

# MULTILAYER CERAMIC CHIP CAPACITORS

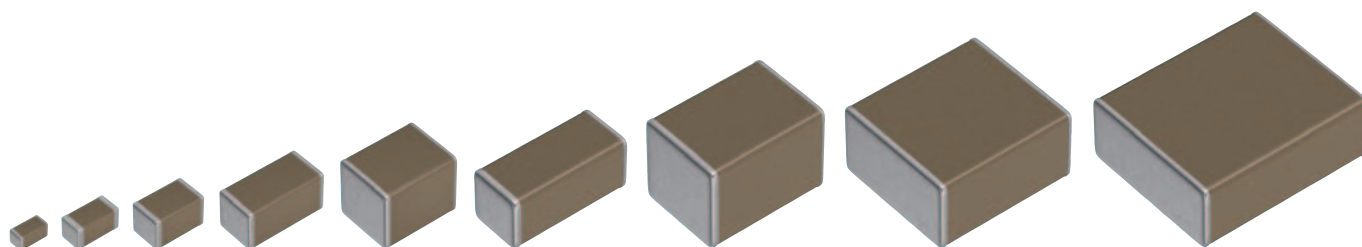
Commercial grade, soft termination

## C series

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|       |             |
|-------|-------------|
| C1005 | [0402 inch] |
| C1608 | [0603 inch] |
| C2012 | [0805 inch] |
| C3216 | [1206 inch] |
| C3225 | [1210 inch] |
| C4520 | [1808 inch] |
| C4532 | [1812 inch] |
| C5750 | [2220 inch] |
| C7563 | [3025 inch] |

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

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

## Soft termination



Type: C1005 [0402 inch], C1608 [0603 inch], C2012 [0805 inch],  
C3216 [1206 inch], C3225 [1210 inch], C4520 [1808 inch],  
C4532 [1812 inch], C5750 [2220 inch], C7563 [3025 inch]

### SERIES OVERVIEW

TDK multilayer ceramic chip capacitor\_Soft termination\_General grade\_C series is a product which conductive resin layers are included in terminations. Soft termination series has higher mechanical endurance by the flexible resin layers which absorbs thermal and mechanical stress.

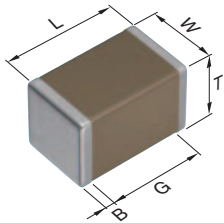
### FEATURES

- Higher mechanical endurance is realized by flexible resin layers.
- X8R type which maximum temperature is up to 150° C is applicable.
- C0G temperature characteristic which has excellent stable temperature and DC-bias characteristics is applicable.

### APPLICATIONS

- Fail-safe design in battery line.
- Prevention of ceramic body cracks by board bending.
- Prevention of solder cracks by thermal shock.
- The set having a high probability of fall.

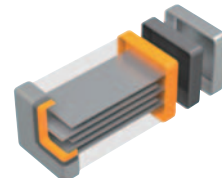
### SHAPE & DIMENSIONS



|   |                  |
|---|------------------|
| L | Body length      |
| W | Body width       |
| T | Body height      |
| B | Terminal width   |
| G | Terminal spacing |

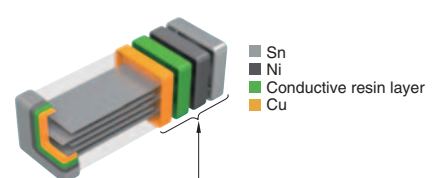
### ELECTRODE STRUCTURE DRAWING

Standard termination



Termination consists of 3 layers by Cu, Ni and Sn.

Soft termination



Termination consists of 4 layers including conductive resin layer.

Dimensions in mm

| Type  | L               | W               | T               | B         | G         |
|-------|-----------------|-----------------|-----------------|-----------|-----------|
| C1005 | 1.00+0.15,-0.05 | 0.50+0.10,-0.05 | 0.50+0.10,-0.05 | 0.10 min. | 0.30 min. |
| C1608 | 1.60+0.20,-0.10 | 0.80+0.15,-0.10 | 0.80+0.15,-0.10 | 0.20 min. | 0.30 min. |
| C2012 | 2.00+0.45,-0.20 | 1.25+0.25,-0.20 | 1.25+0.25,-0.20 | 0.20 min. | 0.50 min. |
| C3216 | 3.20+0.40,-0.20 | 1.60+0.30,-0.20 | 1.60+0.30,-0.20 | 0.20 min. | 1.00 min. |
| C3225 | 3.20+0.50,-0.40 | 2.50±0.30       | 2.50±0.30       | 0.20 min. | —         |
| C4520 | 4.50+0.50,-0.40 | 2.00+0.30,-0.20 | 1.30±0.20       | 0.20 min. | —         |
| C4532 | 4.50+0.50,-0.40 | 3.20±0.40       | 2.50±0.30       | 0.20 min. | —         |
| C5750 | 5.70+0.50,-0.40 | 5.00±0.40       | 2.50±0.30       | 0.20 min. | —         |
| C7563 | 7.50±0.50       | 6.30±0.50       | 3.00 max.       | 0.30 min. | —         |

\*Dimensional tolerances are typical values.

# MULTILAYER CERAMIC CHIP CAPACITORS



## CATALOG NUMBER CONSTRUCTION

|          |             |            |           |            |          |            |          |          |
|----------|-------------|------------|-----------|------------|----------|------------|----------|----------|
| <b>C</b> | <b>7563</b> | <b>X7S</b> | <b>1C</b> | <b>107</b> | <b>M</b> | <b>280</b> | <b>L</b> | <b>E</b> |
| (1)      | (2)         | (3)        | (4)       | (5)        | (6)      | (7)        | (8)      | (9)      |

### (1) Series

### (2) Dimensions L x W (mm)

| Code | EIA    | Length | Width | Terminal width |
|------|--------|--------|-------|----------------|
| 1005 | CC0402 | 1.00   | 0.50  | 0.10           |
| 1608 | CC0603 | 1.60   | 0.80  | 0.20           |
| 2012 | CC0805 | 2.00   | 1.25  | 0.20           |
| 3216 | CC1206 | 3.20   | 1.60  | 0.20           |
| 3225 | CC1210 | 3.20   | 2.50  | 0.20           |
| 4520 | CC1808 | 4.50   | 2.00  | 0.20           |
| 4532 | CC1812 | 4.50   | 3.20  | 0.20           |
| 5750 | CC2220 | 5.70   | 5.00  | 0.20           |
| 7563 | CC3025 | 7.50   | 6.30  | 0.30           |

### (3) Temperature characteristics

| Temperature characteristics | Temperature coefficient or capacitance change | Temperature range |
|-----------------------------|-----------------------------------------------|-------------------|
| C0G                         | 0±30 ppm/°C                                   | -55 to +125°C     |
| X5R                         | ±15%                                          | -55 to +85°C      |
| X7R                         | ±15%                                          | -55 to +125°C     |
| X7S                         | ±22%                                          | -55 to +125°C     |
| X7T                         | +22,-33%                                      | -55 to +125°C     |
| X8R                         | ±15%                                          | -55 to +150°C     |

### (4) Rated voltage (DC)

| Code | Voltage (DC) |
|------|--------------|
| 0J   | 6.3V         |
| 1A   | 10V          |
| 1C   | 16V          |
| 1E   | 25V          |
| 1V   | 35V          |
| 1H   | 50V          |
| 2A   | 100V         |
| 2E   | 250V         |
| 2W   | 450V         |
| 2J   | 630V         |
| 3A   | 1000V        |
| 3D   | 2000V        |
| 3F   | 3000V        |

### (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 |
|------|-----------|
| J    | ±5%       |
| K    | ±10%      |
| M    | ±20%      |

### (7) Thickness

| Code | Thickness |
|------|-----------|
| 050  | 0.50 mm   |
| 060  | 0.60 mm   |
| 080  | 0.80 mm   |
| 085  | 0.85 mm   |
| 115  | 1.15 mm   |
| 125  | 1.25 mm   |
| 130  | 1.30 mm   |
| 160  | 1.60 mm   |
| 200  | 2.00 mm   |
| 230  | 2.30 mm   |
| 250  | 2.50 mm   |
| 280  | 2.80 mm   |

### (8) Packaging style

| Code | Style                  |
|------|------------------------|
| A    | 178mm reel, 4mm pitch  |
| B    | 178mm reel, 2mm pitch  |
| K    | 178mm reel, 8mm pitch  |
| L    | 330mm reel, 12mm pitch |

### (9) Special reserved code

| Code | Description      |
|------|------------------|
| E    | Soft termination |

