TDK

MULTILAYER CERAMIC CHIP CAPACITORS

CGA Series
Automotive Grade
Soft Termination

Type:

CGA3 [EIA CC0603]
CGA4 [EIA CC0805]
CGA5 [EIA CC1206]
CGA6 [EIA CC1210]
CGA7 [EIA CC1808]
CGA8 [EIA CC1812]
CGA9 [EIA CC2220]

Issue date:
Mar 2014

REMINDERS

Please read before using this product

SAFETY REMINDERS

REMINDERS

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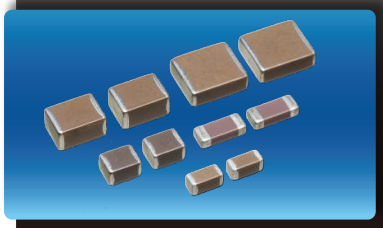
Notice: Effective January 2013, TDK will use a new catalog number which adds product thickness and packaging specification detail. This new catalog number should be referenced on all catalog orders going forward, and is not applicable for OEM part number orders. Please be aware the last five digits of the catalog number will differ from the item description (internal control number) on the product label. Contact your local TDK Sales representative for more information.

(Example)

Catalog Issued date	Catalog Number	Item Description (On Delivery Label)
Prior to January 2013	C1608C0G1E103J	C1608C0G1E103JT000N
January 2013 and Later	C1608C0G1E103J080AA	C1608C0G1E103JT000N



CGA Series
Soft Termination

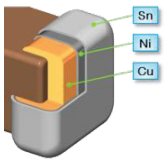
Lead Free | RoHS COMPLIANT | Ecological

Type: CGA3 [EIA CC0603], CGA4 [EIA CC0805], CGA5 [EIA CC1206], CGA6 [EIA CC1210], CGA7 [EIA CC1808], CGA8 [EIA CC1812], CGA9 [EIA CC2220]

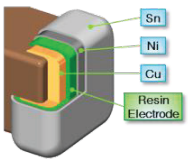
Features

- Improved board bending resistance, drop impact resistance, thermal shock resistance, and heat cycle properties.
- Conductive resin absorb external stress to protect solder joint parts and capacitor body.
- Compliance with the RoHS Directive.
- AEC-Q200 compliant.

Standard Product



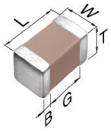
Soft Termination



Applications

- Switching power supply
- Telecom base station
- Electronic circuits mounted on alumina substrate
- SMT application which requires bending robustness in which solder joint reliability is problematic

Shape & Dimensions



L	Body Length
W	Body Width
T	Body Height
B	Terminal Width
G	Terminal Spacing

Catalog Number Construction

CGA • 6 • P • 3 • X7S • 1H • 106 • K • 250 • A • E

Series Name

Dimensions L x W (mm)

Code	Length	Width	Terminal
C1608	1.60 + 0.20/-0.10	0.80 + 0.15/-0.10	0.20 min.
C2012	2.00 + 0.25/-0.20	1.25 + 0.25/-0.20	0.20 min.
C3216	3.20 + 0.40/-0.20	1.60 + 0.30/-0.20	0.20 min.
C3225	3.20 + 0.50/-0.40	2.50 ± 0.30	0.20 min.
C4520	4.50 + 0.30/-0.20	2.00 ± 0.15	0.20 min.
C4532	4.50 + 0.50/-0.40	3.20 ± 0.40	0.20 min.
C5750	5.70 + 0.50/-0.40	5.00 ± 0.40	0.20 min.

*Dimension tolerance are typical values

Thickness T Code (mm)

Code	Thickness
E	0.80 mm
F	0.85 mm
H	1.15 mm
J	1.25 mm
K	1.30 mm
L	1.60 mm
M	2.00 mm
N	2.30 mm
P	2.50 mm

Voltage Condition for Life Test

Symbol	Condition
1	1 × R.V.
2	2 × R.V.
3	1.5 × R.V.
4	1.2 × R.V.

