

High Voltage Surface Mount Series, MIL-PRF-49467 Screened, 500 - 5,000 VDC (Industrial Grade)

Overview

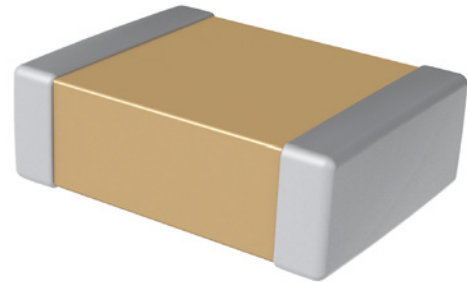
KEMET's High Voltage Surface Mount MIL-PRF-49467 Screened ceramic capacitors are designed with COG and X7R dielectrics which feature a 125°C maximum operating temperature. These devices are made using robust designs and screened to MIL-PRF-49467 Group A to meet the demands of higher reliability applications. Group B is available upon request. These devices are ideal for high voltage power supplies, DC/DC conversion and well suited for timing, resonant, bypass, and decoupling applications. These high voltage capacitors are widely used in industries

related to semiconductors, telecommunications, test/diagnostic equipment and power/grid.

The High Voltage Surface MIL-PRF-49467 Screened Series is part of KEMET's Harsh Environment PME (Precious Metal Electrode) portfolio which is ideal for industrial and high reliability applications.

Benefits

- Operating temperature range of -55°C to +125°C
- Capacitance range from 330 pF – 2.9 µF in X7R
- Capacitance range from 12 pF – 0.1 µF in COG
- DC voltage ratings of 500 V, 1 kV, 2 kV, 3 kV, 4 kV, 5 kV
- High thermal stability



Applications

- Downhole exploration and mining
- Aerospace engine compartments
- Switch mode power supplies
- DC/DC Converters
- Measuring equipment
- Inverters
- High voltage coupling

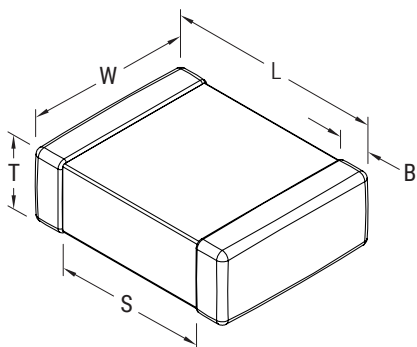
Ordering Information

4540		B	472	M	202	P	M	
Case Size		Dielectric	Capacitance Code	Tolerance	Voltage	Terminal Material	Test Level	Packaging
1515	3530	B, R = X7R	Two significant digits and number of zeros	J = ±5% (COG Only)	Two significant digits and number of zeroes (i.e. 202 = 2,000 V)	P = PdAg S = Ag E = Ag/Ni/ SnPb Plated C = Ag/Ni/Sn Plated	Blank = No screening M = MIL-PRF-49467 Group A Screening (subgroup 1) except Corona	Blank = Waffle Tray 7189 = 7" Reel 7289 = 13" Reel
1812	4040	N = COG (NPO)/BP		K = ±10%				
1825	4540			M = ±20%				
2020	5440			P = 0/+100%				
2225	5550			Z = -20%/+80%				
2520	6560							
3333								

¹ Additional capacitance tolerance offerings may be available. Contact KEMET for details.

² Please refer to the Construction section in the datasheet.

Dimensions – Inches (Millimeters)



