

# Multilayer Ceramic Chip Capacitors

For automobile

General use

## CGA series

Type:           CGA2(C1005[EIA CC0402])  
                  CGA3(C1608[EIA CC0603])  
                  CGA4(C2012[EIA CC0805])  
                  CGA5(C3216[EIA CC1206])  
                  CGA6(C3225[EIA CC1210])

Issue date:     June 2009

- All specifications are subject to change without notice.
  - Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.
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# REMINDERS

Please read this before using the product.

## SAFETY REMINDERS

### REMINDERS

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8. The descriptions in this catalog apply as of June 2009.

# General Multilayer Ceramic Chip Capacitors for Automobile

## CGA Series

Conformity to RoHS Directive

### FEATURES

- The CGA series consists of products that are used for the power train, safety equipment, etc. of a vehicle.
- With the thinner ceramic dielectric layers and the development of the multilayer technology, the capacitor has a large capacitance.
- The capacitor can be used over a wide range of operating temperatures from  $-55$  to  $+125^{\circ}\text{C}$ .

### PRODUCT IDENTIFICATION

CGA 3 E 2 X7R H 104 K  
(1) (2) (3) (4) (5) (6) (7) (8)

#### (1) Series name

#### (2) Dimensions

2	1005(1.0×0.5mm)
3	1608(1.6×0.8mm)
4	2012(2.0×1.25mm)
5	3216(3.2×1.6mm)
6	3225(3.2×2.5mm)

#### (3) Thickness T

B	0.50mm
C	0.60mm
D	0.70mm
E	0.80mm
F	0.85mm
G	1.10mm
H	1.15mm
J	1.25mm
K	1.30mm
L	1.60mm
M	2.00mm
N	2.30mm
P	2.50mm

#### (4) Voltage conditions at the time of high temperature loading (Shown below are guaranteed applied voltages in a high temperature load test. [Maximum operating temperature/1000h])

1	Product with the rated voltage×1 guaranteed
2	Product with the rated voltage×2 guaranteed
3	Product with the rated voltage×1.5 guaranteed

#### (5) Capacitance Temperature characteristics

##### Class 1 (Temperature compensation)

Temperature characteristics	Capacitance change	Temperature range
C0G	$0\pm 30\text{ppm}/^{\circ}\text{C}$	$-55$ to $+125^{\circ}\text{C}$

##### Class 2 (Temperature stable and general purpose)

Temperature characteristics	Capacitance change	Temperature range
X7R	$\pm 15\%$	$-55$ to $+125^{\circ}\text{C}$

#### (6) Product with the rated voltage E<sub>dc</sub>

1C	16V
1E	25V
1H	50V

#### (7) Nominal capacitance

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.

101	100pF
104	100,000pF(0.1μF)
106	10,000,000pF(10μF)

#### (8) Capacitance Tolerance

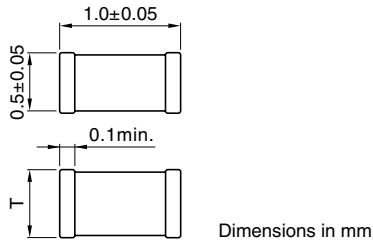
Symbol	Tolerance	Applicable capacitance range
C	$\pm 0.25\text{pF}$	10pF or less
D	$\pm 0.5\text{pF}$	
J	$\pm 5\%$	Over 10pF
K	$\pm 10\%$	
M	$\pm 20\%$	

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## CGA2(C1005[EIA: CC0402]) Type