Temperature Characteristics

Temperature Characteristics	Temperature Coefficient or Capacitance Change	Temperature Range
C0G	0 ±30ppm/°C	-55 to +125°C
X7R	±15%	-55 to +125°C
X7S	±22%	-55 to +125°C
X7T	+22/-33%	-55 to +125°C

Rated Voltage (DC)

Code	Voltage (DC)	Code	Voltage (DC)
1C	16V	2W	450V
1E	25V	2J	630V
1V	35V	3A	1000V
1H	50V	3D	2000V
2A	100V	3F	3000V
2E	250V		

Nominal Capacitance (pF)

The capacitance is expressed in three digit codes and in units of pico Farads (pF). The first and second digits identify the first and second significant figures of the capacitance. The third digit identifies the multiplier. R designates a decimal point.

Ex. 0R2 = 0.2pF; 103 = 10,000pF; 105 = 1,000,000pF = 1,000nF = 1µF

Capacitance Tolerance

Code	Tolerance
K	± 10%
M	± 20%

Nominal Thickness

Code	Thickness
080	0.80 mm
085	0.85 mm
130	1.30 mm
160	1.60 mm
250	2.50 mm

*See Thickness T Code for complete list

Packaging Style

Code	Style
A	178" Reel, 4mm Pitch
K	178" Reel, 8mm Pitch

Special Reserved Code

Code	Description
E	Soft Termination

Capacitance Range Chart

CGA3(1608) [EIA CC0603]

Capacitance Range Chart

Temperature Characteristics: X7R (±15%)
Rated Voltage: 50V (1H)

Capacitance (pF)	Code	Tolerance	X7R 1H (50V)
1,000	102	K: ± 10% M: ± 20%	
10,000	103		
100,000	104		

Standard Thickness
0.80 mm

Capacitance Range Chart

CGA4(2012) [EIA CC0805]

Capacitance Range Chart

Temperature Characteristics: X7R (±15%), X7S (±22%), X7T (+22/-33%)
Rated Voltage: 450V (2W), 250V (2E), 100V (2A), 50V (1H), 35V (1V), 16V (1C)

Capacitance (pF)	Code	Tolerance	X7R 2E (250V)	X7R 2A (100V)	X7R 1H (50V)	X7R 1V (35V)	X7R 1C (16V)	X7S 2A (100V)	X7T 2W (450V)	X7T 2E (250V)
10,000	103	K: ± 10% M: ± 20%								
22,000	223									
47,000	473									
100,000	104									
220,000	224									
470,000	474									
1,000,000	105									
2,200,000	225									
4,700,000	475									

Standard Thickness
0.85 mm
1.25 mm

Capacitance Range Chart

CGA5(3216) [EIA CC1206]

Capacitance Range Chart

Temperature Characteristics: X7R (±15%), X7S (±22%), X7T (+22/-33%)
Rated Voltage: 2000V(3D), 1000V(3A), 630V (2J), 450V (2W), 250V (2E), 100V (2A), 50V (1H), 35V (1V), 25V (1E)

Capacitance (pF)	Code	Tolerance	X7R 2J (630V)	X7R 2E (250V)	X7R 2A (100V)	X7R 1H (50V)	X7R 1V (35V)	X7R 1E (25V)	X7S 3D (2000V)	X7S 3A (1000V)	X7S 2A (100V)	X7T 2J (630V)	X7T 2W (450V)	X7T 2E (250V)
470	471	K: ± 10% M: ± 20%												
1,000	102													
10,000	103													
22,000	223													
47,000	473													
100,000	104													
220,000	224													
470,000	474													
1,000,000	105													
2,200,000	225													
4,700,000	475													
10,000,000	106													

Standard Thickness 0.85 mm 1.15 mm 1.30 mm 1.60 mm

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Capacitance Range Chart

CGA6(3225) [EIA CC1210]

Capacitance Range Chart

Temperature Characteristics: X7R (±15%), X7S (±22%), X7T (+22/-33%)
Rated Voltage: 630V (2J), 450V (2W), 250V (2E), 100V (2A), 50V (1H)

Capacitance (pF)	Code	Tolerance	X7R			X7S		X7T	
			2J (630V)	2E (250V)	2A (100V)	2A (100V)	1H (50V)	2J (630V)	2W (450V)
47,000	473	K: ± 10% M: ± 20%							
100,000	104								
220,000	224								
2,200,000	225								
4,700,000	475								
10,000,000	106								