Series	Style/Size	L Length	W Width	T Thickness	B Bandwidth
HV	1515	0.150 ±0.015 (3.81 ±0.38)	0.150 ±0.015 (3.81 ±0.38)	0.140 (3.55)	0.020 ±0.010 (0.51 ±0.25)
	1812	0.180 ±0.020 (4.57 ±0.51)	0.120 ±0.015 (3.05 ±0.38)	0.100 (2.54)	0.025 ±0.015 (0.64 ±0.38)
	1825	0.180 ±0.020 (4.57 ±0.51)	0.250 ±0.020 (6.35 ±0.51)	0.160 (4.07)	0.025 ±0.015 (0.64 ±0.38)
	2020	0.200 ±0.020 (5.08 ±0.51)	0.200 ±0.020 (5.08 ±0.51)	0.180 (3.55)	0.025 ±0.015 (0.64 ±0.38)
	2225	0.220 ±0.020 (5.59 ±0.51)	0.250 ±0.020 (6.35 ±0.51)	0.200 (5.08)	0.025 ±0.015 (0.64 ±0.38)
	2520	0.250 ±0.020 (6.35 ±0.51)	0.200 ±0.020 (5.08 ±0.51)	0.180 (4.57)	0.045 ±0.015 (1.14 ±0.38)
	3333	0.330 ±0.030 (8.38 ±0.76)	0.330 ±0.030 (8.38 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)
	3530	0.350 ±0.030 (8.89 ±0.76)	0.300 ±0.030 (7.62 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)
	4040	0.400 ±0.030 (10.2 ±0.76)	0.400 ±0.030 (10.2 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)
	4540	0.450 ±0.030 (11.43 ±0.76)	0.400 ±0.030 (10.2 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)
	5440	0.540 ±0.030 (13.7 ±0.76)	0.400 ±0.030 (10.2 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)
	5550	0.550 ±0.030 (14.0 ±0.76)	0.500 ±0.030 (12.7 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)
6560	0.650 ±0.030 (16.5 ±0.76)	0.600 ±0.030 (15.2 ±0.76)	0.220 (5.59)	0.045 ±0.015 (1.14 ±0.38)	

Table 1A – HV X7R Waterfall

Case Size		1515	1812	1825	2020	2225	2520	3333	3530																		
		Voltage																									
Capacitance (pF)	Capacitance Code	500	1,000	2,000	500	1,000	2,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	4,000			
330 pF	331	X	X	X																							
390 pF	391	X	X	X																							
470 pF	471	X	X	X				X	X	X	X																
560 pF	561	X	X	X				X	X	X	X	X	X	X													
680 pF	681	X	X	X				X	X	X	X	X	X	X	X	X	X										
820 pF	821	X	X	X				X	X	X	X	X	X	X	X	X	X										
1,000 pF	102	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X
1,200 pF	122	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X
1,500 pF	152	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X
1,800 pF	182	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X
2,200 pF	222	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2,700 pF	272	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3,300 pF	332	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3,900 pF	392	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4,700 pF	472	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5,000 pF	502	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5,600 pF	562	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6,800 pF	682	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8,200 pF	822	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10,000 pF	103	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12,000 pF	123	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15,000 pF	153	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18,000 pF	183	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22,000 pF	223	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
27,000 pF	273	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
33,000 pF	333	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
39,000 pF	393	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
47,000 pF	473	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
56,000 pF	563	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
68,000 pF	683	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
82,000 pF	823	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.10 µF	104	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.12 µF	124				X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.15 µF	154				X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.18 µF	184				X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.22 µF	224				X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.27 µF	274							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.33 µF	334								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.39 µF	394								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.47 µF	474									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.56 µF	564										X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.68 µF	684											X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
0.82 µF	824												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Capacitance (pF)	Capacitance Code	500	1,000	2,000	500	1,000	2,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	4,000			
Case Size		Voltage																									
		1515	1812	1825	2020	2225	2520	3333	3530																		

Table 1A – HV X7R Waterfall cont.

