

Product Bulletin

Surface Mount Ceramic Chip Capacitors High Temperature 200°C COG MLCC



Benefits and Features:

No Piezoelectric Noise. Extremely low ESR and ESL. High Thermal Stability. High Ripple Current Capability. Preferred capacitance solution at line frequencies and into the MHz range. No capacitance change with respect to applied rated DC voltage. Minimal capacitance change with respect to temperature from -55°C to +200°C. No capacitance decay with time. Non-polar device.

Applications: Typical applications include critical timing, tuning, circuits requiring low loss, circuits with pulse, high current, decoupling, by-pass, filtering, transient voltage suppression, blocking and energy storage for use in extreme environments commonly present in applications such as down-hole exploration, aerospace engine compartments and geophysical probes.

KEMET's New High Temperature Surface Mount COG MLCCs feature a robust and proprietary base metal dielectric system that offers industry-leading performance relative to capacitance and case size combined with capacitance stability at extreme temperatures up to +200°C. This new platform promotes downsizing opportunities of existing High Temperature C0G technology, and offers replacement opportunities of existing X7R/BX/ BR technologies.

Standard capacitance ratings for these devices range from 0.5 pF up to 0.22 µF in capacitance tolerance offerings of ±0.25pF, ±0.5pF, ±1%, ±2%, ±5%, ±10%, or ±20%. The Temperature Coefficient of Capacitance (TCC) is ±30ppm/°C from -55°C to +200°. Devices are available in DC voltage ratings of 10V, 16V, 25V, 50V and 100V, with a maximum dissipation factor of 0.10%. Seven standard EIA case size options are available which include -0603, 0805, 1206, 1210, and 1812- with either nickel barrier/tin or Sn/Pb terminations.

Outline Drawing



Dimensions - Millimeters (Inches)

EIA SIZE CODE	METRIC SIZE CODE	L LENGTH	W WIDTH	B BANDWIDTH	S SEPARATION minimum			
0603	1608	1.6 (.063) ± .15 (.006)	0.8 (.032) ± .15 (.006)	0.35 (.014) ± .15 (.006)	0.7 (.028)			
0805	2012	2.0 (.079) ± .20 (.008)	1.25 (.049) ± .20 (.008)	0.50 (.020) ± .25 (.010)	0.75 (.030)			
1206	3216	3.2 (.126) ± .20 (.008)	1.6 (.063) ± .20 (.008)	0.50 (.020) ± .25 (.010)	N/A			
1210	3225	3.2 (.126) ± .20 (.008)	2.5 (.098) ± .20 (.008)	0.50 (.020) ± .25 (.010)	N/A			
1812	4532	4.5 (.177) ± .30 (.012)	3.2 (.126) ± .30 (.012)	0.60 (.024) ± .35 (.014)	N/A			



Ordering Information

С	1210	H	124	J	5	G	Α	С	TU
Ceramic	Case Size (L"x W")	Specification/ Series	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Dielectric	Failure Rate/ Design	End Metallization (Plated)	Packaging/Grade (C-Spec)*
	0603	H = High Temp (200°C)	2 Sig. Digits +	C = ±0.25pF	8 = 10V	G = C0G	A = N/A	C = 100% Matte Sn	Blank = Bulk
	0805		Number of	D = ±0.5pF	4 = 16V			L = SnPb (5% min)	TU = 7" Reel Unmarked
	1206		Zeros*	F = ±1%	3 = 25V				TM = 7" Reel Marked
	1210		*Use 9 for 1.0 - 9.9pF	G = ±2%	6 = 35V				
	1812		*Use 8 for 0.599pF	$J = \pm 5\%$	5 = 50V				
			ex. 2.2pF = 229	K = ±10%	1 = 100V				
			ex. 0.5pF = 508	M = ±20%	2 = 200V				

*Contact KEMET for availability and ordering details if you require additional reeling or packaging options. Additional termination options may be available, contact KEMET for details.

