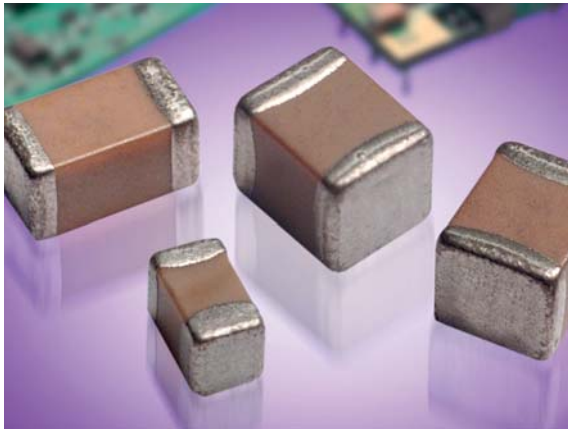


# High Voltage MLC Chips



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

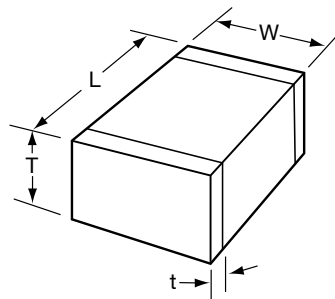
1808	A	A	271	K	A	1	1	A
<b>AVX Style</b>	<b>Voltage</b>	<b>Temperature Coefficient</b>	<b>Capacitance Code</b> (2 significant digits + no. of zeros) Examples: 10 pF = 100 100 pF = 101 1,000 pF = 102 22,000 pF = 223 220,000 pF = 224 1 μF = 105	<b>Capacitance Tolerance</b> COG: J = ±5% K = ±10% M = ±20%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

**\*Note:** Terminations with 5% minimum lead (Pb) is available, see pages 87 and 88 for LD style. Leaded terminations are available, see pages 89 and 90.

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	2.01 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	4.57 ± 0.25 (0.180 ± 0.010)	4.50 ± 0.30 (0.177 ± 0.012)	4.50 ± 0.30 (0.177 ± 0.012)	5.70 ± 0.40 (0.224 ± 0.016)	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 ± 0.20 (0.098 ± 0.008)	2.03 ± 0.25 (0.080 ± 0.010)	3.20 ± 0.20 (0.126 ± 0.008)	6.40 ± 0.30 (0.252 ± 0.012)	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.	1.30 (0.051)	1.52 (0.060)	1.70 (0.067)	2.03 (0.080)	2.54 (0.100)	2.54 (0.100)	3.30 (0.130)	2.54 (0.100)	2.54 (0.100)
(t) terminal min. max.	0.50 ± 0.25 (0.020 ± 0.010)	0.25 (0.010) 0.75 (0.030)	0.25 (0.010) 0.75 (0.030)	0.25 (0.010) 1.02 (0.040)	0.25 (0.010) 1.02 (0.040)	0.25 (0.010) 1.02 (0.040)	0.25 (0.010) 1.02 (0.040)	0.25 (0.010) 1.02 (0.040)	0.76 (0.030) 1.52 (0.060)