### SHAPES AND DIMENSIONS



### CAPACITANCE RANGES: CLASS 1 (TEMPERATURE COMPENSATION)

#### TEMPERATURE CHARACTERISTICS: C0G(0±30ppm/°C)

RATED VOLTAGE Edc: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
1	±0.25pF	0.5±0.05	2	CGA2B2C0G1H010C
1.5	±0.25pF	0.5±0.05	2	CGA2B2C0G1H1R5C
2	±0.25pF	0.5±0.05	2	CGA2B2C0G1H020C
2.2	±0.25pF	0.5±0.05	2	CGA2B2C0G1H2R2C
3	±0.25pF	0.5±0.05	2	CGA2B2C0G1H030C
3.3	±0.25pF	0.5±0.05	2	CGA2B2C0G1H3R3C
4	±0.25pF	0.5±0.05	2	CGA2B2C0G1H040C
4.7	±0.25pF	0.5±0.05	2	CGA2B2C0G1H4R7C
5	±0.25pF	0.5±0.05	2	CGA2B2C0G1H050C
6	±0.5pF	0.5±0.05	2	CGA2B2C0G1H060D
6.8	±0.5pF	0.5±0.05	2	CGA2B2C0G1H6R8D
7	±0.5pF	0.5±0.05	2	CGA2B2C0G1H070D
8	±0.5pF	0.5±0.05	2	CGA2B2C0G1H080D
9	±0.5pF	0.5±0.05	2	CGA2B2C0G1H090D
10	±0.5pF	0.5±0.05	2	CGA2B2C0G1H100D
12	±5%	0.5±0.05	2	CGA2B2C0G1H120J
15	±5%	0.5±0.05	2	CGA2B2C0G1H150J
18	±5%	0.5±0.05	2	CGA2B2C0G1H180J
22	±5%	0.5±0.05	2	CGA2B2C0G1H220J
27	±5%	0.5±0.05	2	CGA2B2C0G1H270J
33	±5%	0.5±0.05	2	CGA2B2C0G1H330J
39	±5%	0.5±0.05	2	CGA2B2C0G1H390J
47	±5%	0.5±0.05	2	CGA2B2C0G1H470J
56	±5%	0.5±0.05	2	CGA2B2C0G1H560J
68	±5%	0.5±0.05	2	CGA2B2C0G1H680J
82	±5%	0.5±0.05	2	CGA2B2C0G1H820J
100	±5%	0.5±0.05	2	CGA2B2C0G1H101J
120	±5%	0.5±0.05	2	CGA2B2C0G1H121J
150	±5%	0.5±0.05	2	CGA2B2C0G1H151J
180	±5%	0.5±0.05	2	CGA2B2C0G1H181J
220	±5%	0.5±0.05	2	CGA2B2C0G1H221J
270	±5%	0.5±0.05	2	CGA2B2C0G1H271J
330	±5%	0.5±0.05	2	CGA2B2C0G1H331J
390	±5%	0.5±0.05	2	CGA2B2C0G1H391J
470	±5%	0.5±0.05	2	CGA2B2C0G1H471J

**CAPACITANCE RANGES: CLASS 2****TEMPERATURE CHARACTERISTICS: X7R( $\pm 15\%$ )**RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
1000	$\pm 10\%$	0.5 $\pm$ 0.05	2	CGA2B2X7R1H102K
2200	$\pm 10\%$	0.5 $\pm$ 0.05	2	CGA2B2X7R1H222K
4700	$\pm 10\%$	0.5 $\pm$ 0.05	2	CGA2B2X7R1H472K

RATED VOLTAGE E<sub>dc</sub>: 25V

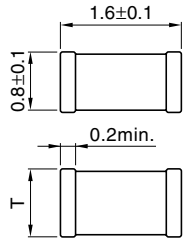
Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
10,000	$\pm 10\%$	0.5 $\pm$ 0.05	2	CGA2B2X7R1E103K
22,000	$\pm 10\%$	0.5 $\pm$ 0.05	2	CGA2B2X7R1E223K
47,000	$\pm 10\%$	0.5 $\pm$ 0.05	1	CGA2B1X7R1E473K

RATED VOLTAGE E<sub>dc</sub>: 16V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
47,000	$\pm 10\%$	0.5 $\pm$ 0.05	2	CGA2B2X7R1C473K
68,000	$\pm 10\%$	0.5 $\pm$ 0.05	1	CGA2B1X7R1C683K
100,000	$\pm 10\%$	0.5 $\pm$ 0.05	1	CGA2B1X7R1C104K