Case Size		4040					4540					5440					5550					6560							
		Voltage																											
Capacitance (pF)	Capacitance Code	500	1,000	2,000	3,000	4,000	500	1,000	2,000	3,000	4,000	5,000	500	1,000	2,000	3,000	4,000	500	1,000	2,000	3,000	4,000	5,000	500	1,000	2,000	3,000	4,000	5,000
1,000 pF	102	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X						
1,200 pF	122	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X						
1,500 pF	152	X	X	X	X	X	X	X	X	X	X	X						X	X	X	X	X	X						
1,800 pF	182	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
2,200 pF	222	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
2,700 pF	272	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
3,300 pF	332	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
3,900 pF	392	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4,700 pF	472	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5,000 pF	502	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5,600 pF	562	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6,800 pF	682	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8,200 pF	822	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10,000 pF	103	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12,000 pF	123	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
15,000 pF	153	X	X	X	X		X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18,000 pF	183	X	X	X	X		X	X	X	X			X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
22,000 pF	223	X	X	X	X		X	X	X	X			X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
27,000 pF	273	X	X	X	X		X	X	X	X			X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
33,000 pF	333	X	X	X			X	X	X	X			X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
39,000 pF	393	X	X	X			X	X	X	X			X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
47,000 pF	473	X	X	X			X	X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
56,000 pF	563	X	X	X			X	X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
68,000 pF	683	X	X	X			X	X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
82,000 pF	823	X	X	X			X	X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
0.10 µF	104	X	X				X	X	X				X	X			X	X	X				X	X	X	X	X	X	X
0.12 µF	124	X	X				X	X					X	X			X	X	X				X	X	X	X	X	X	X
0.15 µF	154	X	X				X	X					X	X			X	X					X	X	X	X	X	X	X
0.18 µF	184	X	X				X	X					X	X			X	X					X	X	X	X	X	X	X
0.22 µF	224	X	X				X	X					X	X			X	X					X	X	X	X	X	X	X
0.27 µF	274	X	X				X	X					X	X			X	X					X	X	X	X	X	X	X
0.33 µF	334	X	X				X	X					X	X			X	X					X	X	X	X	X	X	X
0.39 µF	394	X	X				X	X					X	X			X	X					X	X	X	X	X	X	X
0.45 µF	454	X					X	X					X	X			X	X					X	X	X	X	X	X	X
0.47 µF	474	X					X	X					X	X			X	X					X	X	X	X	X	X	X
0.56 µF	564	X					X						X	X			X	X					X	X	X	X	X	X	X
0.68 µF	684	X					X						X				X	X					X	X	X	X	X	X	X
0.82 µF	824	X					X						X				X	X					X	X	X	X	X	X	X
1.0 µF	105	X					X						X				X						X	X	X	X	X	X	X
1.2 µF	125						X						X				X						X		X	X	X	X	X
1.5 µF	155						X						X				X						X		X	X	X	X	X
1.8 µF	185																	X					X		X	X	X	X	X
2.2 µF	225																						X		X	X	X	X	X
2.7 µF	275																						X		X	X	X	X	X
2.9 µF	295																						X		X	X	X	X	X
Capacitance (pF)	Capacitance Code	500	1,000	2,000	3,000	4,000	500	1,000	2,000	3,000	4,000	5,000	500	1,000	2,000	3,000	4,000	500	1,000	2,000	3,000	4,000	5,000	500	1,000	2,000	3,000	4,000	5,000
Case Size		Voltage																											
		4040					4540					5440					5550					6560							

Table 1B – HV COG Waterfall

Case Size		Voltage																													
		1515			1812			1825			2020			2225			2520			3333			3530								
Capacitance (pF)	Capacitance Code	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	4,000	500	1,000	2,000	3,000	4,000
12 pF	120	X	X	X	X	X	X	X	X																						
15 pF	150	X	X	X	X	X	X	X	X																						
18 pF	180	X	X	X	X	X	X	X	X																						
22 pF	220	X	X	X	X	X	X	X	X	X	X	X																			
27 pF	270	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
33 pF	330	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
39 pF	390	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
47 pF	470	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
56 pF	560	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
68 pF	680	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
82 pF	820	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
100 pF	101	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
120 pF	121	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
150 pF	151	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
180 pF	181	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
220 pF	221	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
270 pF	271	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
330 pF	331	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	
390 pF	391	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	
470 pF	471	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	
560 pF	561	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	
680 pF	681	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	
820 pF	821	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		X	
1000 pF	102	X	X			X	X			X	X			X	X			X	X			X	X			X	X			X	
1200 pF	122	X	X			X	X			X	X	X		X	X			X	X	X		X	X	X		X	X			X	
1500 pF	152	X	X			X	X			X	X			X	X	X		X	X			X	X	X		X	X			X	
1800 pF	182	X	X			X	X			X	X			X	X	X		X	X			X	X	X		X	X			X	
2200 pF	222	X	X			X	X			X	X			X	X	X		X	X			X	X	X		X	X			X	
2700 pF	272	X	X			X				X	X	X		X	X			X	X			X	X	X		X	X			X	
3300 pF	332					X				X	X			X	X			X	X			X	X	X		X	X			X	
3900 pF	392					X				X	X			X	X			X	X			X	X	X		X	X			X	
4700 pF	472									X	X			X	X			X	X			X	X	X		X	X			X	
5600 pF	562									X	X			X	X			X	X			X	X	X		X	X			X	
6800 pF	682									X				X	X			X	X			X	X	X		X	X			X	
7500 pF	752									X				X	X			X	X			X	X	X		X	X			X	
8200 pF	822									X				X	X			X	X			X	X	X		X	X			X	
10000 pF	103									X				X				X				X	X	X		X	X			X	
12000 pF	123													X				X				X	X	X		X	X			X	
15000 pF	153													X				X				X		X		X	X			X	
18000 pF	183													X				X				X		X		X	X			X	
22000 pF	223																					X		X		X				X	
27000 pF	273																					X		X		X				X	
33000 pF	333																					X		X		X				X	
Capacitance (pF)	Capacitance Code	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	500	1,000	2,000	3,000	4,000	500	1,000	2,000	3,000	4,000
Case Size		Voltage																													
		1515			1812			1825			2020			2225			2520			3333			3530								

