



## MULTILAYER CERAMIC CHIP CAPACITORS



### C Series Mid Voltage Application

|       |                    |
|-------|--------------------|
| Type: | C1005 [EIA CC0402] |
|       | C1608 [EIA CC0603] |
|       | C2012 [EIA CC0805] |
|       | C3216 [EIA CC1206] |
|       | C3225 [EIA CC1210] |
|       | C4532 [EIA CC1812] |
|       | C5750 [EIA CC2220] |

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US Catalog**

Version B11

## REMINDERS

Please read before using this product

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## C Series Mid Voltage Application

Type: C1005, C1608, C2012, C3216, C3225, C4532, C5750

### Features



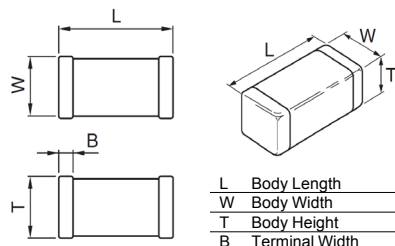
- Unique electrode design allows higher voltage application in smaller case size
- SMT package will help down sizing and lightening of the weight of the product
- A monolithic structure ensures superior mechanical strength and reliability.
- High capacitance has been achieved through precision technologies that enable the use of multiple thinner ceramic dielectric layers.
- Owing to their low ESR and excellent frequency characteristics, these products are optimally suited for high frequency and high-density type power supplies.
- High-accuracy automatic mounting is facilitated through the maintenance of very precise dimensional tolerances.
- Low residual inductance assures superior frequency characteristics.
- Low stray capacitance ensures high conformity with nominal values, thereby simplifying the circuit design process.
- Voltage rating of up to 630V
- High mechanical strength
- No polarity

### Applications



- Snubber in switching power supply
- Ringer cap in telephone set and modem
- Flash light in camera
- DSU/TA in ISDN lines
- HID (High Intensity Discharge Lamp)
- Output bypass in power supply
- Driver circuit in plasma display
- Noise bypass in automotive
- Other mid voltage applications

### Shape & Dimensions



Dimensions in mm

### Part Number Construction

Series Name **C** **3216** **X7R** **2J** **103** **K** **T** **XXXX**

#### Dimensions L x W (mm)

| Case Code | Length      | Width       |
|-----------|-------------|-------------|
| C1005     | 1.00 ± 0.05 | 0.50 ± 0.05 |
| C1608     | 1.60 ± 0.10 | 0.80 ± 0.10 |
| C2012     | 2.00 ± 0.20 | 1.25 ± 0.20 |
| C3216     | 3.20 ± 0.20 | 1.60 ± 0.20 |
| C3225     | 3.20 ± 0.40 | 2.50 ± 0.30 |
| C4532     | 4.50 ± 0.40 | 3.20 ± 0.40 |
| C5750     | 5.70 ± 0.40 | 5.00 ± 0.40 |

#### Temperature Characteristic

| Temperature Characteristics | Capacitance Change | Temperature Range |
|-----------------------------|--------------------|-------------------|
| C0G                         | 0±30 ppm/°C        | -55 to +125°C     |
| X6S                         | ± 22%              | -55 to +105°C     |
| X7R                         | ± 15%              | -55 to +125°C     |
| X7S                         | ± 22%              | -55 to +125°C     |
| X7T                         | +22/-33%           | -55 to +125°C     |

#### Rated Voltage (DC)

| Voltage Code | Voltage (DC) |
|--------------|--------------|
| 2A           | 100V         |
| 2E           | 250V         |
| 2W           | 450V         |
| 2J           | 630V         |

#### Internal Codes

##### Packaging Style

| Packaging Code | Style       |
|----------------|-------------|
| T              | Tape & Reel |

##### Capacitance Tolerance

| Tolerance Code | Tolerance |
|----------------|-----------|
| J              | ± 5%      |
| K              | ± 10%     |
| M              | ± 20%     |

##### 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.

| Capacitance Code | Capacitance       |
|------------------|-------------------|
| 0R5              | 0.5pF             |
| 010              | 1pF               |
| 102              | 1,000pF (1nF)     |
| 105              | 1,000,000pF (1µF) |



