	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	39 390	A	A	A	X	X	X	D	D	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	47 470	A	A	A	X	X	X	D	D	C	C	D	D	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	E
	56 560	A	A	A	X	X	X	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	F
	68 680	A	A	A	X	X	X	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	F
	82 820	X	X	X	X	X	C	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C		C	C	C	C	C	C	F
	100 101	X	X	X	X	X	C	C	C	C	C	C	C	C	C	C	C	C	C	F	F			C	C	C	C	C	C	F
	120 121	C	C	C	X	X	C	E	E	C	C	C	C	C	C	C	C	C	C	F	F			C	C	C	C	C	C	G
	150 151	C	C	C	X	X	C	E	E	C	C	C	E	E	C	C	C	F	F	F	F			C	C	C	C	C	C	G
	180 181	C	C	C	X	X	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F			C	C	C	C	C	F	F
	220 221	C	C		X	X	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F			C	C	C	C	C	F	F
	270 271	C	C		C	C	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F			C	C	C	C	C	F	F
	330 331	C	C		C	C	E	E	E	C	C	E	E	E	C	C	F	F	F	F	F			C	C	C	F	F	F	F
	390 391	C	C		C	C	E	E	E	C	C	E	E	E	C	C	F	F	F	F	F			C	C	C	F	F	F	F
	470 471	C	C		C	C	E	E	E	C	C	E	E	E	C	C	F	F	F	F	F			C	C	F	F	F	F	F
	560 561	C	C		C	C	E			C	C	E	E	E	C	C	F	F	F					C	C	F	F	F	F	F
	680 681	C	C		C	C	E			C	C	E	F	F	C	C	F	F	F					C	C	F	F	F	G	G
	750 751	C	C		E	E	E			C	C	E	G	G	C	C	F	F	F					C	C	F	F	F	G	G
	820 821	C	C		E	E	E			C	C	E	G	G	C	C	F	E	E					C	C	F	F	F	G	G
	1000 102				E	E	E			C	C	E	F	F	C	C	F	E	E					C	C	F	F	F	G	G
	1200 122				E	E				C	C	E			E	E	F	E	E					C	C	F	E	E		
	1500 152				E	E				C	C	G			E	E	F							C	C	F	F	F		
	1800 182				E	E				C	C	G			E	E	F							C	C	F	F	F		
	2200 222				E	E				E	E				E	E	F							C	C	E	G	G		
	2700 272				E	E				E	E				E	E								C	C	E	G	G		
	3300 332				E	E				E	E				E	E								C	C	F				
	3900 392									E	E				E	E								C	C	F				
	4700 472									E	E				E	E								C	C	G				
	5600 562									E	E				E	E								C	C					
	6800 682														F	F								C	C					
	8200 822																							E	E					
Cap (µF)	0.010 103																							E	E					
	0.012 123																							F	F					
	0.015 153																							G	G					
	0.018 183																							G	G					
	0.022 223																													
	0.033 333																													
	0.047 473																													
	0.056 563																													
	0.068 683																													
	0.100 104																													
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

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 (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) 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	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
12 120	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
15 150	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
18 180	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
22 220	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
27 270	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
33 330	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
39 390	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F									
47 470	E	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G									G
56 560	E	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G									G
68 680	E	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G									G
82 820	E	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	G									G
100 101	E	E	E	E	E	E	E	F	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	E	E	E	E	E	F	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	E	E	E	E	E	F	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	E	E	E	E	E	F	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	G	G				G	G	G	G	G	G
220 221	E	E	E	E	E	E	E	F	E	E	E	E	E	E	E	F	F	E	E	E	E	E	E	G	G				G	G	G	G	G	G
270 271	E	E	E	E	E	E	E	F	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	E	E	E	E	E	F	E	E	E	E	E	E	E			E	E	E	E	E	E	G					G	G	G	G	G	G
390 391	E	E	E	E	E	E	E		E	E	E	E	E	E	E			E	E	E	E	E	E	G					G	G	G	G	G	G
470 471	E	E	E	E	E	E	E		E	E	E	E	E	E	E			E	E	E	E	E	E	G					G	G	G	G	G	G
560 561	E	E	E	E	E	E	E		E	E	E	E	E	E	E			E	E	E	E	E	E	G					G	G	G	G	G	G
680 681	E	E	E	E	E	F	F		E	E	E	E	E	F	F			E	E	E	E	E	E						G	G	G	G	G	G
750 751	E	E	E	E	E	F	F		E	E	E	E	E	F	F			E	E	E	E	E	E						G	G	G	G	G	G
820 821	E	E	E	E	E	F	F		E	E	E	E	E	F	F			E	E	E	E	E	F	E					G	G	G	G	G	G
1000 102	E	E	E	E	E	F	F		E	E	E	E	E	F	F			E	E	E	E	E	E				G	G	G	G	G	G	G	G	
1200 122	E	E	E	E	E	G	G		E	E	E	E	E	G	G			E	E	E	E	E	F	F			G	G	G	G	G	G	G	G	
1500 152	E	E	E	F	F	G	G		E	E	E	F	F	G	G			E	E	E	E	E	F	F			G	G	G	G	G	G	G		
1800 182	E	E	E	F	F	G	G		E	E	E	F	F	G	G			E	E	E	E	E	G	G			G	G	G	G	G	G	G		
2200 222	E	E	E	G	G				E	E	E	G	G					E	E	E	E	E					G	G	G	G	G	G			
2700 272	E	E	E	G	G				E	E	E	G	G					E	E	E	F	F					G	G	G	G	G	G	G		
3300 332	E	E	E	G	G				E	E	E	G	G					E	E	E	F	F					G	G	G	G	G	G			
3900 392	E	E	E	G	G				E	E	E	G	G					E	E	E	G	G					G	G	G	G	G	G			
4700 472	E	E	E	G	G				E	E	E	G	G					F	F	F	G	G					G	G	G	G	G				
5600 562	F	F	F	G	G				F	F	F	G	G					F	F	F	G	G					G	G	G	G	G				
6800 682	F	F	F						F	F	F							F	F	F	G	G					G	G	G	G	G				
8200 822	G	G	G						G	G	G							G	G	G							G	G	G	G					
Cap (µF) 0.010 103	F	F	G						7	7	7							G	G	G							G	G	G	G					
0.012 123																		G	G								G	G	G					
0.015 153																		G	G								G	G	G					