Electrical Parameters/Characteristics

Operating Temperature Range:	-55°C to +200°C
Temperature Coefficient of Capacitance :	±30PPM/°C (up to 200°C)
Aging Rate (Max % Cap Loss/Decade Hour):	0%
Dielectric Withstanding Voltage:	250%
Dissipation Factor (DF) @ 25°C:	.001 (0.10%) Max
Insulation Resistance (IR) Limit @ 25°C: Insulation Resistance (IR) Limit @ 200°C:	1000 megohm microfarads or $100G\Omega$ 10 megohm microfarads or $1G\Omega$

Capacitance and Dissipation Factor (DF) measured under the following conditions: 1kHz and 1 Vrms if capacitance >1000pF

1MHz and 1 Vrms if capacitance ≤1000pF

Qualification/Certification

RoHS-PRC (6/6) - 100% matte Sn termination

Product Qualification Test Plan								
RELIABILITY/ ENVIRONMENTAL TESTS per MIL-STD-202/JESD22								
High Temperature Life 200°C, Rated Voltage, 2000 Hours.								
Load Humidity	85°C /85%RH, Rated Voltage, 1000 Hours.							
Low Voltage Humidity	85°C /85%RH, 1.5V, 1000 Hours.							
Temperature Cycling	-55°C to +200°C, 50 Cycles.							
Thermal Shock	-55°C to +150°C, 20s transfer, 15 min dwell, 300 Cycles.							
Moisture Resistance	Cycled Temp / RH. 0V, 10 cycles @ 24 Hrs each.							
PHYSICAL, ME	CHANICAL & PROCESS TESTS per MIL-STD 202/JIS-C-6429							
Resistance to Solvents	Include Aqueous wash chemical - OKEM Clean or equivalent.							
Mechanical Shock and Vibration	Method 213: Figure 1, Condition F Method 204: 5 gs for 20 min, 12 cycles.							
Restistance to Soldering Heat	Condition B, no pre-heat of samples, Single Wave Solder.							
Terminal Strength	Force of 1.8 kg for 60 seconds.							
Board Flex	3mm minimum.							

Electrical Characteristics



Capacitance vs. Temperature with 25V DC bias (Rated Voltage)







C1210H104J1GAC - Life Test IR Distribution (Lognormal)







BME vs. PME/IR vs. Temperature with 25V DC bias (Rated Voltage)