## Capacitance range chart

C1005 [0402 inch]

| Capacitance |      | C0G          |             | X5R         |             |             |              | X7R         |             |             |             |
|-------------|------|--------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|
| (pF)        | Code | 2A<br>(100V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1A<br>(10V) | 0J<br>(6.3V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1C<br>(16V) |
| 100         | 101  |              |             |             |             |             |              |             |             |             |             |
| 150         | 151  |              |             |             |             |             |              |             |             |             |             |
| 220         | 221  |              |             |             |             |             |              |             |             |             |             |
| 330         | 331  |              |             |             |             |             |              |             |             |             |             |
| 470         | 471  |              |             |             |             |             |              |             |             |             |             |
| 680         | 681  |              |             |             |             |             |              |             |             |             |             |
| 1,000       | 102  |              |             |             |             |             |              |             |             |             |             |
| 2,200       | 222  |              |             |             |             |             |              |             |             |             |             |
| 4,700       | 472  |              |             |             |             |             |              |             |             |             |             |
| 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  |              |             |             |             |             |              |             |             |             |             |

| Capacitance |      | X8R          |             |             |             |
|-------------|------|--------------|-------------|-------------|-------------|
| (pF)        | Code | 2A<br>(100V) | 1H<br>(50V) | 1E<br>(25V) | 1C<br>(16V) |
| 150         | 151  |              |             |             |             |
| 220         | 221  |              |             |             |             |
| 330         | 331  |              |             |             |             |
| 470         | 471  |              |             |             |             |
| 680         | 681  |              |             |             |             |
| 1,000       | 102  |              |             |             |             |
| 1,500       | 152  |              |             |             |             |
| 2,200       | 222  |              |             |             |             |
| 3,300       | 332  |              |             |             |             |
| 4,700       | 472  |              |             |             |             |
| 6,800       | 682  |              |             |             |             |
| 10,000      | 103  |              |             |             |             |
| 15,000      | 153  |              |             |             |             |
| 22,000      | 223  |              |             |             |             |
| 33,000      | 333  |              |             |             |             |
| 47,000      | 473  |              |             |             |             |

Standard thickness  0.50 mm Background gray: The product which is not recommended to a new design. Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

## C1608 [0603 inch]

| Capacitance |      | C0G          |              |             | X5R         |             |             |             |              | X7R          |             |             |             |             |
|-------------|------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|-------------|
| (pF)        | Code | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1C<br>(16V) | 1A<br>(10V) | 0J<br>(6.3V) | 2A<br>(100V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1A<br>(10V) |
| 100         | 101  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 330         | 331  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 470         | 471  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 680         | 681  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 1,000       | 102  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 1,200       | 122  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 1,500       | 152  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 1,800       | 182  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 2,200       | 222  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 2,700       | 272  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 3,300       | 332  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 3,900       | 392  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 4,700       | 472  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 5,600       | 562  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 6,800       | 682  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 8,200       | 822  |              |              |             |             |             |             |             |              |              |             |             |             |             |
| 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  |              |              |             |             |             |             |             |              |              |             |             |             |             |

| Capacitance |      | X7S          | X8R          |             |             |             |
|-------------|------|--------------|--------------|-------------|-------------|-------------|
| (pF)        | Code | 2A<br>(100V) | 2A<br>(100V) | 1H<br>(50V) | 1E<br>(25V) | 1C<br>(16V) |
| 1,000       | 102  |              |              |             |             |             |
| 1,500       | 152  |              |              |             |             |             |
| 2,200       | 222  |              |              |             |             |             |
| 3,300       | 332  |              |              |             |             |             |
| 4,700       | 472  |              |              |             |             |             |
| 6,800       | 682  |              |              |             |             |             |
| 10,000      | 103  |              |              |             |             |             |
| 15,000      | 153  |              |              |             |             |             |
| 22,000      | 223  |              |              |             |             |             |
| 33,000      | 333  |              |              |             |             |             |
| 47,000      | 473  |              |              |             |             |             |
| 68,000      | 683  |              |              |             |             |             |
| 100,000     | 104  |              |              |             |             |             |
| 150,000     | 154  |              |              |             |             |             |
| 220,000     | 224  |              |              |             |             |             |
| 330,000     | 334  |              |              |             |             |             |
| 470,000     | 474  |              |              |             |             |             |

Standard thickness 0.8 mm

Background gray: The product which is not recommended to a new design.

Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

## C2012 [0805 inch]

| Capacitance |      | C0G          |              |              |             | X7R          |              |             |             |             |             |             | X7S          |
|-------------|------|--------------|--------------|--------------|-------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|--------------|
| (pF)        | Code | 2W<br>(450V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1C<br>(16V) | 1A<br>(10V) | 2A<br>(100V) |
| 100         | 101  |              |              |              |             |              |              |             |             |             |             |             |              |
| 150         | 151  |              |              |              |             |              |              |             |             |             |             |             |              |
| 220         | 221  |              |              |              |             |              |              |             |             |             |             |             |              |
| 330         | 331  |              |              |              |             |              |              |             |             |             |             |             |              |
| 470         | 471  |              |              |              |             |              |              |             |             |             |             |             |              |
| 680         | 681  |              |              |              |             |              |              |             |             |             |             |             |              |
| 1,000       | 102  |              |              |              |             |              |              |             |             |             |             |             |              |
| 1,200       | 122  |              |              |              |             |              |              |             |             |             |             |             |              |
| 1,500       | 152  |              |              |              |             |              |              |             |             |             |             |             |              |
| 1,800       | 182  |              |              |              |             |              |              |             |             |             |             |             |              |
| 2,200       | 222  |              |              |              |             |              |              |             |             |             |             |             |              |
| 2,700       | 272  |              |              |              |             |              |              |             |             |             |             |             |              |
| 3,300       | 332  |              |              |              |             |              |              |             |             |             |             |             |              |
| 3,900       | 392  |              |              |              |             |              |              |             |             |             |             |             |              |
| 4,700       | 472  |              |              |              |             |              |              |             |             |             |             |             |              |
| 5,600       | 562  |              |              |              |             |              |              |             |             |             |             |             |              |
| 6,800       | 682  |              |              |              |             |              |              |             |             |             |             |             |              |
| 10,000      | 103  |              |              |              |             |              |              |             |             |             |             |             |              |
| 15,000      | 153  |              |              |              |             |              |              |             |             |             |             |             |              |
| 22,000      | 223  |              |              |              |             |              |              |             |             |             |             |             |              |
| 33,000      | 333  |              |              |              |             |              |              |             |             |             |             |             |              |
| 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  |              |              |              |             |              |              |             |             |             |             |             |              |

| Capacitance |      | X7T          |              | X8R          |             |             |             |
|-------------|------|--------------|--------------|--------------|-------------|-------------|-------------|
| (pF)        | Code | 2W<br>(450V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 1E<br>(25V) | 1C<br>(16V) |
| 10,000      | 103  |              |              |              |             |             |             |
| 22,000      | 223  |              |              |              |             |             |             |
| 33,000      | 333  |              |              |              |             |             |             |
| 47,000      | 473  |              |              |              |             |             |             |
| 68,000      | 683  |              |              |              |             |             |             |
| 100,000     | 104  |              |              |              |             |             |             |
| 150,000     | 154  |              |              |              |             |             |             |
| 220,000     | 224  |              |              |              |             |             |             |
| 330,000     | 334  |              |              |              |             |             |             |
| 470,000     | 474  |              |              |              |             |             |             |
| 680,000     | 684  |              |              |              |             |             |             |
| 1,000,000   | 105  |              |              |              |             |             |             |

Standard thickness    0.60 mm    0.85 mm    1.25 mm

Background gray: The product which is not recommended to a new design.

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

## C3216 [1206 inch]

| Capacitance |      | C0G          |              |              |              |             | X7R          |              |              |             |             |             |             | X7S          |
|-------------|------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|--------------|
| (pF)        | Code | 2J<br>(630V) | 2W<br>(450V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 2J<br>(630V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1C<br>(16V) | 2A<br>(100V) |
| 1,000       | 102  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 2,200       | 222  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 3,300       | 332  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 3,900       | 392  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 4,700       | 472  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 5,600       | 562  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 6,800       | 682  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 8,200       | 822  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 10,000      | 103  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 15,000      | 153  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 22,000      | 223  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 33,000      | 333  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 47,000      | 473  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 68,000      | 683  |              |              |              |              |             |              |              |              |             |             |             |             |              |
| 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  |              |              |              |              |             |              |              |              |             |             |             |             |              |

| Capacitance |      | X7T          |              |              | X8R          |             |             |             |
|-------------|------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|
| (pF)        | Code | 2J<br>(630V) | 2W<br>(450V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 1E<br>(25V) | 1C<br>(16V) |
| 47,000      | 473  |              |              |              |              |             |             |             |
| 100,000     | 104  |              |              |              |              |             |             |             |
| 150,000     | 154  |              |              |              |              |             |             |             |
| 220,000     | 224  |              |              |              |              |             |             |             |
| 330,000     | 334  |              |              |              |              |             |             |             |
| 470,000     | 474  |              |              |              |              |             |             |             |
| 680,000     | 684  |              |              |              |              |             |             |             |
| 1,000,000   | 105  |              |              |              |              |             |             |             |
| 1,500,000   | 155  |              |              |              |              |             |             |             |
| 2,200,000   | 225  |              |              |              |              |             |             |             |
| 3,300,000   | 335  |              |              |              |              |             |             |             |
| 4,700,000   | 475  |              |              |              |              |             |             |             |

Standard thickness    0.85 mm    1.15 mm    1.30 mm    1.60 mm

Background gray: The product which is not recommended to a new design.