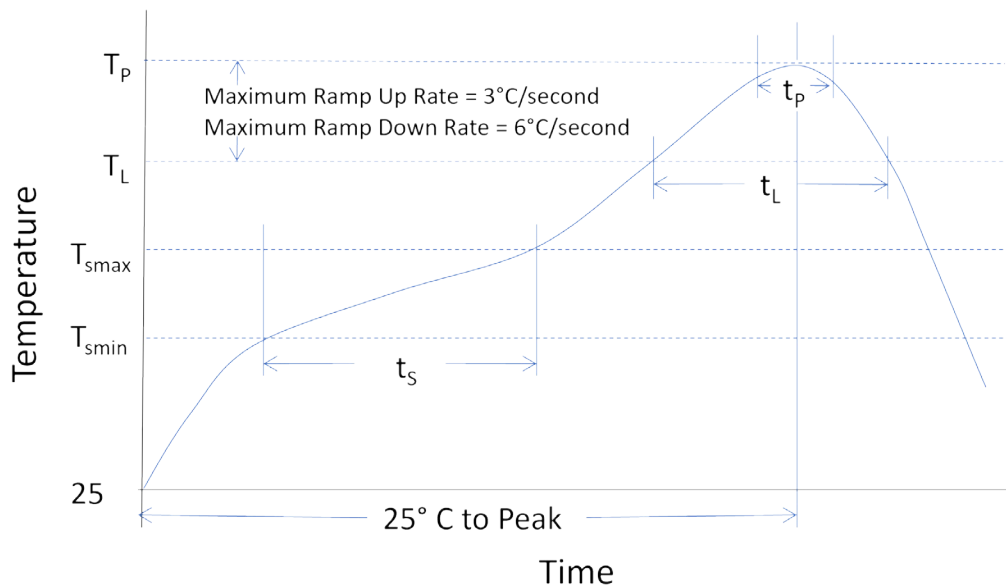
Soldering Process

Recommended Soldering Technique:

- Solder wave or solder reflow for EIA case sizes 0603, 0805 and 1206
- All other EIA case sizes are limited to solder reflow only

Recommended Reflow Soldering Profile:

KEMET's families of surface mount multilayer ceramic capacitors (SMD MLCCs) are compatible with wave (single or dual), convection, IR or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J-STD-020 standard for moisture sensitivity testing. These devices can safely withstand a maximum of three reflow passes at these conditions.



Profile Feature	Termination Finish	
	SnPb	100% Matte Sn
Preheat/Soak		
Temperature Minimum (T_{smin})	100°C	150°C
Temperature Maximum (T_{smax})	150°C	200°C
Time (t_s) from T_{smin} to T_{smax}	60 - 120 seconds	60 - 120 seconds
Ramp-Up Rate (T_L to T_p)	3°C/second maximum	3°C/second maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 - 150 seconds	60 - 150 seconds
Peak Temperature (T_p)	235°C	260°C
Time Within 5°C of Maximum Peak Temperature (t_p)	20 seconds maximum	30 seconds maximum
Ramp-Down Rate (T_p to T_L)	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note: All temperatures refer to the center of the package, measured on the capacitor body surface that is facing up during assembly reflow.