\*Reflow Soldering Only



# High Voltage MLC Chips



For 600V to 5000V Applications

## NP0 (C0G) Dielectric Performance Characteristics

<b>Capacitance Range</b>	10 pF to 0.047 µF (25°C, 1.0 ±0.2 Vrms at 1kHz, for ≤ 1000 pF use 1 MHz)
<b>Capacitance Tolerances</b>	±5%, ±10%, ±20%
<b>Dissipation Factor</b>	0.1% max. (+25°C, 1.0 ±0.2 Vrms, 1kHz, for ≤ 1000 pF use 1 MHz)
<b>Operating Temperature Range</b>	-55°C to +125°C
<b>Temperature Characteristic</b>	0 ±30 ppm/°C (0 VDC)
<b>Voltage Ratings</b>	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
<b>Insulation Resistance (+25°C, at 500 VDC)</b>	100K MΩ min. or 1000 MΩ - µF min., whichever is less
<b>Insulation Resistance (+125°C, at 500 VDC)</b>	10K MΩ min. or 100 MΩ - µF min., whichever is less
<b>Dielectric Strength</b>	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									
	Reflow/Wave			Reflow/Wave				Reflow Only					Reflow Only							Reflow Only									
(L) Length mm (in.)	2.01 ± 0.20 (0.079 ± 0.008)			3.20 ± 0.20 (0.126 ± 0.008)				3.20 ± 0.20 (0.126 ± 0.008)					4.57 ± 0.25 (0.180 ± 0.010)							4.50 ± 0.30 (0.177 ± 0.012)									
(W) Width mm (in.)	1.25 ± 0.20 (0.049 ± 0.008)			1.60 ± 0.20 (0.063 ± 0.008)				2.50 ± 0.20 (0.098 ± 0.008)					2.03 ± 0.25 (0.080 ± 0.010)							3.20 ± 0.20 (0.126 ± 0.008)									
(T) Thickness mm (in.)	1.30 (0.051)			1.52 (0.060)				1.70 (0.067)					2.03 (0.080)							2.54 (0.100)									
(t) Terminal min max	0.50 ± 0.25 (0.020 ± 0.010)			0.25 (0.010) 0.75 (0.030)				0.25 (0.010) 0.75 (0.030)					0.25 (0.010) 1.02 (0.040)							0.25 (0.010) 1.02 (0.040)									
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																					
3.3 3R3	A	A		X	X	X	X	X																					
3.9 3R9	A	A		X	X	X	X	X																					
4.7 4R7	A	A		X	X	X	X	X																					
5.6 5R6	A	A		X	X	X	X	X																					
6.8 6R8	A	A		X	X	X	X	X																					
8.2 8R2	A	A		X	X	X	X	X																					
10 100	A	A		X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C								
12 120	A	A		X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C								
15 150	A	A		X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C								
18 180	A	A		X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C								
22 220	A	A		X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C								
27 270	A	A		X	X	X	X	X	C	C	D	D	D	C	C	C	C	C	C	C	C								
33 330	A	A		X	X	X	D	D	C	C	D	D	D	C	C	C	C	C	C	C	C								
39 390	A	A		X	X	X	D	D	C	C	D	D	D	C	C	C	C	C	C	C	C								
47 470	A	A		X	X	M	D	D	C	C	D	D	D	C	C	C	C	C	C	C	C								
56 560	A	A		X	X	M	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C								
68 680	A	A		X	X	M	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C								
82 820	X	X		X	X	C	C	C	C	D	C	C	C	C	C	C	C	C	C	C	C								
100 101	X	X		X	X	C	C	C	C	C	C	C	C	C	C	C	C	F	F	F	F								
120 121	C	C		X	X	C	E	E	C	C	C	C	C	C	C	C	C	F	F	F	F								
150 151	C	C		X	X	C	E	E	C	C	C	E	E	C	C	C	F	F	F	F	F								
180 181	C	C		X	X	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F	F								
220 221	C	C		X	X	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F	F								
270 271	C	C		C	C	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F	F								
330 331	C	C		C	C	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F	F								
390 391	C	C		C	C	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F	F								
470 471	C	C		C	C	E	E	E	C	C	E	E	E	C	C	C	F	F	F	F	F								
560 561	C	C		C	C	E			C	C	E	E	E	C	C	C	F	F	F	F	F								
680 681	C	C		C	C	E			C	C	E	F	F	C	C	C	F	F	F	F	F								
750 751	C	C		E	E	E			C	C	E	G	G	C	C	F	F	F	F	F	F								
820 821	C	C		E	E	E			C	C	E	G	G	C	C	F	E	E	E	E	E								
1000 102				E	E	E			C	C	E			C	C	F	E	E	E	E	E								
1200 122				E	E				C	C	E			E	E	F	E	E	E	E	E								
1500 152				E	E				C	C	G			E	E	F													
1800 182				E	E				C	C	G			E	E	F													
2200 222				E	E				E	E				E	E														
2700 272				E	E				E	E				E	E														
3300 332				E	E				E	E				E	E														
3900 392									E	E				E	E														
4700 472									E	E				E	E														
5600 562									E	E				E	E														
6800 682									E	E				F	F														
8200 822																													
Cap (µF) 0.010 103																													
0.012 123																													
0.015 153																													
0.018 183																													
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									