## CGA3(C1608[EIA: CC0603]) Type

### SHAPES AND DIMENSIONS



Dimensions in mm



### CAPACITANCE RANGES: CLASS 1 (TEMPERATURE COMPENSATION)

#### TEMPERATURE CHARACTERISTICS: C0G(0±30ppm/°C)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
1	±0.25pF	0.8±0.1	2	CGA3E2C0G1H010C
1.5	±0.25pF	0.8±0.1	2	CGA3E2C0G1H1R5C
2	±0.25pF	0.8±0.1	2	CGA3E2C0G1H020C
2.2	±0.25pF	0.8±0.1	2	CGA3E2C0G1H2R2C
3	±0.25pF	0.8±0.1	2	CGA3E2C0G1H030C
3.3	±0.25pF	0.8±0.1	2	CGA3E2C0G1H3R3C
4	±0.25pF	0.8±0.1	2	CGA3E2C0G1H040C
4.7	±0.25pF	0.8±0.1	2	CGA3E2C0G1H4R7C
5	±0.25pF	0.8±0.1	2	CGA3E2C0G1H050C
6	±0.5pF	0.8±0.1	2	CGA3E2C0G1H060D
6.8	±0.5pF	0.8±0.1	2	CGA3E2C0G1H6R8D
7	±0.5pF	0.8±0.1	2	CGA3E2C0G1H070D
8	±0.5pF	0.8±0.1	2	CGA3E2C0G1H080D
9	±0.5pF	0.8±0.1	2	CGA3E2C0G1H090D
10	±0.5pF	0.8±0.1	2	CGA3E2C0G1H100D
12	±5%	0.8±0.1	2	CGA3E2C0G1H120J
15	±5%	0.8±0.1	2	CGA3E2C0G1H150J
18	±5%	0.8±0.1	2	CGA3E2C0G1H180J
22	±5%	0.8±0.1	2	CGA3E2C0G1H220J
27	±5%	0.8±0.1	2	CGA3E2C0G1H270J
33	±5%	0.8±0.1	2	CGA3E2C0G1H330J
39	±5%	0.8±0.1	2	CGA3E2C0G1H390J
47	±5%	0.8±0.1	2	CGA3E2C0G1H470J
56	±5%	0.8±0.1	2	CGA3E2C0G1H560J
68	±5%	0.8±0.1	2	CGA3E2C0G1H680J
82	±5%	0.8±0.1	2	CGA3E2C0G1H820J
100	±5%	0.8±0.1	2	CGA3E2C0G1H101J
120	±5%	0.8±0.1	2	CGA3E2C0G1H121J
150	±5%	0.8±0.1	2	CGA3E2C0G1H151J
180	±5%	0.8±0.1	2	CGA3E2C0G1H181J
220	±5%	0.8±0.1	2	CGA3E2C0G1H221J
270	±5%	0.8±0.1	2	CGA3E2C0G1H271J
330	±5%	0.8±0.1	2	CGA3E2C0G1H331J
390	±5%	0.8±0.1	2	CGA3E2C0G1H391J
470	±5%	0.8±0.1	2	CGA3E2C0G1H471J
560	±5%	0.8±0.1	2	CGA3E2C0G1H561J
680	±5%	0.8±0.1	2	CGA3E2C0G1H681J
820	±5%	0.8±0.1	2	CGA3E2C0G1H821J
1,000	±5%	0.8±0.1	2	CGA3E2C0G1H102J
1,200	±5%	0.8±0.1	2	CGA3E2C0G1H122J
1,500	±5%	0.8±0.1	2	CGA3E2C0G1H152J
1,800	±5%	0.8±0.1	2	CGA3E2C0G1H182J
2,200	±5%	0.8±0.1	2	CGA3E2C0G1H222J
2,700	±5%	0.8±0.1	2	CGA3E2C0G1H272J
3,300	±5%	0.8±0.1	2	CGA3E2C0G1H332J