0.018 183																		G	G								G	G	G					
0.022 223																		G	G								G	G	G					
0.033 333																		G	G								G	G						
0.047 473																		G	G								G	G						
0.056 563																		G	G															
0.068 683																		G	G															
0.100 104																																		
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% (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							
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)					2.00 ± 0.20 (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 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															
	120	121	X	X	C	C	C	E	E	E	E	E	E	E	E															
	150	151	X	X	C	C	C	E	E	E	E	E	E	E	E															
	180	181	X	X	C	C	C	E	E	E	E	E	E	E	E															
	220	221	X	X	C	C	C	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			
	330	331	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	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	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	F		E	E	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	F	F		E	E	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	F	F		E	E	E	E	E	F	F	
	750	751	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F		E	E	E	E	E	F	F	
	820	821	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	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	E	E	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	E	E	F	F		E	E	E	E	E	F	F	
	1500	152	X	X	X	C	C	E	E	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	E	F	F			E	E	E	E	E	G	G	
	2200	222	X	X	X	C	C	E	E	E	E	E	E	F	E	E	E	E	F	F	F			E	E	E	E	E	G	G	
	2700	272	C	C		C	C	E	E		E	E	E	F	E	E	E	E	F	F				E	E	E	E	E	G	G	
	3300	332	C	C		C	C	E			E	E	E	F	E	E	E	E	F	F				E	E	E	F	F	G	G	
	3900	392	C	C		C	C	E			E	E	E	F		E	E	E	F					E	E	E	F	F	G	G	
	4700	472	C	C		C	C	E			E	E	E	F		E	E	E	F					E	E	E	F	F	G	G	
	5600	562	C	C		C	C	E			E	E	E	F		E	E	E	F					E	E	E	G	G	G		
	6800	682	C	C		C	C	E			E	E	E			E	E	E	F					E	E	E	G	G			
	8200	822	C	C		C	C	E			E	E	E			E	E	E						E	E	E	G	G			
Cap (µF)	0.010	103	C	C		C	C	E			E	E	E			E	E	E						E	E	F	G	G			
	0.015	153	C	C		E	E	E			E	E	E			F	F	F						E	E	F	G				
	0.018	183	C	C		E	E				E	E	E			F	F	F						E	E	G					
	0.022	223	C	C		E	E				E	E	F			F	F							E	E	G					
	0.027	273				E	E				E	E				F	F							E	E	G					
	0.033	333				E	E				E	E				F	F							E	E	G					
	0.039	393									E	E				F	F							E	E	G					
	0.047	473									E	E				F	F							E	E	G					
	0.056	563									F	F				F	F							F	F						
	0.068	683									F	F				F	F							F	F						
	0.082	823									F	F												F	F						
	0.100	104									F	F												F	F						
	0.150	154																						G	G						
	0.220	224																						G	G						
	0.270	274																													
	0.330	334																													
	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

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	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)								
	max																											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																																		
	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	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
	1200 122	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
	1500 152	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
	1800 182	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
	2200 222	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 272	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 332	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 392	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	
	4700 472	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	
	5600 562	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	
	6800 682	F	F	F	G	G	G	G		F	F	F	F	F	G	G			F	F	F	F	F	G	G			G	G	G	G	G	G	G	G	
	8200 822	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		
Cap (µF)	0.010 103	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		
	0.015 153	F	F	F	G	G	G			F	F	F	G	G	G				F	F	F	G	G	G	G			G	G	G	G	G	G	G		
	0.018 183	F	F	F	G	G				F	F	F	G	G	G				F	F	F	G	G	G				G	G	G	G	G	G	G		
	0.022 223	F	F	F	G	G				F	F	F	G	G					F	F	F	G	G	G				G	G	G	G	G	G			
	0.027 273	F	F	F	G					F	F	F	G	G					F	F	F	G	G					G	G	G	G	G				
	0.033 333	F	F	F	G					F	F	F	G						F	F	F	G	G					G	G	G	G					
	0.039 393	F	F	F	G					F	F	F	G						F	F	F	G						G	G	G	G					
	0.047 473	F	F	F	P					F	F	F	G						F	F	F	G						G	G	G	G					
	0.056 563	F	F	F	G					F	F	F	G						F	F	F	G						G	G	G	G					
	0.068 683	F	F	G						F	F	G							F	F	F	G						G	G	G	G					
	0.082 823	F	F	G						F	F	G							F	F	G							G	G							
	0.100 104	F	F	G						F	F	G							F	F	G							G	G							
	0.150 154	F	F							F	F	G							F	F	G							G	G							
	0.220 224	F	F							F	F	G							F	F								G	G							
	0.270 274	F	F							F	F								F	F								G	G							
	0.330 334	F	F							F	F								F	F								G	G							
	0.390 394	F	F							F	F								F	F								G	G							
	0.470 474	F	F							F	F								F	F								G	G							
	0.560 564	G	G							G	G								F	F								G	G							
	0.680 684									G	G								G	G																
	0.820 824																		G	G																
	1.000 105																																		
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