## Capacitance Range Chart

# C1005 [EIA CC0402]

### Capacitance Range Chart

Temperature Characteristics: X7R ( $\pm 15\%$ ), X5R ( $\pm 15\%$ ), Y5V (+22/-82%)  
 Rated Voltage: 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance                      | X7S       |
|------------------|----------|--------------------------------|-----------|
|                  |          |                                | 2A (100V) |
| 1,000            | 102      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |
| 1,500            | 152      |                                |           |
| 2,200            | 222      |                                |           |
| 3,300            | 332      |                                |           |
| 4,700            | 472      |                                |           |
| 6,800            | 682      |                                |           |
| 10,000           | 103      |                                |           |

Standard Thickness

 0.50 mm



## Capacitance Range Table

## C1005 [EIA CC0402]

### Class 2 (Temperature Stable)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C1005X7S2A102K                     | X7S                            | 100V             | 1,000               | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A102M                     | X7S                            | 100V             | 1,000               | ± 20%                    | 0.50 ± 0.05       |
| C1005X7S2A152K                     | X7S                            | 100V             | 1,500               | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A152M                     | X7S                            | 100V             | 1,500               | ± 20%                    | 0.50 ± 0.05       |
| C1005X7S2A222K                     | X7S                            | 100V             | 2,200               | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A222M                     | X7S                            | 100V             | 2,200               | ± 20%                    | 0.50 ± 0.05       |
| C1005X7S2A332K                     | X7S                            | 100V             | 3,300               | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A332M                     | X7S                            | 100V             | 3,300               | ± 20%                    | 0.50 ± 0.05       |
| C1005X7S2A472K                     | X7S                            | 100V             | 4,700               | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A472M                     | X7S                            | 100V             | 4,700               | ± 20%                    | 0.50 ± 0.05       |
| C1005X7S2A682K                     | X7S                            | 100V             | 6,800               | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A682M                     | X7S                            | 100V             | 6,800               | ± 20%                    | 0.50 ± 0.05       |
| C1005X7S2A103K                     | X7S                            | 100V             | 10,000              | ± 10%                    | 0.50 ± 0.05       |
| C1005X7S2A103M                     | X7S                            | 100V             | 10,000              | ± 20%                    | 0.50 ± 0.05       |



## Capacitance Range Chart

## C1608 [EIA CC0603]

### Capacitance Range Chart

Temperature Characteristics: C0G ( $0 \pm 30\text{ppm}/^\circ\text{C}$ )  
 Rated Voltage: 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance    | C0G       |           |
|------------------|----------|--------------|-----------|-----------|
|                  |          |              | 2E (250V) | 2A (100V) |
| 100              | 101      | J: $\pm 5\%$ |           |           |
| 120              | 121      |              |           |           |
| 150              | 151      |              |           |           |
| 180              | 181      |              |           |           |
| 220              | 221      |              |           |           |
| 270              | 271      |              |           |           |
| 330              | 331      |              |           |           |
| 390              | 391      |              |           |           |
| 470              | 471      |              |           |           |
| 560              | 561      |              |           |           |
| 680              | 681      |              |           |           |
| 820              | 821      |              |           |           |
| 1,000            | 102      |              |           |           |
| 1,200            | 122      |              |           |           |

### Capacitance Range Chart

Temperature Characteristics: X7R ( $\pm 15\%$ ), X7S ( $\pm 22\%$ )  
 Rated Voltage: 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance                      | X7R       | X7S       |
|------------------|----------|--------------------------------|-----------|-----------|
|                  |          |                                | 2A (100V) | 2A (100V) |
| 1,000            | 102      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |           |
| 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      |                                |           |           |

Standard Thickness

0.80 mm



## Capacitance Range Table

## C1608 [EIA CC0603]

### Class 1 (Temperature Compensating)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C1608C0G2A101J                     | C0G                            | 100V             | 100                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A121J                     | C0G                            | 100V             | 120                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A151J                     | C0G                            | 100V             | 150                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A181J                     | C0G                            | 100V             | 180                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A221J                     | C0G                            | 100V             | 220                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A271J                     | C0G                            | 100V             | 270                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A331J                     | C0G                            | 100V             | 330                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A391J                     | C0G                            | 100V             | 390                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A471J                     | C0G                            | 100V             | 470                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A561J                     | C0G                            | 100V             | 560                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A681J                     | C0G                            | 100V             | 680                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A821J                     | C0G                            | 100V             | 820                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A102J                     | C0G                            | 100V             | 1,000               | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2A122J                     | C0G                            | 100V             | 1,200               | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E101J                     | C0G                            | 250V             | 100                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E121J                     | C0G                            | 250V             | 120                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E151J                     | C0G                            | 250V             | 150                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E181J                     | C0G                            | 250V             | 180                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E221J                     | C0G                            | 250V             | 220                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E271J                     | C0G                            | 250V             | 270                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E331J                     | C0G                            | 250V             | 330                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E391J                     | C0G                            | 250V             | 390                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E471J                     | C0G                            | 250V             | 470                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E561J                     | C0G                            | 250V             | 560                 | ± 5%                     | 0.80 ± 0.10       |
| C1608C0G2E681J                     | C0G                            | 250V             | 680                 | ± 5%                     | 0.80 ± 0.10       |