	High Temperature 200°C (0603 - 1812 Case Sizes) COG DIELECTRIC												12-															
		Series				ი03 ლ	10	20	1	-1		505 ლ	10	20	-1	1	C12	206 ຫຼ	10	22	-1		C12	210 ຫຼ	10	20	ິ ຫຼ	512 10
Cap pF	Cap Code	Voltage	2	_6<	57	٥٧ -	٥٧ ٧	ō V	٥٧ ٩	- V9	5V	0	٥٧ ٧	Ŷ	٥٧ ١	- V9	57	0V	ŌV	2	0	~ ~	57	٥٧ -	٥ ۷	Ŷ	2	٥٧ ٧
		Voltage Code	8	4	3	5	1 Pr/	2 aduct	8 Avail	4 ability	3	5 Chin ⁻	1 Thick	2	8 Codes	4	3 9 Pag	5 o 78 fu	1 or Ch	2 in Thi	8 cknes	4 se Din	3	5	1	2	5	1
0.50-0.75	508-759		CB	CB	CB	CB	CB	CB	DC	DC	DC		DC	DC	EB	EB	ER	EP	EB		EB		EB	EB	EB	EB		
2.7 3.0	279 309	CD KM CD KM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB	EB EB	EB	EB EB	EB	EB	FB FB	FB FB	FB FB	FB FB	FB FB	FB FB		
3.3 3.6 3.9	339 369 300	CD K M CD K M	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC	DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB FB	EB EB FB	EB EB FB	EB EB FB	EB EB FB	EB EB EB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB		
4.3 4.7	439 479	CD K M CD K M	CB CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB	EB	EB	EB	EB	EB	FB FB	FB FB	FB FB	FB FB	FB FB	FB FB		
5.1 5.6 6.2	519 569 629	CD KM CD JKM CD JKM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB	EB EB	EB EB	EB EB EB	EB EB	EB EB EB	FB FB	FB FB FB	FB FB FB	FB FB	FB FB FB	FB FB FB		
6.8 7.5 8.2	689 759 829	CD JKM CD JKM CD JKM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB EB	EB EB EB	EB EB EB	EB EB EB	EB EB EB	EB EB EB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB		
9.1 10 11	919 100 110	CD JKM CD JKM CD JKM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB EB	EB EB EB	EB EB EB	EB EB EB	EB EB EB	EB EB EB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB		
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16 18	160 180	CD GJKM CD GJKM CD GJKM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB	EB EB	EB	EB	EB	EB	FB FB	FB FB	FB FB	FB FB	FB FB	FB FB		
20 22 24	200 220 240	CD GJKM CD GJKM CD GJKM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB	EB EB	EB EB	EB EB	EB EB	EB EB	FB FB	FB FB FB	FB FB	FB FB	FB FB	FB FB		
27 30 33	270 300 330	D GJKM D GJKM D GJKM	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC	EB EB FB	EB EB FB	EB EB FB	EB EB FB	EB EB FB	EB EB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB	FB FB FB		
36 39	360 390	D GJKM DFGJKM	CB	CB CB	CB CB	CB CB	CB CB	CB CB	DC DC	DC DC	DC DC	DC DC	DC DC	DC DC	EB	EB	EB	EB	EB	EB	FB	FB	FB	FB	FB	FB		
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2,400 2,700 3,000	242 272 302	F G J K M F G J K M F G J K M	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB		DC DC DD	DC DC DD	DC DC DD	DC DC DD	DC DC DC		EB EC	EB EC	EB EC	EB ED EC	EC EC EC	EC	FB FB	FB FB FB	FB FB	FB FB	FC FC FC	FC FC FF		
3,300 3,600 3,900	332 362 392	F G J K M F G J K M F G J K M	CB CB CB	CB CB CB	CB CB CB	CB CB CB	CB CB CB		DD DD DF	DD DD DF	DD DD DF	DD DD DF	DC DC DC		EC EC EC	EC EC FC	EC EC EC	EC EC FC	EE EE FF		FB FB FB	FB FB FB	FB FB FB	FB FB FB	FF FF FF	FF FF FF		
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5,600 6,200	562 622	F G J K M F G J K M	CB	CB CB	CB CB	CB CB			DC DC	DC DC	DC DC	DC DC	DC DC		ED EB	ED EB	ED EB	ED EB	ED EB		FB	FB FB	FB FB	FB FB	FG FG	FG		
7,500 8,200	752 822	FGJKM FGJKM	CB CB CB	CB CB CB	CB CB CB	СВ			DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DC DC		EB EC	EB EC	EB EC	EB EC	EB		FC FC	FC FC	FD FC FC	FC FC	FC FC			
9,100 10,000 12,000	912 103 123	F G J K M F G J K M F G J K M	CB	CB CB	CB CB				DC DC DC	DC DC DC	DC DC DC	DC DC DC	DC DD DE		EC ED EB	EC ED EB	EC ED EB	EC ED EB	EB EB EB		FE FF FG	FE FF FG	FE FF FG	FE FF FG	FE FF FB			
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270,000	274	Voltage Code	8	4	3	5	1	2	8	4	3	5	1	2	8	4	3	5	1	2	8	4	3	5	1	2	5	1
Cap pF	Cap Code	Voltage	10V	16V	25V	50V	100V	200V	10V	16V	25V	50V	100V	200V	10V	16V	25V	50V	100V	200V	10V	16V	25V	50V	100V	200V	50V	100V
		Series			C0	603					C08	305					C12	206					C12	210			C18	812

High T 20000 (0603 - 1912 0 Ci-.

