



# Product Specification Bulletin

## Surface Mount Tip & Ring Ceramic Chip Capacitors

KEMET's 250 VDC or Tip & Ring MLCC capacitors are designed and rated for telecommunication ringer circuits where the capacitor is used to block -48 to -52 Volt DC of line voltage and pass a 16-25 Hz AC signal pulse of 70 Vrms to 90 Vrms. The surface mount ceramic capacitors are excellent replacements for high voltage leaded film devices. The smaller SMT footprints save valuable board space which is critical when creating new designs, and the capacitors are able to withstand today's higher lead-free reflow processing temperatures. The ceramic MLCC have excellent high frequency filtering characteristics, low ESR, and high temperature reflow capabilities.

KEMET Tip and Ring capacitors are available in standard EIA case sizes and standard capacitance values from 0.001 $\mu$ F to 1.2 $\mu$ F. The capacitors have pure tin (100% Matte Sn) plated terminations and are 100% lead free which is ideal for new environmentally demanding designs.

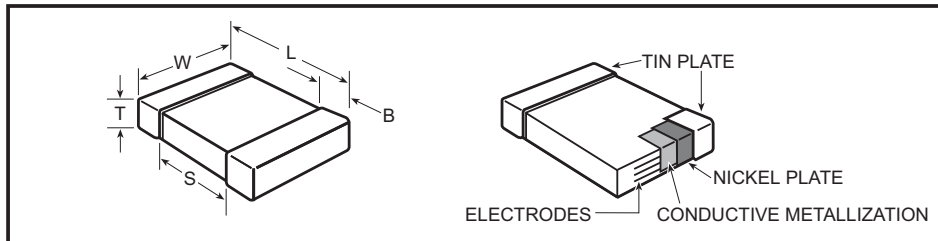
**Applications:**

- Telecommunication Ringing Circuits
- Switch Mode Power Supply Snubber Circuits
- High Voltage DC Blocking
- High Voltage Coupling

**Markets:**

- Phone Lines
- Analog and Digital Modems
- FAX Machines
- Wireless Base Stations, Ethernet
- Digital Video Recording Set-Top Boxes
- Satellite Dish
- Cable Set-Top Boxes
- High Voltage Power Supply, DC/DC Converters
- Ethernet, POS, ATM Hardware

### Outline Drawing



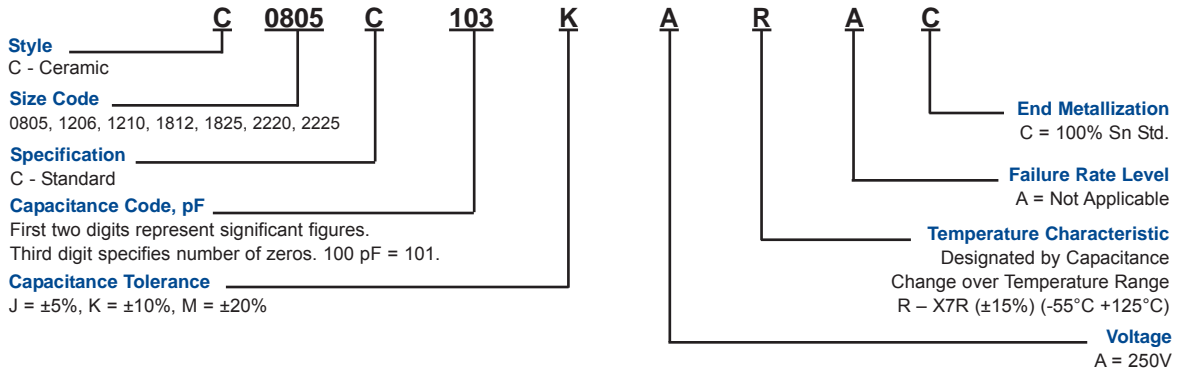
**Table 1 – Dimensions - Millimeters (Inches)**

Metric Code	EIA Size Code	L - Length	W - Width	B - Bandwidth	Band Separation
2012	0805	2.0 (0.079) ± 0.2 (0.008)	1.2 (0.049) ± 0.2 (0.008)	0.5 (0.02) ± 0.25 (0.010)	0.75 (0.030)
3216	1206	3.2 (0.126) ± 0.2 (0.008)	1.6 (0.063) ± 0.2 (0.008)	0.5 (0.02) ± 0.25 (0.010)	N/A
3225	1210	3.2 (0.126) ± 0.2 (0.008)	2.5 (0.098) ± 0.2 (0.008)	0.5 (0.02) ± 0.25 (0.010)	N/A
4532	1812	4.5 (0.177) ± 0.3 (0.012)	3.2 (0.126) ± 0.3 (0.012)	0.6 (0.024) ± 0.35 (0.014)	N/A
4564	1825	4.5 (0.177) ± 0.3 (0.012)	6.4 (0.250) ± 0.4 (0.016)	0.6 (0.024) ± 0.35 (0.014)	N/A
5650	2220	5.6 (0.224) ± 0.4 (0.016)	5.0 (0.197) ± 0.4 (0.016)	0.6 (0.024) ± 0.35 (0.014)	N/A
5664	2225	5.6 (0.224) ± 0.4 (0.016)	6.4 (0.250) ± 0.4 (0.016)	0.6 (0.024) ± 0.35 (0.014)	N/A

Note: For thickness dimensions, see Table 2.