### Class 2 (Temperature Stable)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C1608X7R2A102K                     | X7R                            | 100V             | 1,000               | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A102M                     | X7R                            | 100V             | 1,000               | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A152K                     | X7R                            | 100V             | 1,500               | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A152M                     | X7R                            | 100V             | 1,500               | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A222K                     | X7R                            | 100V             | 2,200               | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A222M                     | X7R                            | 100V             | 2,200               | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A332K                     | X7R                            | 100V             | 3,300               | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A332M                     | X7R                            | 100V             | 3,300               | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A472K                     | X7R                            | 100V             | 4,700               | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A472M                     | X7R                            | 100V             | 4,700               | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A682K                     | X7R                            | 100V             | 6,800               | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A682M                     | X7R                            | 100V             | 6,800               | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A103K                     | X7R                            | 100V             | 10,000              | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A103M                     | X7R                            | 100V             | 10,000              | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A153K                     | X7R                            | 100V             | 15,000              | ± 10%                    | 0.80 ± 0.10       |



## Capacitance Range Table

## C1608 [EIA CC0603]

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%), X7S (-55 to +125°C, ±22%)

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C1608X7R2A153M                     | X7R                            | 100V             | 15,000              | ± 20%                    | 0.80 ± 0.10       |
| C1608X7R2A223K                     | X7R                            | 100V             | 22,000              | ± 10%                    | 0.80 ± 0.10       |
| C1608X7R2A223M                     | X7R                            | 100V             | 22,000              | ± 20%                    | 0.80 ± 0.10       |
| C1608X7S2A333K                     | X7S                            | 100V             | 33,000              | ± 10%                    | 0.80 ± 0.10       |
| C1608X7S2A333M                     | X7S                            | 100V             | 33,000              | ± 20%                    | 0.80 ± 0.10       |
| C1608X7S2A473K                     | X7S                            | 100V             | 47,000              | ± 10%                    | 0.80 ± 0.10       |
| C1608X7S2A473M                     | X7S                            | 100V             | 47,000              | ± 20%                    | 0.80 ± 0.10       |
| C1608X7S2A683K                     | X7S                            | 100V             | 68,000              | ± 10%                    | 0.80 ± 0.10       |
| C1608X7S2A683M                     | X7S                            | 100V             | 68,000              | ± 20%                    | 0.80 ± 0.10       |
| C1608X7S2A104K                     | X7S                            | 100V             | 100,000             | ± 10%                    | 0.80 ± 0.10       |
| C1608X7S2A104M                     | X7S                            | 100V             | 100,000             | ± 20%                    | 0.80 ± 0.10       |



## Capacitance Range Chart

## C2012 [EIA CC0805]

### Capacitance Range Chart

Temperature Characteristics: C0G ( $0 \pm 30\text{ppm}/^\circ\text{C}$ )  
 Rated Voltage: 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance    | C0G       |           |
|------------------|----------|--------------|-----------|-----------|
|                  |          |              | 2E (250V) | 2A (100V) |
| 100              | 101      | J: $\pm 5\%$ |           |           |
| 220              | 221      |              |           |           |
| 470              | 471      |              |           |           |
| 820              | 821      |              |           |           |
| 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      |              |           |           |

### Capacitance Range Chart

Temperature Characteristics: X7R ( $\pm 15\%$ ), X7S ( $\pm 22\%$ ), X7T ( $+22/-33\%$ )  
 Rated Voltage: 450V (2W), 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance                      | X7R       |           | X7S       | X7T       |           |
|------------------|----------|--------------------------------|-----------|-----------|-----------|-----------|-----------|
|                  |          |                                | 2E (250V) | 2A (100V) | 2A (100V) | 2W (450V) | 2E (250V) |
| 1,000            | 102      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |           |           |           |           |
| 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      |                                |           |           |           |           |           |
| 1,000,000        | 105      |                                |           |           |           |           |           |

