

# High Voltage MLC Chips

## Tin/Lead Termination "B" - 600V to 5000V Applications



KYOCERA AVX will support those customers for commercial and military Multilayer Ceramic Capacitors with a termination consisting of 5% minimum lead. This termination is indicated by the use of a "B" in the 12th position of the KYOCERA AVX Catalog Part Number. This fulfills KYOCERA AVX's commitment to providing a full range of products to our customers. KYOCERA AVX has provided in the following pages, a full range of values that we are offering in this "B" termination.

Larger physical sizes than normally encountered chips are used to make high voltage MLC chip product. 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, KYOCERA 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

LD08	A	A	271	K	A	B	2	A
Style	Voltage	Temperature Coefficient	Capacitance Code	Capacitance Tolerance	Test Level	Termination*	Packaging	Special Code
LD05 - 0805	600V/630V = C	COG = A	(2 significant digits + no. of zeros)	COG: J = ±5%	A = Standard	B = 5% Min Pb	2 = 7" Reel**	A = Standard
LD06 - 1206	1000V = A	X7R = C	Examples:	K = ±10%	4 = Automotive*	X = FLEXITERM® 5% min. Pb	4 = 13" Reel**	
LD10 - 1210	1500V = S		10 pF = 100	M = ±20%			6 = Tray (3640 Style)	
LD08 - 1808	2000V = G		100 pF = 101	X7R: K = ±10%				
LD12 - 1812	2500V = W		1,000 pF = 102	M = ±20%				
LD13 - 1825	3000V = H		22,000 pF = 223	Z = +80%, -20%				
LD20 - 2220	4000V = J		220,000 pF = 224					
LD14 - 2225	5000V = K		1 μF = 105					
LD40 - 3640								

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.

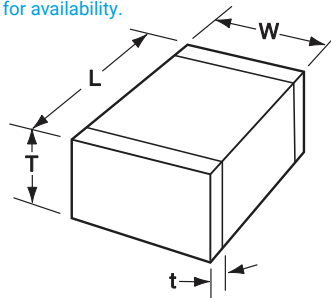
\* FLEXITERM is not available in the LD40 Style

\*\* The LD40 Style is not available on Reels.

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

\* Not all values are supported in Automotive grade. Please contact factory for availability.

**NOT RoHS Compliant**



### DIMENSIONS

### MILLIMETERS (INCHES)

SIZE	LD05 (0805)	LD06 (1206)	LD10* (1210)	LD08* (1808)	LD12* (1812)	LD13* (1825)	LD20* (2220)	LD14* (2225)	LD40* (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)	5.70 ± 0.50 (0.224 ± 0.020)	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)	6.30 ± 0.40 (0.248 ± 0.016)	10.2 ± 0.25 (0.400 ± 0.010)
(t) 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) 1.52 (0.060)

\*Reflow Soldering Only

Performance of ceramic capacitors can be simulated by using the online SpiMLCC software program - <http://spicat.avx.com/mlcc>  
Custom values, ratings and configurations are also available.

# High Voltage MLC Chips

## Tin/Lead Termination "B" - 600V to 5000V Applications

### NP0 (C0G) Dielectric

#### Performance Characteristics

Capacitance Range	10 pF to 0.047 $\mu$ 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 (0 VDC)
Voltage Ratings	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
Insulation Resistance (+25°C, at 500 VDC)	100K M $\Omega$ min. or 1000 M $\Omega$ - $\mu$ F min., whichever is less
Insulation Resistance (+125°C, at 500 VDC)	10K M $\Omega$ min. or 100 M $\Omega$ - $\mu$ F min., whichever is less
Dielectric Strength	Minimum 120% rated voltage for 5 seconds at 50 mA max. current