Standard Thickness
- 1.60 mm
- 2.00 mm
- 2.30 mm
- 2.50 mm

Capacitance Range Chart

CGA7(4520) [EIA CC1808]

Capacitance Range Chart

Temperature Characteristics: X7R (±15%)
Rated Voltage: 2000V (3D)

Capacitance (pF)	Code	Tolerance	X7R
			3D (2000V)
1,000	102	K: ±10% M: ±20%	

Standard Thickness
- 1.30 mm

Capacitance Range Chart

CGA8(4532) [EIA CC1812]

Capacitance Range Chart

Temperature Characteristics: C0G (0 ± 30 ppm/ºC), X7R (±15%), X7S (±22%), X7T (+22/-33%)
Rated Voltage: 3000V (3F), 2000V (3D), 1000V (3A), 630V (2J), 450V (2W), 250V (2E)

Capacitance (pF)	Code	Tolerance	C0G	X7R		X7S	X7T		
			3F (3000V)	3D (2000V)	2E (250V)	3A (1000V)	2J (630V)	2W (450V)	2E (250V)
330	331	K: ± 10% M: ± 20%							
2,200	222								
10,000	103								
220,000	224								
470,000	474								
1,000,000	105								

- 1.30 mm
- 1.60 mm
- 2.00 mm
- 2.30 mm
- 2.50 mm

Capacitance Range Chart

CGA9(5750) [EIA CC2220]

Capacitance Range Chart

Temperature Characteristics: X7R (±15%), X7S (±22%), X7T (+22/-33%)
Rated Voltage: 2000V(3D), 630V (2J), 450V (2W), 250V (2E), 100V (2A)

Capacitance (pF)	Code	Tolerance	X7R	X7S		X7T		
			2E (250V)	3D (2000V)	2A (100V)	2J (630V)	2W (450V)	2E (250V)
10,000	103	K: ± 10% M: ± 20%						
470,000	474							
1,000,000	105							
2,200,000	225							
10,000,000	106							

Standard Thickness
- 2.30 mm
- 2.50 mm

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Capacitance Range Table

Class 1 (Temperature Compensating)

Temperature Characteristics: C0G (-55 to 125ºC, 0±30 ppm/ºC)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number
				Rated Voltage Edc: 3000V
330 pF	4532	2.50 ± 0.20	± 10%	CGA8P1C0G3F331K250KE

Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125ºC, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number				
				Rated Voltage Edc: 2000V	Rated Voltage Edc: 630V	Rated Voltage Edc: 250V	Rated Voltage Edc: 100V	Rated Voltage Edc: 50V
1 nF	1608	0.80 +0.15/-0.1	± 10%					CGA3E2X7R1H102K080AE
			± 20%					CGA3E2X7R1H102M080AE
	4520	1.30 ± 0.15	± 10%	CGA7K1X7R3D102K130KE				
			± 20%	CGA7K1X7R3D102M130KE				
2.2nF	4532	1.30 ± 0.15	± 10%	CGA8K1X7R3D222K130KE				
			± 20%	CGA8K1X7R3D222M130KE				
10 nF	1608	0.80 +0.15/-0.1	± 10%					CGA3E2X7R1H103K080AE
			± 20%					CGA3E2X7R1H103M080AE
	2012	1.25 +0.25/-0.20	± 10%			CGA4J3X7R2E103K125AE		
			± 20%			CGA4J3X7R2E103M125AE		
	3216	1.15 ± 0.15	± 10%		CGA5H4X7R2J103K115AE			
			± 20%		CGA5H4X7R2J103M115AE			
22 nF	2012	1.25 +0.25/-0.20	± 10%			CGA4J3X7R2E223K125AE		
			± 20%			CGA4J3X7R2E223M125AE		
	3216	1.30 ± 0.20	± 10%		CGA5K4X7R2J223K130AE			
			± 20%		CGA5K4X7R2J223M130AE			
47 nF	3225	2.00 +0.30/-0.20	± 10%		CGA6M4X7R2J473K200AE			
			± 20%		CGA6M4X7R2J473M200AE			
100 nF	1608	0.80 +0.15/-0.1	± 10%					CGA3E2X7R1H104K080AE
			± 20%					CGA3E2X7R1H104M080AE
	2012	1.25 +0.25/-0.20	± 10%				CGA4J2X7R2A104K125AE	CGA4J2X7R1H104K125AE
			± 20%				CGA4J2X7R2A104M125AE	CGA4J2X7R1H104M125AE
	3216	1.60 +0.30/-0.20	± 10%			CGA5L3X7R2E104K160AE	CGA5L2X7R2A104K160AE	
			± 20%			CGA5L3X7R2E104M160AE	CGA5L2X7R2A104M160AE	
	3225	2.00 +0.30/-0.20	± 10%			CGA6M3X7R2E104K200AE		
			± 20%			CGA6M3X7R2E104M200AE		
220 nF	3225	2.00 +0.30/-0.20	± 10%			CGA6M3X7R2E224K200AE		
			± 20%			CGA6M3X7R2E224M200AE		
470 nF	2012	1.25 +0.25/-0.20	± 10%					CGA4J3X7R1H474K125AE
			± 20%					CGA4J3X7R1H474M125AE
	3216	1.60 +0.30/-0.20	± 10%				CGA5L2X7R2A474K160AE	
			± 20%				CGA5L2X7R2A474M160AE	
	4532	2.30 +0.30/-0.20	± 10%			CGA8N3X7R2E474K230KE		
			± 20%			CGA8N3X7R2E474M230KE		
1 µF	2012	1.25 +0.25/-0.20	± 10%					CGA4J3X7R1H105K125AE
			± 20%					CGA4J3X7R1H105M125AE
	3216	1.60 +0.30/-0.20	± 10%				CGA5L2X7R2A105K160AE	CGA5L3X7R1H105K160AE
			± 20%				CGA5L2X7R2A105M160AE	CGA5L3X7R1H105M160AE
	5750	2.30 +0.30/-0.20	± 10%			CGA9N3X7R2E105K230KE		
			± 20%			CGA9N3X7R2E105M230KE		
2.2 µF	3216	1.60 +0.30/-0.20	± 10%					CGA5L3X7R1H225K160AE
			± 20%					CGA5L3X7R1H225M160AE
	3225	2.30 +0.30/-0.20	± 10%				CGA6N3X7R2A225K230AE	
			± 20%				CGA6N3X7R2A225M230AE	

Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125ºC, ±15%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number		
				Rated Voltage Edc: 35V	Rated Voltage Edc: 25V	Rated Voltage Edc: 16V
2.2 µF	2012	1.25 +0.25/-0.20	± 10%	CGA4J1X7R1V225K125AE		
			± 20%	CGA4J1X7R1V225M125AE		
4.7 µF	2012	1.25 +0.25/-0.20	± 10%			CGA4J3X7R1C475K125AE
			± 20%			CGA4J3X7R1C475M125AE
	3216	1.60 +0.30/-0.20	± 10%	CGA5L1X7R1V475K160AE		
			± 20%	CGA5L1X7R1V475M160AE		
10 µF	3216	1.60 +0.30/-0.20	± 10%		CGA5L1X7R1E106K160AE	
			± 20%		CGA5L1X7R1E106M160AE	

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Capacitance Range Table

Class 2 (Temperature Stable)

Temperature Characteristics: X7S (-55 to +125ºC, ±22%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number			
				Rated Voltage Edc: 2000V	Rated Voltage Edc: 1000V	Rated Voltage Edc: 100V	Rated Voltage Edc: 50V
470 pF	3216	1.30 ± 0.20	± 10%	CGA5K1X7S3D471K130AE			
			± 20%	CGA5K1X7S3D471M130AE			
1 nF	3216	0.85 ± 0.15	± 10%		CGA5F1X7S3A102K085AE		
			± 20%		CGA5F1X7S3A102M085AE		
10nF	4532	1.60 +0.30/-0.20	± 10%		CGA8L1X7S3A103K160KE		
			± 20%		CGA8L1X7S3A103M160KE		
	5750	2.50 ± 0.30	± 10%	CGA9P1X7S3D103K250KE			
			± 20%	CGA9P1X7S3D103M250KE			
220 nF	2012	0.85 ± 0.15	± 10%			CGA4F3X7S2A224K085AE	
			± 20%			CGA4F3X7S2A224M085AE	
470 nF	2012	1.25 +0.25/-0.20	± 10%			CGA4J3X7S2A474K125AE	
			± 20%			CGA4J3X7S2A474M125AE	
1 µF	2012	1.25 +0.25/-0.20	± 10%			CGA4J3X7S2A105K125AE	
			± 20%			CGA4J3X7S2A105M125AE	
2.2 µF	3216	1.60 +0.30/-0.20	± 10%			CGA5L3X7S2A225K160AE	
			± 20%			CGA5L3X7S2A225M160AE	
4.7 µF	3225	2.00 +0.30/-0.20	± 10%			CGA6M3X7S2A475K200AE	
			± 20%			CGA6M3X7S2A475M200AE	
		2.30 +0.30/-0.20	± 10%				CGA6N3X7S1H475K230AE
			± 20%				CGA6N3X7S1H475M230AE
10 µF	3225	2.50 ± 0.30	± 10%				CGA6P3X7S1H106K250AE
			± 20%				CGA6P3X7S1H106M250AE
	5750	2.30 +0.30/-0.20	± 10%			CGA9N3X7S2A106K230KE	
			± 20%			CGA9N3X7S2A106M230KE	

