TDK

January 2022

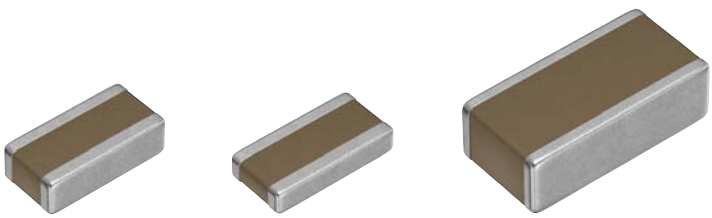
MULTILAYER CERAMIC CHIP CAPACITORS

Commercial grade, low ESL reverse geometry

C series

C0510 [EIA 0204]
CGBD [EIA 0204]
C0816 [EIA 0306]

*** Dimensions code: JIS[EIA]**



REMINDERS FOR USING THESE PRODUCTS

Before using these products, be sure to request the delivery specifications.

SAFETY REMINDERS

Please pay sufficient attention to the warnings for safe designing when using this products.

⚠ REMINDERS

1. The products listed on this catalog are intended for use in general electronic equipment (AV equipment, telecommunications equipment, home appliances, amusement equipment, computer equipment, personal equipment, office equipment, measurement equipment, industrial robots) under a normal operation and use condition.
   The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property.
   If you intend to use the products in the applications listed below or if you have special requirements exceeding the range or conditions set forth in the each catalog, please contact us.

   (1) Aerospace/aviation equipment
   (2) Transportation equipment (cars, electric trains, ships, etc.)
   (3) Medical equipment (excepting Pharmaceutical Affairs Law classification Class1,2)
   (4) Power-generation control equipment
   (5) Atomic energy-related equipment
   (6) Seabed equipment
   (7) Transportation control equipment
   (8) Public information-processing equipment
   (9) Military equipment
   (10) Electric heating apparatus, burning equipment
   (11) Disaster prevention/crime prevention equipment
   (12) Safety equipment
   (13) Other applications that are not considered general-purpose applications

   When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.
2. We may modify products or discontinue production of a product listed in this catalog without prior notification.
3. We provide “Delivery Specification” that explain precautions for the specifications and safety of each product listed in this catalog. We strongly recommend that you exchange these delivery specifications with customers that use one of these products.
4. If you plan to export a product listed in this catalog, keep in mind that it may be a restricted item according to the “Foreign Exchange and Foreign Trade Control Law”. In such cases, it is necessary to acquire export permission in harmony with this law.
5. Any reproduction or transferring of the contents of this catalog is prohibited without prior permission from our company.
6. We are not responsible for problems that occur related to the intellectual property rights or other rights of our company or a third party when you use a product listed in this catalog. We do not grant license of these rights.
7. This catalog only applies to products purchased through our company or one of our company’s official agencies. This catalog does not apply to products that are purchased through other third parties.

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(080AA)	C1608C0G1E103JT000N
January 2013 and later	C1608C0G1E103J080AA	C1608C0G1E103JT000N

C series

Low ESL reverse geometry

Type: C0510 [EIA 0204], CGBD [EIA 0204], C0816 [EIA 0306]

RoHS | REACH SVHC-Free | Halogen Free | Lead Free

SERIES OVERVIEW

Low ESL reverse geometry C series, commercial grade of TDK's multilayer ceramic chip capacitor, is a product whose electrodes rotated 90 degrees compared to general type. The structure makes the current route wider and shorter, therefore ESR/ESL and impedance are reduced.

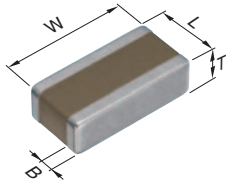
FEATURES

- Reduction in ESR/ESL and impedance due to the reverse geometry structure
- Superior attenuation characteristic in wide bandwidth
- Contributes to reduction in the number of decoupling MLCCs

APPLICATIONS

- EMC countermeasure and decoupling use in power lines for general electronic equipment

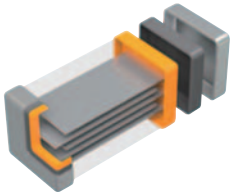
SHAPE & DIMENSIONS



L	Body length
W	Body width
T	Body height
B	Terminal width

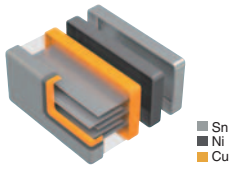
PRODUCT STRUCTURE

General type



The structure which multiple sheets of dielectric and conductive material are stacked alternately.

Reverse geometry type



The current route becomes wider and shorter due to the reverse geometry structure which the electrode direction rotated 90 degrees compared to general type.

Dimensions in mm

Type	L	W	T	B
C0510	0.52±0.05	1.00±0.05	0.30±0.05	0.10 min.
CGBD	0.52±0.05	1.00±0.05	0.22 max.	0.10 min.
C0816	0.80±0.15	1.60±0.20	0.50±0.10	0.10 min.

∗ Dimensional tolerances are typical values.

CATALOG NUMBER CONSTRUCTION

C	0510	X7S	0E	105	M	030	B	C
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

(1) Series

(2) Dimensions L x W (mm)

Dimensions code	EIA	Length	Width	Terminal width
0510	0204	0.52	1.00	0.10
CGBD	0204	0.52	1.00	0.10
0816	0306	0.80	1.60	0.10

(3) Temperature characteristics

Temperature characteristics	Capacitance change	Temperature range
X5R	±15%	–55 to +85°C
X6S	±22%	–55 to +105°C
X7R	±15%	–55 to +125°C
X7S	±22%	–55 to +125°C
X7T	+22,–33%	–55 to +125°C

(4) Rated voltage (DC)

Code	Voltage (DC)
0E	2.5V
0G	4V
0J	6.3V
1A	10V
1C	16V
1E	25V
1H	50V

(5) 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.