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.



## Capacitance range chart

C3225 [1210 inch]

| Capacitance |      | C0G         |              |              |              |              | X7R          |              |              |             | X7S          |             |
|-------------|------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|-------------|
| (pF)        | Code | 3A<br>(1kV) | 2J<br>(630V) | 2W<br>(450V) | 2E<br>(250V) | 2A<br>(100V) | 2J<br>(630V) | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 2A<br>(100V) | 1H<br>(50V) |
| 1,000       | 102  |             |              |              |              |              |              |              |              |             |              |             |
| 1,200       | 122  |             |              |              |              |              |              |              |              |             |              |             |
| 1,500       | 152  |             |              |              |              |              |              |              |              |             |              |             |
| 1,800       | 182  |             |              |              |              |              |              |              |              |             |              |             |
| 2,200       | 222  |             |              |              |              |              |              |              |              |             |              |             |
| 2,700       | 272  |             |              |              |              |              |              |              |              |             |              |             |
| 3,300       | 332  |             |              |              |              |              |              |              |              |             |              |             |
| 3,900       | 392  |             |              |              |              |              |              |              |              |             |              |             |
| 4,700       | 472  |             |              |              |              |              |              |              |              |             |              |             |
| 5,600       | 562  |             |              |              |              |              |              |              |              |             |              |             |
| 6,800       | 682  |             |              |              |              |              |              |              |              |             |              |             |
| 8,200       | 822  |             |              |              |              |              |              |              |              |             |              |             |
| 15,000      | 153  |             |              |              |              |              |              |              |              |             |              |             |
| 22,000      | 223  |             |              |              |              |              |              |              |              |             |              |             |
| 33,000      | 333  |             |              |              |              |              |              |              |              |             |              |             |
| 47,000      | 473  |             |              |              |              |              |              |              |              |             |              |             |
| 68,000      | 683  |             |              |              |              |              |              |              |              |             |              |             |
| 100,000     | 104  |             |              |              |              |              |              |              |              |             |              |             |
| 220,000     | 224  |             |              |              |              |              |              |              |              |             |              |             |
| 470,000     | 474  |             |              |              |              |              |              |              |              |             |              |             |
| 1,000,000   | 105  |             |              |              |              |              |              |              |              |             |              |             |
| 2,200,000   | 225  |             |              |              |              |              |              |              |              |             |              |             |
| 3,300,000   | 335  |             |              |              |              |              |              |              |              |             |              |             |
| 4,700,000   | 475  |             |              |              |              |              |              |              |              |             |              |             |
| 10,000,000  | 106  |             |              |              |              |              |              |              |              |             |              |             |

| Capacitance |      | X7T          |              |              |              | X8R         |             |
|-------------|------|--------------|--------------|--------------|--------------|-------------|-------------|
| (pF)        | Code | 2J<br>(630V) | 2W<br>(450V) | 2E<br>(250V) | 2A<br>(100V) | 1E<br>(25V) | 1C<br>(16V) |
| 100,000     | 104  |              |              |              |              |             |             |
| 150,000     | 154  |              |              |              |              |             |             |
| 220,000     | 224  |              |              |              |              |             |             |
| 330,000     | 334  |              |              |              |              |             |             |
| 470,000     | 474  |              |              |              |              |             |             |
| 680,000     | 684  |              |              |              |              |             |             |
| 3,300,000   | 335  |              |              |              |              |             |             |
| 4,700,000   | 475  |              |              |              |              |             |             |
| 10,000,000  | 106  |              |              |              |              |             |             |

Standard thickness  1.60 mm  2.00 mm  2.30 mm  2.50 mm

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

C4520 [1808 inch]

| Capacitance |      | X7R         |
|-------------|------|-------------|
| (pF)        | Code | 3D<br>(2kV) |
| 1,000       | 102  |             |

Standard thickness  1.30 mm

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

C4532 [1812 inch]

| Capacitance |      | C0G                                                                               |                                                                                   | X7R                                                                               |                                                                                   |                                                                                   | X7T                                                                               |              |                                                                                    |
|-------------|------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------|
| (pF)        | Code | 3F<br>(3kV)                                                                       | 2J<br>(630V)                                                                      | 3D<br>(2kV)                                                                       | 2J<br>(630V)                                                                      | 2E<br>(250V)                                                                      | 2J<br>(630V)                                                                      | 2W<br>(450V) | 2E<br>(250V)                                                                       |
| 330         | 331  |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |              |                                                                                    |
| 2,200       | 222  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |                                                                                   |              |                                                                                    |
| 33,000      | 333  |                                                                                   |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |              |                                                                                    |
| 100,000     | 104  |                                                                                   |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |              |                                                                                    |
| 220,000     | 224  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |              |                                                                                    |
| 470,000     | 474  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |              |                                                                                    |
| 1,000,000   | 105  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |              |  |

Standard thickness  1.30 mm  2.00 mm  2.30 mm  2.50 mm

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

C5750 [2220 inch]

| Capacitance |      | C0G                                                                               |                                                                                    |                                                                                    | X7R                                                                                 |                                                                                     | X7S                                                                                 | X7T                                                                                 |                                                                                      |                                                                                       |
|-------------|------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| (pF)        | Code | 2J<br>(630V)                                                                      | 2E<br>(250V)                                                                       | 2A<br>(100V)                                                                       | 2J<br>(630V)                                                                        | 2E<br>(250V)                                                                        | 2A<br>(100V)                                                                        | 2J<br>(630V)                                                                        | 2W<br>(450V)                                                                         | 2E<br>(250V)                                                                          |
| 68,000      | 683  |  |                                                                                    |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |
| 150,000     | 154  |                                                                                   |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |
| 220,000     | 224  |                                                                                   |                                                                                    |                                                                                    |  |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |
| 470,000     | 474  |                                                                                   |                                                                                    |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |                                                                                      |                                                                                       |
| 1,000,000   | 105  |                                                                                   |                                                                                    |                                                                                    |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                       |
| 2,200,000   | 225  |                                                                                   |                                                                                    |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                      |  |
| 10,000,000  | 106  |                                                                                   |                                                                                    |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                      |                                                                                       |

Standard thickness  2.30 mm  2.50 mm

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

## Capacitance range chart

C7563 [3025 inch]

| Capacitance |      | X7R                                                                                 | X7S                                                                                 |                                                                                     |  |
|-------------|------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
| (pF)        | Code | 1E<br>(25V)                                                                         | 1H<br>(50V)                                                                         | 1C<br>(16V)                                                                         |  |
| 22,000,000  | 226  |                                                                                     |  |                                                                                     |  |
| 47,000,000  | 476  |  |                                                                                     |                                                                                     |  |
| 100,000,000 | 107  |                                                                                     |                                                                                     |  |  |

Standard thickness  2.30 mm  2.80 mm

■ Please refer to the capacitance range table at P-11 and after for the details such as product thickness and capacitance tolerance.

# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

Temperature characteristics: C0G (–55 to +125°C, 0±30ppm/°C)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number         |                        |                         |                         |
|-------------|------------|-----------------|-----------------------|------------------------|------------------------|-------------------------|-------------------------|
|             |            |                 |                       | Rated voltage Edc: 3kV | Rated voltage Edc: 1kV | Rated voltage Edc: 630V | Rated voltage Edc: 450V |
| 100pF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W101J060AE     |
| 150pF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W151J060AE     |
| 220pF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W221J060AE     |
| 330pF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W331J060AE     |
|             | 4532       | 2.50±0.30       | ±10%                  | C4532C0G3F331K250KE    |                        |                         |                         |
| 470pF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W471J060AE     |
| 680pF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W681J060AE     |
| 1nF         | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W102J060AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A102J200AE    |                         |                         |
| 1.2nF       | 2012       | 0.60±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W122J060AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A122J200AE    |                         |                         |
| 1.5nF       | 2012       | 0.85±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W152J085AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A152J200AE    |                         |                         |
| 1.8nF       | 2012       | 0.85±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W182J085AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A182J200AE    |                         |                         |
| 2.2nF       | 2012       | 0.85±0.15       | ±5%                   |                        |                        |                         | C2012C0G2W222J085AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A222J200AE    |                         |                         |
| 2.7nF       | 2012       | 1.25±0.25,-0.20 | ±5%                   |                        |                        |                         | C2012C0G2W272J125AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A272J200AE    |                         |                         |
| 3.3nF       | 2012       | 1.25±0.25,-0.20 | ±5%                   |                        |                        |                         | C2012C0G2W332J125AE     |
|             | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A332J200AE    |                         |                         |
| 3.9nF       | 2012       | 1.25±0.25,-0.20 | ±5%                   |                        |                        |                         | C2012C0G2W392J125AE     |
|             | 3216       | 0.85±0.15       | ±5%                   |                        |                        | C3216C0G2J392J085AE     |                         |
| 4.7nF       | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A392J200AE    |                         |                         |
|             | 3216       | 1.15±0.15       | ±5%                   |                        |                        | C3216C0G2J562J115AE     |                         |
| 5.6nF       | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A562J200AE    |                         |                         |
|             | 3216       | 1.15±0.15       | ±5%                   |                        |                        | C3216C0G2J682J115AE     | C3216C0G2W682J115AE     |
| 6.8nF       | 3225       | 2.00+0.30,-0.20 | ±5%                   |                        | C3225C0G3A682J200AE    |                         |                         |
|             | 3216       | 1.15±0.15       | ±5%                   |                        |                        |                         | C3216C0G2W822J115AE     |
| 8.2nF       | 3225       | 2.30+0.30,-0.20 | ±5%                   |                        | C3225C0G3A822J230AE    |                         |                         |
|             | 3216       | 1.60+0.30,-0.20 | ±5%                   |                        |                        | C3216C0G2J822J160AE     |                         |
| 10nF        | 3216       | 1.60+0.30,-0.20 | ±5%                   |                        |                        | C3216C0G2J103J160AE     | C3216C0G2W103J160AE     |
| 15nF        | 3225       | 1.60+0.30,-0.20 | ±5%                   |                        |                        | C3225C0G2J153J160AE     |                         |
| 33nF        | 3225       | 2.50±0.30       | ±5%                   |                        |                        |                         | C3225C0G2W333J250AE     |
|             | 4532       | 2.00+0.30,-0.20 | ±5%                   |                        |                        | C4532C0G2J333J200KE     |                         |
| 68nF        | 5750       | 2.30+0.30,-0.20 | ±5%                   |                        |                        | C5750C0G2J683J230KE     |                         |

## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

## Temperature characteristics: C0G (–55 to +125°C, 0±30ppm/°C)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number          |                         |                        |
|-------------|------------|-----------------|-----------------------|-------------------------|-------------------------|------------------------|
|             |            |                 |                       | Rated voltage Edc: 250V | Rated voltage Edc: 100V | Rated voltage Edc: 50V |
| 100pF       | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A101J050BE     | C1005C0G1H101J050BE    |
|             | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         |                         | C1608C0G1H101J080AE    |
| 150pF       | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A151J050BE     | C1005C0G1H151J050BE    |
| 220pF       | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A221J050BE     | C1005C0G1H221J050BE    |
| 330pF       | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A331J050BE     | C1005C0G1H331J050BE    |
|             | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A331J080AE     | C1608C0G1H331J080AE    |
| 470pF       | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A471J050BE     | C1005C0G1H471J050BE    |
|             | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A471J080AE     | C1608C0G1H471J080AE    |
| 680pF       | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A681J050BE     | C1005C0G1H681J050BE    |
|             | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A681J080AE     | C1608C0G1H681J080AE    |
| 1nF         | 1005       | 0.50+0.10,-0.05 | ±5%                   |                         | C1005C0G2A102J050BE     | C1005C0G1H102J050BE    |
|             | 1608       | 0.80+0.15,-0.10 | ±5%                   | C1608C0G2E102J080AE     | C1608C0G2A102J080AE     | C1608C0G1H102J080AE    |
| 1.2nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   | C1608C0G2E122J080AE     | C1608C0G2A122J080AE     | C1608C0G1H122J080AE    |
| 1.5nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   | C1608C0G2E152J080AE     | C1608C0G2A152J080AE     | C1608C0G1H152J080AE    |
| 1.8nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   | C1608C0G2E182J080AE     | C1608C0G2A182J080AE     | C1608C0G1H182J080AE    |
| 2.2nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A222J080AE     | C1608C0G1H222J080AE    |
| 2.7nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A272J080AE     | C1608C0G1H272J080AE    |
| 3.3nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A332J080AE     | C1608C0G1H332J080AE    |
|             | 2012       | 0.85±0.15       | ±5%                   | C2012C0G2E332J085AE     |                         |                        |
| 3.9nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A392J080AE     | C1608C0G1H392J080AE    |
|             | 2012       | 1.25+0.25,-0.20 | ±5%                   | C2012C0G2E392J125AE     |                         |                        |
| 4.7nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A472J080AE     | C1608C0G1H472J080AE    |
|             | 2012       | 1.25+0.25,-0.20 | ±5%                   | C2012C0G2E472J125AE     |                         |                        |
| 5.6nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A562J080AE     | C1608C0G1H562J080AE    |
|             | 2012       | 1.25+0.25,-0.20 | ±5%                   | C2012C0G2E562J125AE     |                         |                        |
| 6.8nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A682J080AE     | C1608C0G1H682J080AE    |
|             | 2012       | 1.25+0.25,-0.20 | ±5%                   | C2012C0G2E682J125AE     |                         |                        |
| 8.2nF       | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A822J080AE     | C1608C0G1H822J080AE    |
|             | 1608       | 0.80+0.15,-0.10 | ±5%                   |                         | C1608C0G2A103J080AE     | C1608C0G1H103J080AE    |
| 10nF        | 3216       | 1.15±0.15       | ±5%                   | C3216C0G2E103J115AE     |                         |                        |
|             | 2012       | 0.85±0.15       | ±5%                   |                         | C2012C0G2A153J085AE     | C2012C0G1H153J085AE    |
| 15nF        | 3216       | 1.60+0.30,-0.20 | ±5%                   | C3216C0G2E153J160AE     |                         |                        |
|             | 2012       | 1.25+0.25,-0.20 | ±5%                   |                         | C2012C0G2A223J125AE     | C2012C0G1H223J125AE    |
| 22nF        | 3225       | 1.60+0.30,-0.20 | ±5%                   | C3225C0G2E223J160AE     |                         |                        |
| 33nF        | 2012       | 1.25+0.25,-0.20 | ±5%                   |                         | C2012C0G2A333J125AE     | C2012C0G1H333J125AE    |
| 47nF        | 3216       | 1.15±0.15       | ±5%                   |                         | C3216C0G2A473J115AE     | C3216C0G1H473J115AE    |
| 68nF        | 3216       | 1.60+0.30,-0.20 | ±5%                   |                         | C3216C0G2A683J160AE     | C3216C0G1H683J160AE    |
|             | 3225       | 2.30+0.30,-0.20 | ±5%                   |                         | C3225C0G2A683J230AE     |                        |
| 100nF       | 3216       | 1.60+0.30,-0.20 | ±5%                   |                         | C3216C0G2A104J160AE     | C3216C0G1H104J160AE    |
| 150nF       | 5750       | 2.30+0.30,-0.20 | ±5%                   | C5750C0G2E154J230KE     | C5750C0G2A154J230KE     |                        |

## Capacitance range table

## Temperature characteristics: X5R (–55 to +85°C, ±15%)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number         |                        |                        |                        |                         |
|-------------|------------|-----------------|-----------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|
|             |            |                 |                       | Rated voltage Edc: 35V | Rated voltage Edc: 25V | Rated voltage Edc: 16V | Rated voltage Edc: 10V | Rated voltage Edc: 6.3V |
| 470nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X5R1V474K050BE    | C1005X5R1E474K050BE    |                        |                        |                         |
| 1μF         | 1005       | 0.50+0.15,-0.05 | ±10%                  | C1005X5R1V105K050BE    | C1005X5R1E105K050BE    |                        |                        |                         |
| 2.2μF       | 1005       | 0.50+0.20,-0.10 | ±10%                  | C1005X5R1V225K050BE    | C1005X5R1E225K050BE    |                        |                        |                         |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X5R1V225K080AE    | C1608X5R1E225K080AE    |                        |                        |                         |
| 4.7μF       | 1005       | 0.50+0.20,-0.10 | ±10%                  |                        |                        |                        | C1005X5R1A475K050BE    | C1005X5R0J475K050BE     |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  |                        |                        |                        | C1608X5R1A475K080AE    |                         |
| 10μF        | 1608       | 0.80+0.20,-0.10 | ±10%                  |                        |                        | C1608X5R1C475K080AE    |                        |                         |
|             |            |                 |                       |                        |                        |                        |                        | C1608X5R0J106K080AE     |

## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

## Temperature characteristics: X7R (−55 to +125°C, ±15%)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number      |           |                     |            |                     |                     |                     |                     |
|-------------|------------|-----------------|-----------------------|---------------------|-----------|---------------------|------------|---------------------|---------------------|---------------------|---------------------|
|             |            |                 |                       | Rated voltage       | Edc : 2kV | Rated voltage       | Edc : 630V | Rated voltage       | Edc : 250V          | Rated voltage       | Edc : 100V          |
| 1nF         | 1005       | 0.50±0.10,-0.05 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H102K050BE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H102M050BE |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                     |           |                     |            |                     | C1608X7R2A102K080AE | C1608X7R1H102K080AE |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C1608X7R2A102M080AE | C1608X7R1H102M080AE |                     |
|             | 2012       | 0.85±0.15       | ±10%                  |                     |           |                     |            | C2012X7R2E102K085AE | C2012X7R2A102K085AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            | C2012X7R2E102M085AE | C2012X7R2A102M085AE |                     |                     |
| 2.2nF       | 3216       | 1.15±0.15       | ±10%                  |                     |           | C3216X7R2J102K115AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J102M115AE |            |                     |                     |                     |                     |
|             | 4520       | 1.30±0.20       | ±10%                  | C4520X7R3D102K130KE |           |                     |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  | C4520X7R3D102M130KE |           |                     |            |                     |                     |                     |                     |
|             | 1005       | 0.50±0.10,-0.05 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H222K050BE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H222M050BE |
| 3.3nF       | 1608       | 0.80±0.15,-0.10 | ±10%                  |                     |           |                     |            |                     | C1608X7R2A222K080AE | C1608X7R1H222K080AE |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C1608X7R2A222M080AE | C1608X7R1H222M080AE |                     |
|             | 2012       | 0.85±0.15       | ±10%                  |                     |           |                     |            | C2012X7R2E222K085AE | C2012X7R2A222K085AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            | C2012X7R2E222M085AE | C2012X7R2A222M085AE |                     |                     |
|             | 3216       | 1.15±0.15       | ±10%                  |                     |           | C3216X7R2J222K115AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J222M115AE |            |                     |                     |                     |                     |
| 4.7nF       | 4532       | 1.30±0.20       | ±10%                  | C4532X7R3D222K130KE |           |                     |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  | C4532X7R3D222M130KE |           |                     |            |                     |                     |                     |                     |
|             | 3216       | 1.15±0.15       | ±10%                  |                     |           | C3216X7R2J332K115AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J332M115AE |            |                     |                     |                     |                     |
|             | 1005       | 0.50±0.10,-0.05 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H472K050BE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H472M050BE |
| 10nF        | 1608       | 0.80±0.15,-0.10 | ±10%                  |                     |           |                     |            |                     | C1608X7R2A472K080AE | C1608X7R1H472K080AE |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C1608X7R2A472M080AE | C1608X7R1H472M080AE |                     |
|             | 2012       | 0.85±0.15       | ±10%                  |                     |           |                     |            | C2012X7R2E472K085AE | C2012X7R2A472K085AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            | C2012X7R2E472M085AE | C2012X7R2A472M085AE |                     |                     |
|             | 3216       | 1.15±0.15       | ±10%                  |                     |           | C3216X7R2J472K115AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J472M115AE |            |                     |                     |                     |                     |
| 22nF        | 1005       | 0.50±0.10,-0.05 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H103K050BE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H103M050BE |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                     |           |                     |            |                     | C1608X7R2A103K080AE | C1608X7R1H103K080AE |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C1608X7R2A103M080AE | C1608X7R1H103M080AE |                     |
|             | 2012       | 0.85±0.15       | ±10%                  |                     |           |                     |            |                     | C2012X7R2A103K085AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C2012X7R2A103M085AE |                     |                     |
| 33nF        | 3216       | 1.15±0.15       | ±10%                  |                     |           | C3216X7R2J103K115AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J103M115AE |            |                     |                     |                     |                     |
|             | 1005       | 0.50±0.10,-0.05 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H223K050BE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H223M050BE |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                     |           |                     |            |                     | C1608X7R2A223K080AE | C1608X7R1H223K080AE |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C1608X7R2A223M080AE | C1608X7R1H223M080AE |                     |
| 47nF        | 2012       | 1.25±0.25,-0.20 | ±10%                  |                     |           |                     |            | C2012X7R2E223K125AE | C2012X7R2A223K125AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            | C2012X7R2E223M125AE | C2012X7R2A223M125AE |                     |                     |
|             | 3216       | 1.15±0.15       | ±10%                  |                     |           |                     |            |                     | C3216X7R2E223K115AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C3216X7R2E223M115AE |                     |                     |
|             | 3216       | 1.30±0.20       | ±10%                  |                     |           | C3216X7R2J223K130AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J223M130AE |            |                     |                     |                     |                     |
| 75nF        | 3216       | 1.60±0.30,-0.20 | ±10%                  |                     |           | C3216X7R2J333K160AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2J333M160AE |            |                     |                     |                     |                     |
|             | 1005       | 0.50±0.10,-0.05 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H473K050BE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1005X7R1H473M050BE |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                     |           |                     |            |                     |                     |                     | C1608X7R1H473K080AE |
|             |            |                 | ±20%                  |                     |           |                     |            |                     |                     |                     | C1608X7R1H473M080AE |
| 100nF       | 2012       | 1.25±0.25,-0.20 | ±10%                  |                     |           |                     |            |                     | C2012X7R2A473K125AE |                     |                     |
|             |            |                 | ±20%                  |                     |           |                     |            |                     | C2012X7R2A473M125AE |                     |                     |
|             | 3216       | 1.60±0.30,-0.20 | ±10%                  |                     |           | C3216X7R2E473K160AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3216X7R2E473M160AE |            |                     |                     |                     |                     |
|             | 3225       | 2.00±0.30,-0.20 | ±10%                  |                     |           | C3225X7R2J473K200AE |            |                     |                     |                     |                     |
|             |            |                 | ±20%                  |                     |           | C3225X7R2J473M200AE |            |                     |                     |                     |                     |

■ Gray item: The product which is not recommended to a new design.

## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

## Temperature characteristics: X7R (−55 to +125°C, ±15%)

| Capacitance | Dimensions      | Thickness<br>(mm) | Capacitance<br>tolerance | Catalog number      |            |               |            |                     |                     |               |           |
|-------------|-----------------|-------------------|--------------------------|---------------------|------------|---------------|------------|---------------------|---------------------|---------------|-----------|
|             |                 |                   |                          | Rated voltage       | Edc : 630V | Rated voltage | Edc : 250V | Rated voltage       | Edc : 100V          | Rated voltage | Edc : 50V |
| 68nF        | 3225            | 2.00+0.30,-0.20   | ±10%                     | C3225X7R2J683K200AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C3225X7R2J683M200AE |            |               |            |                     |                     |               |           |
| 100nF       | 1005            | 0.50+0.10,-0.05   | ±10%                     | C1005X7R1H104K050BE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C1005X7R1H104M050BE |            |               |            |                     |                     |               |           |
|             | 1608            | 0.80+0.15,-0.10   | ±10%                     | C1608X7R1H104K080AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C1608X7R1H104M080AE |            |               |            |                     |                     |               |           |
|             | 2012            | 1.25+0.25,-0.20   | ±10%                     |                     |            |               |            | C2012X7R2A104K125AE | C2012X7R1H104K125AE |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C2012X7R2A104M125AE | C2012X7R1H104M125AE |               |           |
|             | 3216            | 1.60+0.30,-0.20   | ±10%                     | C3216X7R2E104K160AE |            |               |            | C3216X7R2A104K160AE |                     |               |           |
|             |                 |                   | ±20%                     | C3216X7R2E104M160AE |            |               |            | C3216X7R2A104M160AE |                     |               |           |
|             | 3225            | 2.00+0.30,-0.20   | ±10%                     | C3225X7R2E104K200AE |            |               |            | C3225X7R2A104M160AE |                     |               |           |
|             |                 |                   | ±20%                     | C3225X7R2E104M200AE |            |               |            |                     |                     |               |           |
| 4532        | 2.30+0.30,-0.20 | ±10%              | C4532X7R2J104K230KE      |                     |            |               |            |                     |                     |               |           |
|             |                 | ±20%              | C4532X7R2J104M230KE      |                     |            |               |            |                     |                     |               |           |
| 220nF       | 1608            | 0.80+0.15,-0.10   | ±10%                     | C1608X7R1H224K080AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C1608X7R1H224M080AE |            |               |            |                     |                     |               |           |
|             | 2012            | 1.25+0.25,-0.20   | ±10%                     |                     |            |               |            | C2012X7R1H224K125AE | C2012X7R1H224M125AE |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C2012X7R1H224K125AE | C2012X7R1H224M125AE |               |           |
|             | 3216            | 1.15±0.15         | ±10%                     |                     |            |               |            | C3216X7R2A224K115AE |                     |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C3216X7R2A224M115AE |                     |               |           |
|             | 3225            | 2.00+0.30,-0.20   | ±10%                     | C3225X7R2E224K200AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C3225X7R2E224M200AE |            |               |            |                     |                     |               |           |
| 5750        | 2.30+0.30,-0.20 | ±10%              | C5750X7R2J224K230KE      |                     |            |               |            |                     |                     |               |           |
|             |                 | ±20%              | C5750X7R2J224M230KE      |                     |            |               |            |                     |                     |               |           |
| 470nF       | 1608            | 0.80+0.15,-0.10   | ±10%                     | C1608X7R1H474K080AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C1608X7R1H474M080AE |            |               |            |                     |                     |               |           |
|             | 2012            | 1.25+0.25,-0.20   | ±10%                     |                     |            |               |            | C2012X7R1H474K125AE | C2012X7R1H474M125AE |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C2012X7R1H474K125AE | C2012X7R1H474M125AE |               |           |
|             | 3216            | 1.60+0.30,-0.20   | ±10%                     |                     |            |               |            | C3216X7R2A474K160AE |                     |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C3216X7R2A474M160AE |                     |               |           |
|             | 3225            | 2.00+0.30,-0.20   | ±10%                     | C3225X7R2A474K200AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C3225X7R2A474M200AE |            |               |            |                     |                     |               |           |
| 4532        | 2.30+0.30,-0.20 | ±10%              | C4532X7R2E474K230KE      |                     |            |               |            |                     |                     |               |           |
|             |                 | ±20%              | C4532X7R2E474M230KE      |                     |            |               |            |                     |                     |               |           |
| 1uF         | 2012            | 1.25+0.25,-0.20   | ±10%                     | C2012X7R1H105K125AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C2012X7R1H105M125AE |            |               |            |                     |                     |               |           |
|             | 3216            | 1.60+0.30,-0.20   | ±10%                     | C3216X7R2A105K160AE |            |               |            | C3216X7R1H105K160AE | C3216X7R1H105M160AE |               |           |
|             |                 |                   | ±20%                     | C3216X7R2A105M160AE |            |               |            | C3216X7R1H105M160AE |                     |               |           |
|             | 3225            | 2.00+0.30,-0.20   | ±10%                     | C3225X7R2A105K200AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C3225X7R2A105M200AE |            |               |            |                     |                     |               |           |
| 5750        | 2.30+0.30,-0.20 | ±10%              | C5750X7R2E105K230KE      |                     |            |               |            |                     |                     |               |           |
|             |                 | ±20%              | C5750X7R2E105M230KE      |                     |            |               |            |                     |                     |               |           |
| 2.2uF       | 2012            | 1.25+0.25,-0.20   | ±10%                     | C2012X7R1H225K125AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C2012X7R1H225M125AE |            |               |            |                     |                     |               |           |
|             | 3216            | 1.60+0.30,-0.20   | ±10%                     |                     |            |               |            | C3216X7R1H225K160AE | C3216X7R1H225M160AE |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C3216X7R1H225K160AE | C3216X7R1H225M160AE |               |           |
|             | 3225            | 2.00+0.30,-0.20   | ±10%                     |                     |            |               |            | C3225X7R1H225K200AE | C3225X7R1H225M200AE |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C3225X7R1H225K200AE | C3225X7R1H225M200AE |               |           |
|             | 3225            | 2.30+0.30,-0.20   | ±10%                     |                     |            |               |            | C3225X7R2A225K230AE |                     |               |           |
|             |                 |                   | ±20%                     |                     |            |               |            | C3225X7R2A225M230AE |                     |               |           |
| 4.7uF       | 3216            | 1.60+0.30,-0.20   | ±10%                     | C3216X7R1H475K160AE |            |               |            |                     |                     |               |           |
|             |                 |                   | ±20%                     | C3216X7R1H475M160AE |            |               |            |                     |                     |               |           |

## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

## Temperature characteristics: X7R (–55 to +125°C, ±15%)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number          |                         | Rated voltage Edc : 25V | Rated voltage Edc : 16V | Rated voltage Edc : 10V |
|-------------|------------|-----------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|             |            |                 |                       | Rated voltage Edc : 35V | Rated voltage Edc : 35V |                         |                         |                         |
| 220nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X7R1V224K050BE     | C1005X7R1E224K050BE     | C1005X7R1C224K050BE     |                         |                         |
|             |            |                 | ±20%                  | C1005X7R1V224M050BE     | C1005X7R1E224M050BE     | C1005X7R1C224M050BE     |                         |                         |
| 470nF       | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X7R1V474K080AE     | C1608X7R1E474K080AE     |                         |                         |                         |
|             |            |                 | ±20%                  | C1608X7R1V474M080AE     | C1608X7R1E474M080AE     |                         |                         |                         |
| 1µF         | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X7R1V105K080AE     | C1608X7R1E105K080AE     |                         |                         |                         |
|             |            |                 | ±20%                  | C1608X7R1V105M080AE     | C1608X7R1E105M080AE     |                         |                         |                         |
|             | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X7R1V105K125AE     |                         |                         |                         |                         |
|             |            |                 | ±20%                  | C2012X7R1V105M125AE     |                         |                         |                         |                         |
| 2.2µF       | 1608       | 0.80+0.15,-0.10 | ±10%                  |                         |                         |                         |                         | C1608X7R1A225K080AE     |
|             |            |                 | ±20%                  |                         |                         |                         |                         | C1608X7R1A225M080AE     |
|             | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X7R1V225K125AE     | C2012X7R1E225K125AE     |                         |                         |                         |
|             |            |                 | ±20%                  | C2012X7R1V225M125AE     | C2012X7R1E225M125AE     |                         |                         |                         |
| 4.7µF       | 3216       | 1.60+0.30,-0.20 | ±10%                  | C3216X7R1V225K160AE     | C3216X7R1E225K160AE     |                         |                         |                         |
|             |            |                 | ±20%                  | C3216X7R1V225M160AE     | C3216X7R1E225M160AE     |                         |                         |                         |
|             | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X7R1V475K125AE     | C2012X7R1E475K125AE     | C2012X7R1C475K125AE     |                         |                         |
|             |            |                 | ±20%                  | C2012X7R1V475M125AE     | C2012X7R1E475M125AE     | C2012X7R1C475M125AE     |                         |                         |
| 10µF        | 3216       | 1.60+0.30,-0.20 | ±10%                  | C3216X7R1V475K160AE     | C3216X7R1E475K160AE     |                         |                         |                         |
|             |            |                 | ±20%                  | C3216X7R1V475M160AE     | C3216X7R1E475M160AE     |                         |                         |                         |
|             | 2012       | 1.25+0.25,-0.20 | ±10%                  |                         |                         |                         |                         | C2012X7R1A106K125AE     |
|             |            |                 | ±20%                  |                         |                         |                         |                         | C2012X7R1A106M125AE     |
| 47nF        | 7563       | 2.30 (2.50max.) | ±10%                  |                         |                         |                         |                         |                         |
|             |            |                 | ±20%                  |                         |                         |                         |                         |                         |

## Capacitance range table

## Temperature characteristics: X7S (–55 to +125°C, ±22%)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number           |                         |                         |
|-------------|------------|-----------------|-----------------------|--------------------------|-------------------------|-------------------------|
|             |            |                 |                       | Rated voltage Edc : 100V | Rated voltage Edc : 50V | Rated voltage Edc : 16V |
| 47nF        | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X7S2A473K080AE      |                         |                         |
|             |            |                 | ±20%                  | C1608X7S2A473M080AE      |                         |                         |
| 100nF       | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X7S2A104K080AE      |                         |                         |
|             |            |                 | ±20%                  | C1608X7S2A104M080AE      |                         |                         |
| 220nF       | 2012       | 0.85±0.15       | ±10%                  | C2012X7S2A224K085AE      |                         |                         |
|             |            |                 | ±20%                  | C2012X7S2A224M085AE      |                         |                         |
| 470nF       | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X7S2A474K125AE      |                         |                         |
|             |            |                 | ±20%                  | C2012X7S2A474M125AE      |                         |                         |
| 1µF         | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X7S2A105K125AE      |                         |                         |
|             |            |                 | ±20%                  | C2012X7S2A105M125AE      |                         |                         |
| 2.2µF       | 3216       | 1.60+0.30,-0.20 | ±10%                  | C3216X7S2A225K160AE      |                         |                         |
|             |            |                 | ±20%                  | C3216X7S2A225M160AE      |                         |                         |
| 3.3µF       | 3225       | 2.00+0.30,-0.20 | ±10%                  | C3225X7S2A335K200AE      |                         |                         |
|             |            |                 | ±20%                  | C3225X7S2A335M200AE      |                         |                         |
| 4.7µF       | 3225       | 2.00+0.30,-0.20 | ±10%                  | C3225X7S2A475K200AE      |                         |                         |
|             |            |                 | ±20%                  | C3225X7S2A475M200AE      |                         |                         |
|             | 3225       | 2.30+0.30,-0.20 | ±10%                  |                          | C3225X7S1H475K230AE     |                         |
|             |            |                 | ±20%                  |                          | C3225X7S1H475M230AE     |                         |
| 10µF        | 3225       | 2.50 ±0.30      | ±10%                  |                          | C3225X7S1H106K250AE     |                         |
|             |            |                 | ±20%                  |                          | C3225X7S1H106M250AE     |                         |
|             | 5750       | 2.30+0.30,-0.20 | ±10%                  | C5750X7S2A106K230KE      |                         |                         |
|             |            |                 | ±20%                  | C5750X7S2A106M230KE      |                         |                         |
| 22µF        | 7563       | 2.30 (2.50max.) | ±20%                  |                          | C7563X7S1H226M230LE     |                         |
| 100µF       | 7563       | 2.80 (3.00max.) | ±20%                  |                          |                         | C7563X7S1C107M280LE     |

## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

Temperature characteristics: X7T (–55 to +125°C, +22, –33%)

| Capacitance | Dimensions | Thickness<br>(mm) | Capacitance<br>tolerance | Catalog number      |            |                     |            |                     |            |
|-------------|------------|-------------------|--------------------------|---------------------|------------|---------------------|------------|---------------------|------------|
|             |            |                   |                          | Rated voltage       | Edc : 630V | Rated voltage       | Edc : 450V | Rated voltage       | Edc : 250V |
| 10 nF       | 2012       | 0.85±0.15         | ± 10%                    |                     |            | C2012X7T2W103K085AE |            |                     |            |
|             |            |                   | ± 20%                    |                     |            | C2012X7T2W103M085AE |            |                     |            |
| 22 nF       | 2012       | 1.25+0.25,-0.20   | ± 10%                    |                     |            | C2012X7T2W223K125AE |            |                     |            |
|             |            |                   | ± 20%                    |                     |            | C2012X7T2W223M125AE |            |                     |            |
| 47 nF       | 2012       | 1.25+0.25,-0.20   | ± 10%                    |                     |            | C2012X7T2W473K125AE |            | C2012X7T2E473K125AE |            |
|             |            |                   | ± 20%                    |                     |            | C2012X7T2W473M125AE |            | C2012X7T2E473M125AE |            |
|             | 3216       | 1.60+0.30,-0.20   | ± 10%                    | C3216X7T2J473K160AE |            |                     |            |                     |            |
|             |            |                   | ± 20%                    | C3216X7T2J473M160AE |            |                     |            |                     |            |
| 100 nF      | 2012       | 1.25+0.25,-0.20   | ±10%                     |                     |            |                     |            | C2012X7T2E104K125AE |            |
|             |            |                   | ±20%                     |                     |            |                     |            | C2012X7T2E104M125AE |            |
|             | 3216       | 1.60+0.30,-0.20   | ±10%                     |                     |            | C3216X7T2W104K160AE |            |                     |            |
|             |            |                   | ±20%                     |                     |            | C3216X7T2W104M160AE |            |                     |            |
|             | 3225       | 1.60+0.30,-0.20   | ±10%                     | C3225X7T2J104K160AE |            |                     |            |                     |            |
|             |            |                   | ±20%                     | C3225X7T2J104M160AE |            |                     |            |                     |            |
| 150nF       | 3225       | 2.00+0.30,-0.20   | ±10%                     | C3225X7T2J154K200AE |            |                     |            |                     |            |
|             |            |                   | ±20%                     | C3225X7T2J154M200AE |            |                     |            |                     |            |
|             | 3216       | 1.60+0.30,-0.20   | ±10%                     |                     |            |                     |            | C3216X7T2E224K160AE |            |
|             |            |                   | ±20%                     |                     |            |                     |            | C3216X7T2E224M160AE |            |
| 220 nF      | 3225       | 2.00+0.30,-0.20   | ±10%                     |                     |            | C3225X7T2W224K200AE |            |                     |            |
|             |            |                   | ±20%                     |                     |            | C3225X7T2W224M200AE |            |                     |            |
|             | 4532       | 2.00+0.30,-0.20   | ±10%                     | C4532X7T2J224K200KE |            |                     |            |                     |            |
|             |            |                   | ±20%                     | C4532X7T2J224M200KE |            |                     |            |                     |            |
| 330nF       | 3225       | 2.00+0.30,-0.20   | ±10%                     |                     |            |                     |            | C3225X7T2E334K200AE |            |
|             |            |                   | ±20%                     |                     |            |                     |            | C3225X7T2E334M200AE |            |
| 470 nF      | 4532       | 2.30+0.30,-0.20   | ±10%                     |                     |            | C4532X7T2W474K230KE |            |                     |            |
|             |            |                   | ±20%                     |                     |            | C4532X7T2W474M230KE |            |                     |            |
|             | 5750       | 2.50±0.30         | ±10%                     | C5750X7T2J474K250KE |            |                     |            |                     |            |
|             |            |                   | ±20%                     | C5750X7T2J474M250KE |            |                     |            |                     |            |
| 1 µF        | 4532       | 2.50±0.30         | ± 10%                    |                     |            |                     |            | C4532X7T2E105K250KE |            |
|             |            |                   | ± 20%                    |                     |            |                     |            | C4532X7T2E105M250KE |            |
|             | 5750       | 2.50±0.30         | ± 10%                    |                     |            | C5750X7T2W105K250KE |            |                     |            |
|             |            |                   | ± 20%                    |                     |            | C5750X7T2W105M250KE |            |                     |            |
| 2.2uF       | 5750       | 2.50±0.30         | ± 10%                    |                     |            |                     |            | C5750X7T2E225K250KE |            |
|             |            |                   | ± 20%                    |                     |            |                     |            | C5750X7T2E225M250KE |            |



## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

## Temperature characteristics: X8R (−55 to +150°C, ±15%)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number          |                        |                        |                        |
|-------------|------------|-----------------|-----------------------|-------------------------|------------------------|------------------------|------------------------|
|             |            |                 |                       | Rated voltage Edc: 100V | Rated voltage Edc: 50V | Rated voltage Edc: 25V | Rated voltage Edc: 16V |
| 150pF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A151K050BE     | C1005X8R1H151K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A151M050BE     | C1005X8R1H151M050BE    |                        |                        |
| 220pF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A221K050BE     | C1005X8R1H221K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A221M050BE     | C1005X8R1H221M050BE    |                        |                        |
| 330pF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A331K050BE     | C1005X8R1H331K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A331M050BE     | C1005X8R1H331M050BE    |                        |                        |
| 470pF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A471K050BE     | C1005X8R1H471K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A471M050BE     | C1005X8R1H471M050BE    |                        |                        |
| 680pF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A681K050BE     | C1005X8R1H681K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A681M050BE     | C1005X8R1H681M050BE    |                        |                        |
| 1nF         | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A102K050BE     | C1005X8R1H102K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A102M050BE     | C1005X8R1H102M050BE    |                        |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A102K080AE     | C1608X8R1H102K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A102M080AE     | C1608X8R1H102M080AE    |                        |                        |
| 1.5nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A152K050BE     | C1005X8R1H152K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A152M050BE     | C1005X8R1H152M050BE    |                        |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A152K080AE     | C1608X8R1H152K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A152M080AE     | C1608X8R1H152M080AE    |                        |                        |
| 2.2nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A222K050BE     | C1005X8R1H222K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A222M050BE     | C1005X8R1H222M050BE    |                        |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A222K080AE     | C1608X8R1H222K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A222M080AE     | C1608X8R1H222M080AE    |                        |                        |
| 3.3nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  | C1005X8R2A332K050BE     | C1005X8R1H332K050BE    |                        |                        |
|             |            |                 | ±20%                  | C1005X8R2A332M050BE     | C1005X8R1H332M050BE    |                        |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A332K080AE     | C1608X8R1H332K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A332M080AE     | C1608X8R1H332M080AE    |                        |                        |
| 4.7nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         | C1005X8R1H472K050BE    |                        |                        |
|             |            |                 | ±20%                  |                         | C1005X8R1H472M050BE    |                        |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A472K080AE     | C1608X8R1H472K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A472M080AE     | C1608X8R1H472M080AE    |                        |                        |
| 6.8nF       | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         | C1005X8R1H682K050BE    | C1005X8R1E682K050BE    |                        |
|             |            |                 | ±20%                  |                         | C1005X8R1H682M050BE    | C1005X8R1E682M050BE    |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A682K080AE     | C1608X8R1H682K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A682M080AE     | C1608X8R1H682M080AE    |                        |                        |
| 10nF        | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         | C1005X8R1H103K050BE    | C1005X8R1E103K050BE    |                        |
|             |            |                 | ±20%                  |                         | C1005X8R1H103M050BE    | C1005X8R1E103M050BE    |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A103K080AE     | C1608X8R1H103K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A103M080AE     | C1608X8R1H103M080AE    |                        |                        |
| 15nF        | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         |                        | C1005X8R1E153K050BE    |                        |
|             |            |                 | ±20%                  |                         |                        | C1005X8R1E153M050BE    |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A153K080AE     | C1608X8R1H153K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A153M080AE     | C1608X8R1H153M080AE    |                        |                        |
| 22nF        | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         |                        | C1005X8R1E223K050BE    |                        |
|             |            |                 | ±20%                  |                         |                        | C1005X8R1E223M050BE    |                        |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  | C1608X8R2A223K080AE     | C1608X8R1H223K080AE    |                        |                        |
|             |            |                 | ±20%                  | C1608X8R2A223M080AE     | C1608X8R1H223M080AE    |                        |                        |
| 33nF        | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X8R2A223K125AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C2012X8R2A223M125AE     |                        |                        |                        |
|             | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         |                        | C1005X8R1E333K050BE    | C1005X8R1C333K050BE    |
|             |            |                 | ±20%                  |                         |                        | C1005X8R1E333M050BE    | C1005X8R1C333M050BE    |
| 47nF        | 1608       | 0.80+0.15,-0.10 | ±10%                  |                         | C1608X8R1H333K080AE    |                        |                        |
|             |            |                 | ±20%                  |                         | C1608X8R1H333M080AE    |                        |                        |
|             | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X8R2A333K125AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C2012X8R2A333M125AE     |                        |                        |                        |
| 68nF        | 1005       | 0.50+0.10,-0.05 | ±10%                  |                         |                        | C1005X8R1E473K050BE    | C1005X8R1C473K050BE    |
|             |            |                 | ±20%                  |                         |                        | C1005X8R1E473M050BE    | C1005X8R1C473M050BE    |
|             | 1608       | 0.80+0.15,-0.10 | ±10%                  |                         | C1608X8R1H473K080AE    |                        |                        |
|             |            |                 | ±20%                  |                         | C1608X8R1H473M080AE    |                        |                        |
| 82nF        | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X8R2A473K125AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C2012X8R2A473M125AE     |                        |                        |                        |
| 100nF       | 1608       | 0.80+0.15,-0.10 | ±10%                  |                         | C1608X8R1H683K080AE    | C1608X8R1E683K080AE    |                        |
|             |            |                 | ±20%                  |                         | C1608X8R1H683M080AE    | C1608X8R1E683M080AE    |                        |
|             | 2012       | 1.25+0.25,-0.20 | ±10%                  | C2012X8R2A683K125AE     | C2012X8R1H683K125AE    |                        |                        |
|             |            |                 | ±20%                  | C2012X8R2A683M125AE     | C2012X8R1H683M125AE    |                        |                        |