**CAPACITANCE RANGES: CLASS 2****TEMPERATURE CHARACTERISTICS: X7R(±15%)**RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
1,000	±10%	0.8±0.1	2	CGA3E2X7R1H102K
2,200	±10%	0.8±0.1	2	CGA3E2X7R1H222K
4,700	±10%	0.8±0.1	2	CGA3E2X7R1H472K
10,000	±10%	0.8±0.1	2	CGA3E2X7R1H103K
22,000	±10%	0.8±0.1	2	CGA3E2X7R1H223K
47,000	±10%	0.8±0.1	2	CGA3E2X7R1H473K
68,000	±10%	0.8±0.1	2	CGA3E2X7R1H683K
100,000 [0.1μF]	±10%	0.8±0.1	2	CGA3E2X7R1H104K

RATED VOLTAGE E<sub>dc</sub>: 25V

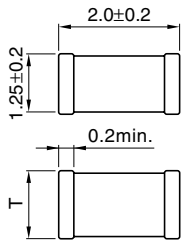
Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
100,000 [0.1μF]	±10%	0.8±0.1	2	CGA3E2X7R1E104K
150,000	±10%	0.8±0.1	2	CGA3E2X7R1E154K
220,000	±10%	0.8±0.1	1	CGA3E1X7R1E224K

RATED VOLTAGE E<sub>dc</sub>: 16V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
220,000	±10%	0.8±0.1	2	CGA3E2X7R1C224K
330,000	±10%	0.8±0.1	1	CGA3E1X7R1C334K
470,000	±10%	0.8±0.1	1	CGA3E1X7R1C474K
680,000	±10%	0.8±0.1	1	CGA3E1X7R1C684K

## CGA4(C2012[EIA: CC0805]) Type

### SHAPES AND DIMENSIONS



Dimensions in mm



### CAPACITANCE RANGES: CLASS 1 (TEMPERATURE COMPENSATION)

#### TEMPERATURE CHARACTERISTICS: C0G(0±30ppm/°C)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
2,700	±5%	0.6±0.15	2	CGA4C2C0G1H272J
3,300	±5%	0.6±0.15	2	CGA4C2C0G1H332J
3,900	±5%	0.85±0.15	2	CGA4F2C0G1H392J
4,700	±5%	0.85±0.15	2	CGA4F2C0G1H472J
5,600	±5%	0.85±0.15	2	CGA4F2C0G1H562J
6,800	±5%	1.25±0.20	2	CGA4J2C0G1H682J
8,200	±5%	1.25±0.20	2	CGA4J2C0G1H822J
10,000	±5%	1.25±0.20	2	CGA4J2C0G1H103J

### CAPACITANCE RANGES: CLASS 2

#### TEMPERATURE CHARACTERISTICS: X7R(±15%)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
150,000 [0.15μF]	±10%	1.25±0.20	2	CGA4J2X7R1H154K
220,000	±10%	1.25±0.20	2	CGA4J2X7R1H224K
330,000	±10%	1.25±0.20	2	CGA4J2X7R1H334K

RATED VOLTAGE E<sub>dc</sub>: 25V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
470,000	±10%	1.25±0.20	2	CGA4J2X7R1E474K
680,000	±10%	1.25±0.20	3	CGA4J3X7R1E684K
1,000,000 [1μF]	±10%	1.25±0.20	3	CGA4J3X7R1E105K

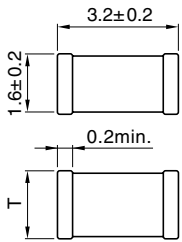
RATED VOLTAGE E<sub>dc</sub>: 16V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
680,000	±10%	1.25±0.20	2	CGA4J2X7R1C684K
1,000,000 [1μF]	±10%	1.25±0.20	2	CGA4J2X7R1C105K
1,500,000	±10%	1.25±0.20	3	CGA4J3X7R1C155K
2,200,000	±10%	1.25±0.20	3	CGA4J3X7R1C225K