## Capacitor Ordering Information



## General Performance Characteristics & Electrical Parameters 250 VDC

<b>EIA Case Sizes</b>	0805, 1206, 1210, 1812, 1825, 2220, 2225
<b>Capacitance Range</b>	0.001µF to 1.2µF
<b>Test Parameters</b>	Capacitance and Dissipation Factor measured at 1.0 ± 0.2 Vrms and 1.0 ± 0.2 kHz
<b>Operating Temperature Range</b>	-55°C to +125°C
<b>Temperature Characteristic</b>	-55°C to +125°C X7R: ±15% (0% VDC)
<b>Capacitance Tolerances</b>	J = ±5%, K = ±10%, M = ±20%
<b>Dissipation Factor</b>	≤2.5%
<b>Aging Rate</b>	2.5% per decade hour
<b>Voltage Rating</b>	250 VDC
<b>25°C IR @ Rated Voltage</b>	1000MΩ-µF or 100GΩ, whichever is less
<b>Dielectric Strength (DMV)</b>	250% of Rated Voltage 5 ± 1 seconds and charge/discharge not exceeding 50mA

### Marking

These chips are supplied unmarked. If required, they can be laser-marked as an extra cost option. Details on the marking format are included in KEMET Surface Mount Catalog F3102 on page 96.

### Soldering Process

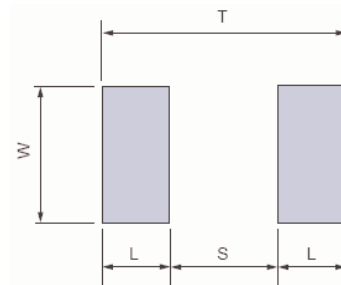
The 0805 and 1206 sizes are suitable for either reflow or wave soldering. Sizes 1210 and larger should be limited to reflow soldering only. All sizes incorporate the standard KEMET barrier layer of pure nickel with an overplating of pure tin for excellent solderability and resistance to leaching of the termination.

### Packaging

KEMET High Voltage Surface Mount MLCC capacitors are available packaged in tape and reel configuration.

### Recommended Solder Pad Dimensions

Chip Size	T - Total Length		S - Separation		W - Pad Width		L - Pad Length	
	mm	in.	mm	in.	mm	in.	mm	in.
0805	3.30	0.130	0.70	0.028	1.60	0.063	1.30	0.051
1206	4.50	0.177	1.50	0.059	2.00	0.079	1.50	0.059
1210	4.50	0.177	1.50	0.059	2.90	0.114	1.50	0.059
1812	5.90	0.232	2.30	0.091	3.70	0.146	1.80	0.071
1825	5.90	0.232	2.30	0.091	6.90	0.272	1.80	0.071
2220	7.00	0.276	3.30	0.130	5.50	0.217	1.85	0.073
2225	7.00	0.276	3.30	0.130	6.80	0.268	1.85	0.073



**Table 2 - X7R Dielectric Capacitance Values**

Cap Code pF	0805	1206	1210	1812	1825	2220	2225
1,000	DC						
1,200	DC						
1,500	DC						
1,800	DC						
2,200	DC						
2,700	DC						
3,300	DC						
3,900	DC						
4,700	DC						
5,600	DC	EB	FB				
6,800	DC	EB	FB				
8,200	DC	EB	FB				
10,000	DC	EB	FB				
12,000	DC	EB	FB				
15,000	DC	EB	FB				
18,000	DC	EB	FB				
22,000	DC	EB	FB				
27,000		EB	FB				
33,000		EB	FB				
39,000		EB	FB				
47,000		ED	FC				
56,000		ED	FC				
68,000		ED	FC				
82,000		ED	FF				
100,000		EM	FG	GB			
120,000				GB			
150,000				GE			
180,000				GF			
220,000				GG			
270,000				GG			
330,000				GG			
390,000				GG			
470,000				GJ	HD	JC	KD
560,000					HD	JD	KD
680,000					HD	JD	KD
820,000					HF	JF	KE
1,000,000					HF	JF	KE
1,200,000							KE

**Thickness Code (mm) & Reeling Quantities**

Thickness Code	Series	Dimension	7" Reel Qty.	13" Reel Qty.
DC	0805	0.78 ± 0.10	4000	10000
EB	1206	0.78 ± 0.10	4000	10000
ED	1206	1.00 ± 0.10	2500	10000
EM	1206	1.25 ± 0.15	2500	10000
FB	1210	0.78 ± 0.10	4000	10000
FC	1210	0.90 ± 0.10	4000	10000
FF	1210	1.10 ± 0.10	2500	10000
FG	1210	1.25 ± 0.10	2500	10000
FH	1210	1.55 ± 0.15	2000	8000
GB	1812	1.00 ± 0.10	1000	4000
GE	1812	1.30 ± 0.15	1000	4000
GF	1812	1.55 ± 0.10	1000	4000
GG	1812	1.50 ± 0.15	1000	4000
GJ	1812	1.70 ± 0.15	1000	4000
HD	1825	1.30 ± 0.15	1000	4000
HF	1825	1.50 ± 0.15	1000	4000
JC	2220	1.10 ± 0.15	1000	4000
JD	2220	1.30 ± 0.15	1000	4000
JF	2220	1.50 ± 0.15	1000	4000
KD	2225	1.30 ± 0.15	1000	4000
KE	2225	1.40 ± 0.15	1000	4000