■ Gray item: The product which is not recommended to a new design.

## MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance range table

## Temperature characteristics: X8R (–55 to +150°C, ±15%)

| Capacitance | Dimensions | Thickness (mm)  | Capacitance tolerance | Catalog number          |                        |                        |                        |
|-------------|------------|-----------------|-----------------------|-------------------------|------------------------|------------------------|------------------------|
|             |            |                 |                       | Rated voltage Edc: 100V | Rated voltage Edc: 50V | Rated voltage Edc: 25V | Rated voltage Edc: 16V |
| 100nF       | 1608       | 0.80±0.15,-0.10 | ±10%                  |                         | C1608X8R1H104K080AE    | C1608X8R1E104K080AE    |                        |
|             |            |                 | ±20%                  |                         | C1608X8R1H104M080AE    | C1608X8R1E104M080AE    |                        |
|             | 2012       | 1.25±0.25,-0.20 | ±10%                  |                         | C2012X8R1H104K125AE    |                        |                        |
|             |            |                 | ±20%                  |                         | C2012X8R1H104M125AE    |                        |                        |
|             | 3216       | 1.15±0.15       | ±10%                  | C3216X8R2A104K115AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C3216X8R2A104M115AE     |                        |                        |                        |
| 150nF       | 1608       | 0.80±0.15,-0.10 | ±10%                  |                         |                        | C1608X8R1E154K080AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C1608X8R1E154M080AE    |                        |
|             | 2012       | 0.85±0.15       | ±10%                  |                         |                        | C2012X8R1E154K085AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C2012X8R1E154M085AE    |                        |
|             |            | 1.25±0.25,-0.20 | ±10%                  |                         | C2012X8R1H154K125AE    |                        |                        |
|             |            |                 | ±20%                  |                         | C2012X8R1H154M125AE    |                        |                        |
| 220nF       | 3216       | 1.60±0.30,-0.20 | ±10%                  | C3216X8R2A154K160AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C3216X8R2A154M160AE     |                        |                        |                        |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                         |                        | C1608X8R1E224K080AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C1608X8R1E224M080AE    |                        |
|             | 2012       | 1.25±0.25,-0.20 | ±10%                  |                         | C2012X8R1H224K125AE    | C2012X8R1E224K125AE    |                        |
|             |            |                 | ±20%                  |                         | C2012X8R1H224M125AE    | C2012X8R1E224M125AE    |                        |
| 330nF       | 3216       | 1.60±0.30,-0.20 | ±10%                  | C3216X8R2A224K160AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C3216X8R2A224M160AE     |                        |                        |                        |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                         |                        | C1608X8R1E334K080AE    | C1608X8R1C334K080AE    |
|             |            |                 | ±20%                  |                         |                        | C1608X8R1E334M080AE    | C1608X8R1C334M080AE    |
|             | 2012       | 1.25±0.25,-0.20 | ±10%                  |                         |                        | C2012X8R1E334K125AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C2012X8R1E334M125AE    |                        |
| 470nF       | 3216       | 1.60±0.30,-0.20 | ±10%                  | C3216X8R2A334K160AE     | C3216X8R1H334K160AE    |                        |                        |
|             |            |                 | ±20%                  | C3216X8R2A334M160AE     | C3216X8R1H334M160AE    |                        |                        |
|             | 1608       | 0.80±0.15,-0.10 | ±10%                  |                         |                        |                        | C1608X8R1C474K080AE    |
|             |            |                 | ±20%                  |                         |                        |                        | C1608X8R1C474M080AE    |
|             | 2012       | 1.25±0.25,-0.20 | ±10%                  |                         |                        | C2012X8R1E474K125AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C2012X8R1E474M125AE    |                        |
| 680nF       | 3216       | 1.60±0.30,-0.20 | ±10%                  |                         | C3216X8R1H474K160AE    |                        |                        |
|             |            |                 | ±20%                  |                         | C3216X8R1H474M160AE    |                        |                        |
|             | 3225       | 2.00±0.30,-0.20 | ±10%                  | C3225X8R2A474K200AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C3225X8R2A474M200AE     |                        |                        |                        |
|             | 2012       | 1.25±0.25,-0.20 | ±10%                  |                         |                        | C2012X8R1E684K125AE    | C2012X8R1C684K125AE    |
|             |            |                 | ±20%                  |                         |                        | C2012X8R1E684M125AE    | C2012X8R1C684M125AE    |
| 1µF         | 3216       | 1.60±0.30,-0.20 | ±10%                  |                         | C3216X8R1H684K160AE    |                        |                        |
|             |            |                 | ±20%                  |                         | C3216X8R1H684M160AE    |                        |                        |
|             | 3225       | 2.50±0.30       | ±10%                  | C3225X8R2A684K250AE     |                        |                        |                        |
|             |            |                 | ±20%                  | C3225X8R2A684M250AE     |                        |                        |                        |
|             | 2012       | 1.25±0.25,-0.20 | ±10%                  |                         |                        | C2012X8R1E105K125AE    | C2012X8R1C105K125AE    |
|             |            |                 | ±20%                  |                         |                        | C2012X8R1E105M125AE    | C2012X8R1C105M125AE    |
| 1.5µF       | 3216       | 1.60±0.30,-0.20 | ±10%                  |                         | C3216X8R1H105K160AE    | C3216X8R1E105K160AE    |                        |
|             |            |                 | ±20%                  |                         | C3216X8R1H105M160AE    | C3216X8R1E105M160AE    |                        |
| 2.2µF       | 3216       | 1.60±0.30,-0.20 | ±10%                  |                         |                        | C3216X8R1E155K160AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C3216X8R1E155M160AE    |                        |
| 3.3µF       | 3216       | 1.60±0.30,-0.20 | ±10%                  |                         |                        | C3216X8R1E225K160AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C3216X8R1E225M160AE    |                        |
|             | 3225       | 2.50±0.30       | ±10%                  |                         |                        | C3225X8R1E335K160AE    | C3216X8R1C335K160AE    |
|             |            |                 | ±20%                  |                         |                        | C3225X8R1E335M160AE    | C3216X8R1C335M160AE    |
| 4.7µF       | 3216       | 1.60±0.30,-0.20 | ±10%                  |                         |                        | C3225X8R1E335K250AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C3225X8R1E335M250AE    |                        |
|             | 3225       | 2.50±0.30       | ±10%                  |                         |                        | C3225X8R1E475K160AE    | C3216X8R1C475K160AE    |
|             |            |                 | ±20%                  |                         |                        | C3225X8R1E475M160AE    | C3216X8R1C475M160AE    |
| 10µF        | 3225       | 2.50±0.30       | ±10%                  |                         |                        | C3225X8R1E475M250AE    |                        |
|             |            |                 | ±20%                  |                         |                        | C3225X8R1E106K250AE    | C3225X8R1C106K250AE    |
|             |            |                 |                       |                         |                        | C3225X8R1E106M250AE    | C3225X8R1C106M250AE    |