## CGA5(C3216[EIA: CC1206]) Type

### SHAPES AND DIMENSIONS



Dimensions in mm



### CAPACITANCE RANGES: CLASS 1 (TEMPERATURE COMPENSATION)

#### TEMPERATURE CHARACTERISTICS: C0G(0±30ppm/°C)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
4,700	±5%	0.6±0.15	2	CGA5C2C0G1H472J
5,600	±5%	0.6±0.15	2	CGA5C2C0G1H562J
6,800	±5%	0.6±0.15	2	CGA5C2C0G1H682J
8,200	±5%	0.85±0.15	2	CGA5F2C0G1H822J
10,000	±5%	0.85±0.15	2	CGA5F2C0G1H103J
15,000	±5%	1.15±0.15	2	CGA5H2C0G1H153J
22,000	±5%	1.15±0.15	2	CGA5H2C0G1H223J
33,000	±5%	1.60±0.20	2	CGA5L2C0G1H333J

### CAPACITANCE RANGES: CLASS 2

#### TEMPERATURE CHARACTERISTICS: X7R(±15%)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
470,000	±10%	1.60±0.20	2	CGA5L2X7R1H474K
680,000	±10%	1.60±0.20	2	CGA5L2X7R1H684K
1,000,000 [1μF]	±10%	1.60±0.20	3	CGA5L3X7R1H105K

RATED VOLTAGE E<sub>dc</sub>: 25V

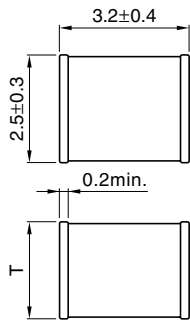
Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
1,500,000 [1.5μF]	±10%	1.60±0.20	2	CGA5L2X7R1E155K
2,200,000	±10%	1.60±0.20	2	CGA5L2X7R1E225K
3,300,000	±10%	1.60±0.20	1	CGA5L1X7R1E335K
4,700,000	±10%	1.60±0.20	1	CGA5L1X7R1E475K

RATED VOLTAGE E<sub>dc</sub>: 16V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
6,800,000	±10%	1.60±0.20	1	CGA5L1X7R1C685K

## CGA6(C3225[EIA: CC1210]) Type

### SHAPES AND DIMENSIONS



Dimensions in mm

### CAPACITANCE RANGES: CLASS 1 (TEMPERATURE COMPENSATION)

#### TEMPERATURE CHARACTERISTICS: C0G(0±30ppm/°C)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
22,000	±5%	1.25±0.20	2	CGA6J2C0G1H223J
33,000	±5%	1.60±0.20	2	CGA6L2C0G1H333J
47,000	±5%	2.00±0.20	2	CGA6M2C0G1H473J
68,000	±5%	2.00±0.20	2	CGA6M2C0G1H683J
100,000	±5%	2.50±0.30	2	CGA6P2C0G1H104J

### CAPACITANCE RANGES: CLASS 2

#### TEMPERATURE CHARACTERISTICS: X7R(±15%)

RATED VOLTAGE E<sub>dc</sub>: 50V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
1,000,000 [1μF]	±10%	1.60±0.20	2	CGA6L2X7R1H105K
1,500,000	±10%	2.00±0.20	2	CGA6M2X7R1H155K
2,200,000	±10%	2.00±0.20	3	CGA6M3X7R1H225K
3,300,000	±10%	2.50±0.30	3	CGA6P3X7R1H335K

RATED VOLTAGE E<sub>dc</sub>: 25V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
3,300,000	±10%	1.60±0.20	2	CGA6L2X7R1E335K
4,700,000	±10%	2.00±0.20	2	CGA6M2X7R1E475K
6,800,000	±10%	2.50±0.30	3	CGA6P3X7R1E685K
10,000,000 [10μF]	±20%	2.50±0.30	1	CGA6P1X7R1E106M*

\* Contact us for information on K tolerance.

RATED VOLTAGE E<sub>dc</sub>: 16V

Capacitance (pF)	Tolerance	Thickness T (mm)	Voltage conditions at the time of high temperature loading	Part No.
10,000,000	±20%	2.00±0.20	3	CGA6M3X7R1C106M
15,000,000	±20%	2.50±0.30	3	CGA6P3X7R1C156M
22,000,000 [22μF]	±20%	2.50±0.30	1	CGA6P1X7R1C226M*

\* Contact us for information on K tolerance.