### HIGH VOLTAGE C0G CAPACITANCE VALUES

VOLTAGE	LD05 (0805)	LD06 (1206)	LD10 (1210)	LD08 (1808)	LD12 (1812)	LD13 (1825)	LD20 (2220)	LD14 (2225)	LD40 (3640)	
600/630	min.	10 pF	10 pF	100 pF	100 pF	100 pF	1000 pF	1000 pF	1000 pF	1000 pF
	max.	330 pF	1200 pF	2700 pF	3300 pF	5600 pF	0.012 $\mu$ F	0.012 $\mu$ F	0.018 $\mu$ F	0.047 $\mu$ F
1000	min.	10 pF	10 pF	10 pF	100 pF	100 pF	100 pF	1000 pF	1000 pF	1000 pF
	max.	180 pF	560 pF	1500 pF	2200 pF	3300 pF	8200 pF	0.010 $\mu$ F	0.010 $\mu$ F	0.022 $\mu$ F
1500	min.	-	10 pF	10 pF	10 pF	10 pF	100 pF	100 pF	100 pF	100 pF
	max.	-	270 pF	680 pF	820 pF	1800 pF	4700 pF	4700 pF	5600 pF	0.010 $\mu$ F
2000	min.	-	10 pF	10 pF	10 pF	10 pF	100 pF	100 pF	100 pF	100 pF
	max.	-	120 pF	270 pF	330 pF	1000 pF	1800 pF	2200 pF	2700 pF	6800 pF
2500	min.	-	-	-	10 pF	10 pF	100 pF	100 pF	100 pF	100 pF
	max.	-	-	-	180 pF	470 pF	1200 pF	1500 pF	1800 pF	3900 pF
3000	min.	-	-	-	10 pF	10 pF	10 pF	10 pF	10 pF	100 pF
	max.	-	-	-	120 pF	330 pF	820 pF	1000 pF	1200 pF	2700 pF
4000	min.	-	-	-	10 pF	10 pF	10 pF	10 pF	10 pF	100 pF
	max.	-	-	-	47 pF	150 pF	330 pF	470 pF	560 pF	1200 pF
5000	min.	-	-	-	-	-	-	10 pF	10 pF	10 pF
	max.	-	-	-	-	-	-	220 pF	270 pF	820 pF

### X7R Dielectric

#### Performance Characteristics

Capacitance Range	10 pF to 0.56 $\mu$ 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% (0 VDC)
Voltage Ratings	600, 630, 1000, 1500, 2000, 2500, 3000, 4000 & 5000 VDC (+125°C)
Insulation Resistance (+25°C, at 500 VDC)	100K M $\Omega$ min. or 1000 M $\Omega$ - $\mu$ F min., whichever is less
Insulation Resistance (+125°C, at 500 VDC)	10K M $\Omega$ min. or 100 M $\Omega$ - $\mu$ F min., whichever is less
Dielectric Strength	Minimum 120% rated voltage for 5 seconds at 50 mA max. current

### HIGH VOLTAGE X7R MAXIMUM CAPACITANCE VALUES

VOLTAGE	0805	1206	1210	1808	1812	1825	2220	2225	3640	
600/630	min.	100 pF	1000 pF	1000 pF	1000 pF	1000 pF	0.010 $\mu$ F	0.010 $\mu$ F	0.010 $\mu$ F	0.010 $\mu$ F
	max.	6800 pF	0.022 $\mu$ F	0.056 $\mu$ F	0.068 $\mu$ F	0.120 $\mu$ F	0.390 $\mu$ F	0.270 $\mu$ F	0.330 $\mu$ F	0.560 $\mu$ F
1000	min.	100 pF	100 pF	1000 pF	1000 pF	1000 pF	1000 pF	1000 pF	1000 pF	0.010 $\mu$ F
	max.	1500 pF	6800 pF	0.015 $\mu$ F	0.018 $\mu$ F	0.039 $\mu$ F	0.100 $\mu$ F	0.120 $\mu$ F	0.150 $\mu$ F	0.220 $\mu$ F
1500	min.	-	100 pF	100 pF	100 pF	100 pF	1000 pF	1000 pF	1000 pF	1000 pF
	max.	-	2700 pF	5600 pF	6800 pF	0.015 $\mu$ F	0.056 $\mu$ F	0.056 $\mu$ F	0.068 $\mu$ F	0.100 $\mu$ F
2000	min.	-	10 pF	100 pF	100 pF	100 pF	1000 pF	1000 pF	1000 pF	1000 pF
	max.	-	1500 pF	3300 pF	3300 pF	8200 pF	0.022 $\mu$ F	0.027 $\mu$ F	0.033 $\mu$ F	0.027 $\mu$ F
2500	min.	-	-	-	10 pF	10 pF	100 pF	100 pF	100 pF	1000 pF
	max.	-	-	-	2200 pF	5600 pF	0.015 $\mu$ F	0.018 $\mu$ F	0.022 $\mu$ F	0.022 $\mu$ F
3000	min.	-	-	-	10 pF	10 pF	100 pF	100 pF	100 pF	1000 pF
	max.	-	-	-	1800 pF	3900 pF	0.010 $\mu$ F	0.012 $\mu$ F	0.015 $\mu$ F	0.018 $\mu$ F
4000	min.	-	-	-	-	-	-	-	-	100 pF
	max.	-	-	-	-	-	-	-	-	6800 pF
5000	min.	-	-	-	-	-	-	-	-	100 pF
	max.	-	-	-	-	-	-	-	-	3300 pF