(Example)0R5 = 0.5pF
101 = 100pF
225 = 2,200,000pF = 2.2µF

(6) Capacitance tolerance

Code	Tolerance
M	±20%

(7) Thickness

Code	Thickness
022	0.22mm
030	0.30mm
050	0.50mm

(8) Packaging style

Code	Style
A	178mm reel, 4mm pitch
B	178mm reel, 2mm pitch

(9) Special reserved code

Code	Description
A, C	TDK internal code

Capacitance range chart — C0510 [EIA 0204]

Capacitance		X5R			X6S		X7R		X7S	
(pF)	Code	1C (16V)	1A (10V)	0J (6.3V)	0J (6.3V)	0G (4V)	1H (50V)	1E (25V)	0G (4V)	0E (2.5V)
47,000	**473**									
100,000	**104**									
220,000	**224**									
470,000	**474**									
1,000,000	**105**									

Standard thickness 0.30 mm

■ For details such as the catalog numbers, please refer to the capacitance range table on page 6.

Capacitance range chart — CGBD/0510 [EIA 0204]

Capacitance		X5R	X6S	X7T
(pF)	Code	0G (4V)	0G (4V)	0E (2.5V)
1,000,000	**105**			

Standard thickness 0.22 mm max.

■ For details such as the catalog numbers, please refer to the capacitance range table on page 6.

Capacitance range chart — C0816 [EIA 0306]

Capacitance		X5R		X6S	X7S
(pF)	Code	1C (16V)	0J (6.3V)	0G (4V)	0G (4V)
1,000,000	**105**				
2,200,000	**225**				
4,700,000	**475**				

Standard thickness 0.50 mm

Background gray: These products are not recommended for new designs.

■ For details such as the catalog numbers, please refer to the capacitance range table on page 6.

Capacitance range table — Temperature characteristic: X5R (–55 to +85°C, ±15%)

Capacitance	Dimensions	Thickness (mm)	Capacitance tolerance	Catalog number			
				Rated voltage Edc: 16V	Rated voltage Edc: 10V	Rated voltage Edc: 6.3V	Rated voltage Edc: 4V
100nF	0510	0.30±0.05	±20%	C0510X5R1C104M030BC			
470nF	0510	0.30±0.05	±20%	C0510X5R1C474M030BC	C0510X5R1A474M030BC		
1μF	0510	0.30±0.05	±20%			C0510X5R0J105M030BC	
		0.22max.	±20%				CGBDT1X5R0G105M022BC
	0816	0.50±0.10	±20%	C0816X5R1C105M050AC		C0816X5R0J105M050AC	
2.2μF	0816	0.50±0.10	±20%			C0816X5R0J225M050AC	
4.7μF	0816	0.50±0.10	±20%			C0816X5R0J475M050AC	

■ Gray items: These products are not recommended for new designs.
Click the part numbers for details.

Capacitance range table — Temperature characteristic: X6S (–55 to +105°C, ±22%)

Capacitance	Dimensions	Thickness (mm)	Capacitance tolerance	Catalog number	
				Rated voltage Edc: 6.3V	Rated voltage Edc: 4V
100 nF	0510	0.30±0.05	±20%		C0510X6S0G104M030BC
220 nF	0510	0.30±0.05	±20%		C0510X6S0G224M030BC
470 nF	0510	0.30±0.05	±20%	C0510X6S0J474M030BC	C0510X6S0G474M030BC
1 μF	0510	0.30±0.05	±20%		C0510X6S0G105M030BC
		0.22max.	±20%		CGBDT1X6S0G105M022BC
4.7 μF	0816	0.50±0.10	±20%		C0816X6S0G475M050AC

■ Gray item: The product is not recommended for new designs.
Click the part numbers for details.

Capacitance range table — Temperature characteristic: X7R (–55 to +125°C, ±15%)

Capacitance	Dimensions	Thickness (mm)	Capacitance tolerance	Catalog number	
				Rated voltage Edc: 50V	Rated voltage Edc: 25V
47nF	0510	0.30±0.05	±20%	C0510X7R1H473M030BC	C0510X7R1E473M030BA

Click the part numbers for details.

Capacitance range table — Temperature characteristic: X7S (–55 to +125°C, ±22%)

Capacitance	Dimensions	Thickness (mm)	Capacitance tolerance	Catalog number	
				Rated voltage Edc: 4V	Rated voltage Edc: 2.5V
470nF	0510	0.30±0.05	±20%	C0510X7S0G474M030BC	
1μF	0510	0.30±0.05	±20%		C0510X7S0E105M030BC
	0816	0.50±0.10	±20%	C0816X7S0G105M050AC	
2.2μF	0816	0.50±0.10	±20%	C0816X7S0G225M050AC	

■ Gray items: These products are not recommended for new designs.
Click the part numbers for details.

Capacitance range table — Temperature characteristic: X7T (–55 to +125°C, +22,-33%)

Capacitance	Dimensions	Thickness (mm)	Capacitance tolerance	Catalog number
				Rated voltage Edc: 2.5V
1μF	0510	0.22 max.	±20%	CGBDT1X7T0E105M022BC

Click the part numbers for details.