Class 2 (Temperature Stable)

Temperature Characteristics: X7T (-55 to +125ºC, +22/-33%)

Capacitance	Size	Thickness (mm)	Capacitance Tolerance	Catalog Number		
				Rated Voltage Edc: 630V	Rated Voltage Edc: 450V	Rated Voltage Edc: 250V
10 nF	2012	0.85 ± 0.15	± 10%		CGA4F4X7T2W103K085AE	
			± 20%		CGA4F4X7T2W103M085AE	
22 nF	2012	1.25 +0.25/-0.20	± 10%		CGA4J4X7T2W223K125AE	
			± 20%		CGA4J4X7T2W223M125AE	
47 nF	2012	1.25 +0.25/-0.20	± 10%		CGA4J4X7T2W473K125AE	CGA4J3X7T2E473K125AE
			± 20%		CGA4J4X7T2W473M125AE	CGA4J3X7T2E473M125AE
	3216	1.60 +0.30/-0.20	± 10%	CGA5L1X7T2J473K160AE		
			± 20%	CGA5L1X7T2J473M160AE		
100 nF	2012	1.25 +0.25/-0.20	± 10%			CGA4J3X7T2E104K125AE
			± 20%			CGA4J3X7T2E104M125AE
	3216	1.60 +0.30/-0.20	± 10%		CGA5L4X7T2W104K160AE	
			± 20%		CGA5L4X7T2W104M160AE	
	3225	1.60 +0.30/-0.20	± 10%	CGA6L1X7T2J104K160AE		
			± 20%	CGA6L1X7T2J104M160AE		
220 nF	3216	1.60 +0.30/-0.20	± 10%			CGA5L3X7T2E224K160AE
			± 20%			CGA5L3X7T2E224M160AE
	3225	2.00 +0.30/-0.20	± 10%		CGA6M4X7T2W224K200AE	
			± 20%		CGA6M4X7T2W224M200AE	
	4532	2.00 +0.30/-0.20	± 10%	CGA8M1X7T2J224K200KE		
			± 20%	CGA8M1X7T2J224M200KE		
470 nF	4532	2.30 +0.30/-0.20	± 10%		CGA8N4X7T2W474K230KE	
			± 20%		CGA8N4X7T2W474M230KE	
	5750	2.50 ± 0.30	± 10%	CGA9P1X7T2J474K250KE		
			± 20%	CGA9P1X7T2J474M250KE		
1 µF	4532	2.50 ± 0.30	± 10%			CGA8P3X7T2E105K250KE
			± 20%			CGA8P3X7T2E105M250KE
	5750	2.50 ± 0.30	± 10%		CGA9P4X7T2W105K250KE	
			± 20%		CGA9P4X7T2W105M250KE	
2.2 µF	5750	2.50 ± 0.30	± 10%			CGA9P3X7T2E225K250KE
			± 20%			CGA9P3X7T2E225M250KE

TDK provides Soft Termination on the most commonly used MLCC sizes and capacitance values. Soft Termination offers an external electrode design that differs from the standard electrode design, and this design may be able to be applied to capacitance values beyond those listed in the catalog. Please contact TDK if your specific product needs are not listed and we will consider adding it to the product offering.