### Standard Thickness

|  |         |
|--|---------|
|  | 0.60 mm |
|  | 0.85 mm |
|  | 1.25 mm |



## Capacitance Range Table

## C2012 [EIA CC0805]

### Class 1 (Temperature Compensating)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C2012C0G2A101J                     | C0G                            | 100V             | 100                 | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2A221J                     | C0G                            | 100V             | 220                 | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2A471J                     | C0G                            | 100V             | 470                 | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2A102J                     | C0G                            | 100V             | 1,000               | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2A122J                     | C0G                            | 100V             | 1,200               | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2A152J                     | C0G                            | 100V             | 1,500               | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2A182J                     | C0G                            | 100V             | 1,800               | ± 5%                     | 0.85 ± 0.10       |
| C2012C0G2A222J                     | C0G                            | 100V             | 2,200               | ± 5%                     | 0.85 ± 0.10       |
| C2012C0G2A272J                     | C0G                            | 100V             | 2,700               | ± 5%                     | 1.25 ± 0.20       |
| C2012C0G2A332J                     | C0G                            | 100V             | 3,300               | ± 5%                     | 1.25 ± 0.20       |
| C2012C0G2A392J                     | C0G                            | 100V             | 3,900               | ± 5%                     | 1.25 ± 0.20       |
| C2012C0G2A472J                     | C0G                            | 100V             | 4,700               | ± 5%                     | 1.25 ± 0.20       |
| C2012C0G2E101J                     | C0G                            | 250V             | 100                 | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2E821J                     | C0G                            | 250V             | 820                 | ± 5%                     | 0.60 ± 0.10       |
| C2012C0G2E102J                     | C0G                            | 250V             | 1,000               | ± 5%                     | 0.85 ± 0.10       |
| C2012C0G2E122J                     | C0G                            | 250V             | 1,200               | ± 5%                     | 0.85 ± 0.10       |
| C2012C0G2E152J                     | C0G                            | 250V             | 1,500               | ± 5%                     | 0.85 ± 0.10       |
| C2012C0G2E182J                     | C0G                            | 250V             | 1,800               | ± 5%                     | 1.25 ± 0.20       |
| C2012C0G2E222J                     | C0G                            | 250V             | 2,200               | ± 5%                     | 1.25 ± 0.20       |
| C2012C0G2E272J                     | C0G                            | 250V             | 2,700               | ± 5%                     | 1.25 ± 0.20       |

### Class 2 (Temperature Stable)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C2012X7R2A102K                     | X7R                            | 100V             | 1,000               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A102M                     | X7R                            | 100V             | 1,000               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A152K                     | X7R                            | 100V             | 1,500               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A152M                     | X7R                            | 100V             | 1,500               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A222K                     | X7R                            | 100V             | 2,200               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A222M                     | X7R                            | 100V             | 2,200               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A332K                     | X7R                            | 100V             | 3,300               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A332M                     | X7R                            | 100V             | 3,300               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A472K                     | X7R                            | 100V             | 4,700               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A472M                     | X7R                            | 100V             | 4,700               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A682K                     | X7R                            | 100V             | 6,800               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A682M                     | X7R                            | 100V             | 6,800               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A103K                     | X7R                            | 100V             | 10,000              | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A103M                     | X7R                            | 100V             | 10,000              | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A153K                     | X7R                            | 100V             | 15,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2A153M                     | X7R                            | 100V             | 15,000              | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2A223K                     | X7R                            | 100V             | 22,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2A223M                     | X7R                            | 100V             | 22,000              | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2A333K                     | X7R                            | 100V             | 33,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2A333M                     | X7R                            | 100V             | 33,000              | ± 20%                    | 1.25 ± 0.20       |



## Capacitance Range Table

## C2012 [EIA CC0805]

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%), X7S (-55 to +125°C, ±22%), X7T (-55 to +125°C, +22/-33%)