Table 2 – Performance & Reliability: Test Methods and Conditions

Stress	Reference	Test or Inspection Method	Limits
Visual and Mechanical	KEMET Internal	No defects that may affect performance (10X)	Dimensions according KEMET Spec Sheet
Capacitance (Cap)	MIL-STD-202 Method 305	C ≤ 100 pF: 1 MHz ± 100 kHz and 1.0 ±0.2 Vrms C > 100 pF: 1 kHz ±100 Hz and 1.0 ±0.2 Vrms	Dimensions according KEMET Spec Sheet
Dissipation Factor (DF)	KEMET Internal	C ≤ 100 pF: 1 MHz ± 100 kHz and 1.0 ±0.2 Vrms C > 100 pF: 1 kHz ±100 Hz and 1.0 ±0.2 Vrms	X7R: 2.5% C0G: 0.15%
Insulation Resistance (IR)	MIL-STD-202 Method 302	Test potential: 500 V dc between capacitor element terminals Surge current: limited to 30mA Special condition: If failure at relative humidity of ≥ 50%, IR may be measured again at a relative humidity of less than 50%	Within Specification To obtain IR limit, divide MQ-μF value by the capacitance and compare to GΩ limit. Select the lower of the two limits. At 25°C: 100,000 megohms or 1,000 Megohm-microfarad, whichever is less. At 125°C: 10,000 megohms or 100 Megohm-microfarad, whichever is less.
Temperature Coefficient of Capacitance (TCC)	KEMET Internal	C0G (P): 0 ppm/°C ±30 ppm/°C X7R (R or Z): ±15%	Within Specification
Temperature Coefficient of Capacitance at Applied Voltage (TCVC)	KEMET Internal	C0G (P): 0 ppm/°C ±30 ppm/°C X7R (R or Z): +15%/-70%	C0G: Within Specification X7R: Within KEMET Specification limits
Dielectric Withstanding Voltage (DWV)	KEMET Internal	150% of rated voltage for voltage rating of 500 V ≤ V < 1,000 V 120% of rated voltage for voltage rating of ≥ 1,000 V (5 ±1 seconds and charge/discharge not exceeding 50 mA at 25°C)	Cap: Initial Limit DF: Initial Limit IR: Initial Limit Withstand test voltage without insulation breakdown or damage.
Aging Rate (Maximum % Capacitance Loss/Decade Hour)	KEMET Internal	Capacitance measurements (including tolerance) are indexed to a referee time of 48 or 1,000 hours. Please refer to a part number specific datasheet for referee time details.	Please refer to a part number specification sheet for specific Aging rate
Terminal Strength	MIL-STD-202 Method 211	Applied force: 5 pounds (2.3 kg)	No evidence of mechanical damage
Solderability	MIL-STD-202 Method 208	Condition: 4 hours ± 15 minutes at 155°C dry bake apply all methods Test 245 ± 5°C (SnPb & Pb-Free)	Visual Inspection. 95% coverage on termination. No leaching
Temperature Cycling	JESD22 Method JA-104	Test condition A (5 cycles) except that in step 3, sample units shall be tested at +125°C.	Measurement at 24 hours ±4 hours after test conclusion. Cap: Initial Limit DF: Initial Limit IR: Initial Limit

Table 2 – Performance & Reliability: Test Methods and Conditions cont.