Chip Thickness / Packaging Quantities

Thickness	Chip	Thickness ±	Qty per Reel	Qty per Reel	Qty per Reel	Qty per Reel	Qty per Bulk
Code	Size	Range (mm)	7" Plastic	13" Plastic	7" Paper	13" Paper	Cassette
	01005	0.20 + 0.02			15000		
	01005	0.20 ± 0.02			15000		
AD DD	0201	0.50 ± 0.05			10000	50000	50000
CB	0402	0.30 ± 0.03			4000	10000	15000
00	0603	0.80 ± 0.07			4000	10000	13000
CD	0603	0.80 ± 0.15			4000	10000	
DB	0805	0.60 ± 0.10			4000	10000	10000
DC	0805	0.78 ± 0.10			4000	10000	
DD	0805	0.90 ± 0.10			4000	10000	
DE	0805	1.00 ± 0.10	2500	10000			
DF	0805	1.10 ± 0.10	2500	10000			
DG	0805	1.25 ± 0.15	2500	10000			
DH	0805	1.25 ± 0.20	2500	10000			
DL	0805	0.95 ± 0.10	4000	10000			
EB	1206	0.78 ± 0.10	4000	10000	4000	10000	
EC	1206	0.90 ± 0.10	4000	10000			
ED	1206	1.00 ± 0.10	2500	10000			
EE	1206	1.10 ± 0.10	2500	10000			
EF	1206	1.20 ± 0.15	2500	10000			
EG	1206	1.60 ± 0.15	2000	8000			
EH	1206	1.60 ± 0.20	2000	8000			
EJ	1206	1.70 ± 0.20	2000	8000	-		
EK	1206	0.80 ± 0.10	2000	8000			
	1206	1.25 ± 0.15	2000	10000			
	1200	0.95 ± 0.10	4000	10000	-		
FB EC	1210	0.00 + 0.10	4000	10000			
	1210	0.90 ± 0.10	4000	10000	-	-	
FD	1210	1 00 ± 0 10	2500	10000	-	-	
FE	1210	1.00 ± 0.10	2500	10000			
FC	1210	1.10 ± 0.10	2500	10000			
FU	1210	1.25 ± 0.15	2000	8000			
FI	1210	1.85 ± 0.15	2000	8000			
FK	1210	2 10 ± 0.20	2000	8000			
FL	1210	1 40 + 0 15	2000	8000			
FM	1210	1.40 ± 0.10	2000	8000			
FN	1210	1.85 + 0.20	2000	8000			
FO	1210	1.50 ± 0.20	2000	8000			
FP	1210	1.60 ± 0.20	2000	8000			
FR	1210	2 25 + 0 20	2000	8000			
FS	1210	2.50 ± 0.20	1000	4000			
FT	1210	1.90 ± 0.20	1500	4000			
GB	1812	1.00 ± 0.10	1000	4000			
GC	1812	1.10 ± 0.10	1000	4000			
GD	1812	1.25 ± 0.15	1000	4000			
GE	1812	1.30 ± 0.10	1000	4000			
GF	1812	1.50 ± 0.10	1000	4000			
GG	1812	1.55 ± 0.10	1000	4000			
GH	1812	1.40 ± 0.15	1000	4000			
GJ	1812	1.70 ± 0.15	1000	4000			
GK	1812	1.60 ± 0.20	1000	4000			
GL	1812	1.90 ± 0.20	1000	4000			
GM	1812	2.00 ± 0.20	1000	4000			
GN	1812	1.70 ± 0.20	1000	4000			
GO	1812	2.50 ± 0.20	500	2000			
HB	1825	1.10 ± 0.15	1000	4000			
HC	1825	1.15 ± 0.15	1000	4000			
HD	1825	1.30 ± 0.15	1000	4000			
HE	1825	1.40 ± 0.15	1000	4000	-		
HF	1825	1.50 ± 0.15	1000	4000			
HG	1825	1.60 ± 0.20	1000	4000			
JB	2220	1.00 ± 0.15	1000	4000			
JC	2220	1.10±0.15	1000	4000			
JD	2220	1.30 ± 0.15	1000	4000			
	2220	1.40 ± 0.15 1.50 ± 0.15	1000	4000		-	
JF	2220	1.00 ± 0.10	1000	4000			
<u>ј</u> јц	2220	1.10 ± 0.15	1000	4000			
JH	2220	1.00 ± 0.15	500	2000			
10	2220	2.40 ± 0.10	1000	2000			
KR	2220	1.00 ± 0.20	1000	4000			
KC	2225	1 10 + 0 15	1000	4000			
KD	2225	1.30 + 0.15	1000	4000			
KE	2225	1 40 + 0 15	1000	4000	-	-	-
KE	2225	1.40 ± 0.15	1000	4000			
	1808	1 40 + 0 15	1000	4000			
IR	1808	1 60 + 0 15	1000	4000			
LC	1808	2.00 ± 0.15	1000	4000			
	1808	0.90 + 0.10	2500	10000			
MA	1632	0.80 ± 0.10	4000	10000			

Thickness Code Reference Chart Packaging Quantity Based on Finished Chip Thickness Specifications



Soldering Process

All parts incorporate the standard KEMET barrier layer of pure nickel, with an overplate of pure tin to provide excellent solderability as well as resistance to leaching.

HMP solders ,e.g., Pb94, are recommended for high temperature applications.

Marking

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

In general, the information in the KEMET Surface Mount catalog F3102 applies to these capacitors. The information in this bulletin supplements that in the catalog.