# High Voltage MLC Chips



For 600V to 5000V Applications

## X7R Dielectric Performance Characteristics

<b>Capacitance Range</b>	10 pF to 0.56 $\mu$ F (25°C, 1.0 $\pm$ 0.2 Vrms at 1kHz)
<b>Capacitance Tolerances</b>	$\pm$ 10%; $\pm$ 20%; +80%, -20%
<b>Dissipation Factor</b>	2.5% max. (+25°C, 1.0 $\pm$ 0.2 Vrms, 1kHz)
<b>Operating Temperature Range</b>	-55°C to +125°C
<b>Temperature Characteristic</b>	$\pm$ 15% (0 VDC)
<b>Voltage Ratings</b>	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
<b>Insulation Resistance</b> (+25°C, at 500 VDC)	100K M $\Omega$ min. or 1000 M $\Omega$ - $\mu$ F min., whichever is less
<b>Insulation Resistance</b> (+125°C, at 500 VDC)	10K M $\Omega$ min. or 100 M $\Omega$ - $\mu$ F min., whichever is less
<b>Dielectric Strength</b>	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 Only					Reflow Only								Reflow Only							
(L) Length	mm (in.)			mm (in.)					mm (in.)					mm (in.)								mm (in.)							
(W) Width	mm (in.)			mm (in.)					mm (in.)					mm (in.)								mm (in.)							
(T) Thickness	mm (in.)			mm (in.)					mm (in.)					mm (in.)								mm (in.)							
(t) Terminal	min max			min max					min max					min max								min max							
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	F									
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																
330 331	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F									
390 391	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F									
470 471	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F									
560 561	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F								
680 681	X	X	C	C	C	E	E	E	E	E	E	E	E	E	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	E	F	F								
820 821	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F								
1000 102	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F								
1200 122	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F								
1500 152	X	X	C	C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F								
1800 182	X	X		C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F								
2200 222	X	X		C	C	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F							
2700 272	X	X		C	C	E	E			E	E	E	F	E	E	E	E	E	F	F									
3300 332	X	X		C	C	E				E	E	E	F	E	E	E	E	E	F	F									
3900 392	X	X		C	C	E				E	E	E	G						F	F									
4700 472	X	X		C	C	E				E	E	E	G						F	F									
5600 562	X	X		C	C	E				E	E	E	G						F	F									
6800 682	X	X		C	C	E				E	E	E							F	F									
8200 822	X	X		C	C	E				E	E	E							F	F									
Cap ( $\mu$ F) 0.010 103	C	C		C	C	E				E	E	E							E	E									
0.015 153	C	C		E	E	E				E	E	E							F	F	F								
0.018 183	C	C		E	E					E	E	E							F	F	F								
0.022 223	C	C		E	E					E	E	E							F	F									
0.027 273				E	E					E	E								F	F									
0.033 333				E	E					E	E								F	F									
0.039 393										E	E								F	F									
0.047 473										E	E								F	F									
0.056 563										F	F								F	F									
0.068 683										F	F								F	F									
0.082 823										F	F								F	F									
0.100 104										F	F								F	F									
0.150 154																													
0.220 224																													
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							



# 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	4.50 ± 0.30 (0.177 ± 0.012)								5.70 ± 0.40 (0.224 ± 0.016)								5.72 ± 0.25 (0.225 ± 0.010)								9.14 ± 0.25 (0.360 ± 0.010)										
(W) Width	6.40 ± 0.30 (0.252 ± 0.012)								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	2.54 (0.100)								3.30 (0.130)								2.54 (0.100)								2.54 (0.100)										
(t) Terminal	0.25 (0.010) 1.02 (0.040)								0.25 (0.010) 1.02 (0.040)								0.25 (0.010) 1.02 (0.040)								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																																	
	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	F	F	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	F	F	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	F	F	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	F	F	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	F	F	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	F	F	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	F	F	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	F	F	F	F	F	F	F	F	F	G	G	G	G	G	G	G	G	G		
	4700	472	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G	G	G	G	G	G	G	G	G		
	5600	562	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G	G	G	G	G	G	G	G	G		
	6800	682	F	F	F	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	G		
	8200	822	F	F	F	G	G	G	F	F	F	G	G	G	G	F	F	F	F	F	F	G	G	G	G	G	G	G	G	G	G	G			
Cap (μF)	0.010	103	F	F	F	G	G	G	F	F	F	G	G	G	G	F	F	F	F	F	F	G	G	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	G	G					
	0.018	183	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	G						
	0.022	223	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	G						
	0.027	273	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	G						
	0.033	333	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	G						
	0.039	393	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	G						
	0.047	473	F	F	F	P	G	G	F	F	F	G	G	G	F	F	F	G	G	G	G	G	G	G	G	G	G	G	G						
	0.056	563	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	G						
	0.068	683	F	F	G	G	G	G	F	F	G	G	G	G	F	F	F	G	G	G	G	G	G	G	G	G	G	G	G						
	0.082	823	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.100	104	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.150	154	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.220	224	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.270	274	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.330	334	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.390	394	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.470	474	F	F	G	G	G	G	F	F	G	G	G	G	F	F	G	G	G	G	G	G	G	G	G	G	G	G	G						
	0.560	564	G	G	G	G	G	G	G	G	G	G	G	G	F	F	G	G	G	G															
	0.680	684	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G															
	0.820	824	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	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

Letter	A	C	E	F	G	P	X
Max. Thickness	0.813 (0.032)	1.448 (0.057)	1.8034 (0.071)	2.2098 (0.087)	2.794 (0.110)	3.048 (0.120)	0.940 (0.037)

NOTE: Contact factory for non-specified capacitance values