Stress	Reference	Test or Inspection Method	Limits
Moisture Resistance	MIL-STD-202 Method 106	Number of cycles required 10, 24 hours per cycle. Steps 7a and 7b not required	Visual examination: No mechanical damage. Marking shall remain legible Measurement at 24 hours \pm 4 hours after test conclusion. Within Post Environmental Limits Cap: X7R: Change not to exceed \pm 10% of initial measured value Cap: COG: \pm 0.5 percent or 5 pF, whichever is greater, of initial measured value IR: 10% of Initial Limit of the initial +25°C requirement
Thermal Shock	MIL-STD-202 Method 107	Number of cycles required 5, (-55°C to 125°C) Dwell time 15 minutes.	Cap: Initial Limit DF: Initial Limit IR: Initial Limit
High Temperature Life	MIL-STD-202 Method 108	1,000 hours at 125°C with 2 X rated voltage applied excluding the following:	Within Post Environmental Limits Visual examination: No mechanical damage. Marking shall remain legible. IR: (at +25°C): Shall not be less than 30 percent of the value specified IR: (at elevated ambient temperature): Shall not be less than 30 percent of the value specified
Storage Life		1,000 hours at 125°C, Unpowered	
Vibration	MIL-STD-202 Method 204	5 g's for 20 minutes, 12 cycles each of 3 orientations. Test from 10 – 2,000 Hz	Cap: Initial Limit DF: Initial Limit IR: Initial Limit
Mechanical Shock	MIL-STD-202 Method 213	1,500 g's 0.5 ms Half-sine, Velocity Change 15.4 feett/second (Condition F)	Cap: Initial Limit DF: Initial Limit IR: Initial Limit
Resistance to Solvents	MIL-STD-202 Method 215	Add Aqueous wash chemical OKEMCLEAN (A 6% concentrated Oakite cleaner) or equivalent. Do not use banned solvents	Capacitors shall be visually examined for evidence of mechanical damage and marking.

Packaging Quantities

Style	Waffle Pack Quantity	Style	Waffle Pack Quantity
1515	50	3530	50
1812	50	4040	50
1825	50	4540	50
2020	50	5440	50
2225	50	5550	50
2520	50	6560	50
3333	50		

Storage & Handling

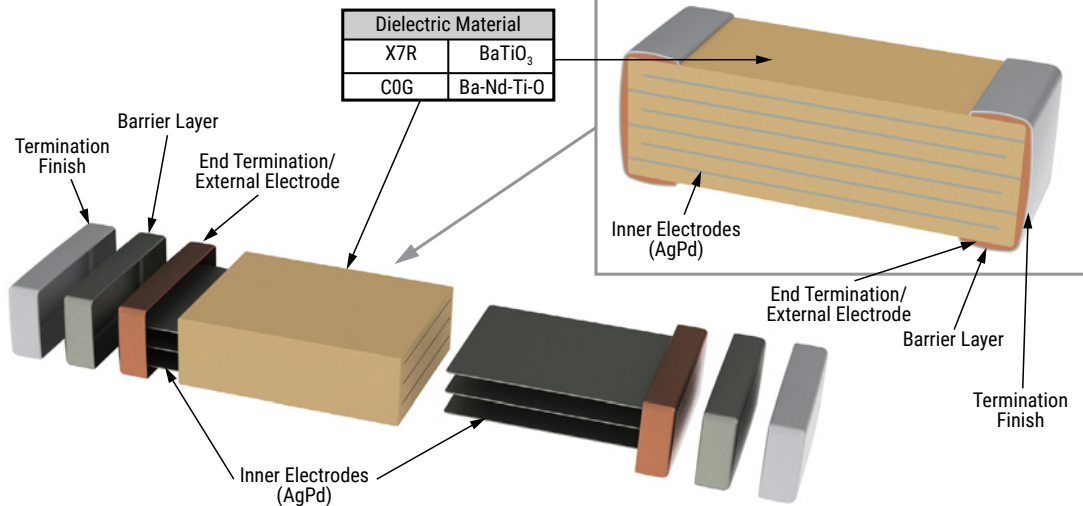
The un-mounted storage life of a leaded ceramic capacitor is dependent upon storage and atmospheric conditions as well as packaging materials. While the ceramic chips enveloped under the epoxy coating themselves are quite robust in most environments, solderability of the wire lead on the final epoxy-coated product will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature and exposure to direct sunlight—reels may soften or warp, and tape peel force may increase.

KEMET recommends storing the un-mounted capacitors in their original packaging, in a location away from direct sunlight, and where the temperature and relative humidity do not exceed 40 degrees centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 18 months of receipt. For applications requiring pre-tinning of components, storage life may be extended if solderability is verified. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes.

Construction

	P	S	E	C
Termination Finish	N/A	N/A	SnPb	Sn
Barrier Layer	N/A	N/A	Ni	Ni
End Termination	PdAg*	Ag*	Ag	Ag

* End Termination is solderable.



Environmental Compliance

Industrial PME (precious metal electrode) part types are not RoHS compliant.

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