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C2012X7R2A473K                     | X7R                            | 100V             | 47,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2A473M                     | X7R                            | 100V             | 47,000              | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2A683K                     | X7R                            | 100V             | 68,000              | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2A683M                     | X7R                            | 100V             | 68,000              | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2A104K                     | X7R                            | 100V             | 100,000             | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2A104M                     | X7R                            | 100V             | 100,000             | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2E102K                     | X7R                            | 250V             | 1,000               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2E102M                     | X7R                            | 250V             | 1,000               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2E152K                     | X7R                            | 250V             | 1,500               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2E152M                     | X7R                            | 250V             | 1,500               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2E222K                     | X7R                            | 250V             | 2,200               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2E222M                     | X7R                            | 250V             | 2,200               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2E332K                     | X7R                            | 250V             | 3,300               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2E332M                     | X7R                            | 250V             | 3,300               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2E472K                     | X7R                            | 250V             | 4,700               | ± 10%                    | 0.85 ± 0.10       |
| C2012X7R2E472M                     | X7R                            | 250V             | 4,700               | ± 20%                    | 0.85 ± 0.10       |
| C2012X7R2E682K                     | X7R                            | 250V             | 6,800               | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2E682M                     | X7R                            | 250V             | 6,800               | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2E103K                     | X7R                            | 250V             | 10,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2E103M                     | X7R                            | 250V             | 10,000              | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2E153K                     | X7R                            | 250V             | 15,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2E153M                     | X7R                            | 250V             | 15,000              | ± 20%                    | 1.25 ± 0.20       |
| C2012X7R2E223K                     | X7R                            | 250V             | 22,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7R2E223M                     | X7R                            | 250V             | 22,000              | ± 20%                    | 1.25 ± 0.20       |
| C2012X7S2A154K                     | X7S                            | 100V             | 150,000             | ± 10%                    | 0.85 ± 0.10       |
| C2012X7S2A154M                     | X7S                            | 100V             | 150,000             | ± 20%                    | 0.85 ± 0.10       |
| C2012X7S2A224K                     | X7S                            | 100V             | 220,000             | ± 10%                    | 0.85 ± 0.10       |
| C2012X7S2A224M                     | X7S                            | 100V             | 220,000             | ± 20%                    | 0.85 ± 0.10       |
| C2012X7S2A334K                     | X7S                            | 100V             | 330,000             | ± 10%                    | 1.25 ± 0.20       |
| C2012X7S2A334M                     | X7S                            | 100V             | 330,000             | ± 20%                    | 1.25 ± 0.20       |
| C2012X7S2A474K                     | X7S                            | 100V             | 470,000             | ± 10%                    | 1.25 ± 0.20       |
| C2012X7S2A474M                     | X7S                            | 100V             | 470,000             | ± 20%                    | 1.25 ± 0.20       |
| C2012X7S2A105K                     | X7S                            | 100V             | 1,000,000           | ± 10%                    | 1.25 ± 0.20       |
| C2012X7S2A105M                     | X7S                            | 100V             | 1,000,000           | ± 20%                    | 1.25 ± 0.20       |
| C2012X7T2E333K                     | X7T                            | 250V             | 33,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7T2E473K                     | X7T                            | 250V             | 47,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7T2E683K                     | X7T                            | 250V             | 68,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7T2E104K                     | X7T                            | 250V             | 100,000             | ± 10%                    | 1.25 ± 0.20       |
| C2012X7T2W103K                     | X7T                            | 450V             | 10,000              | ± 10%                    | 0.85 ± 0.10       |
| C2012X7T2W153K                     | X7T                            | 450V             | 15,000              | ± 10%                    | 0.85 ± 0.10       |
| C2012X7T2W223K                     | X7T                            | 450V             | 22,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7T2W333K                     | X7T                            | 450V             | 33,000              | ± 10%                    | 1.25 ± 0.20       |
| C2012X7T2W473K                     | X7T                            | 450V             | 47,000              | ± 10%                    | 1.25 ± 0.20       |



## Capacitance Range Chart

## C3216 [EIA CC1206]

### Capacitance Range Chart

Temperature Characteristics: C0G ( $0 \pm 30\text{ppm}/^\circ\text{C}$ )

Rated Voltage: 630V (2J), 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance    | C0G       |           |           |
|------------------|----------|--------------|-----------|-----------|-----------|
|                  |          |              | 2J (630V) | 2E (250V) | 2A (100V) |
| 100              | 101      | J: $\pm 5\%$ |           |           |           |
| 120              | 121      |              |           |           |           |
| 150              | 151      |              |           |           |           |
| 180              | 181      |              |           |           |           |
| 220              | 221      |              |           |           |           |
| 270              | 271      |              |           |           |           |
| 330              | 331      |              |           |           |           |
| 390              | 391      |              |           |           |           |
| 470              | 471      |              |           |           |           |
| 560              | 561      |              |           |           |           |
| 680              | 681      |              |           |           |           |
| 820              | 821      |              |           |           |           |
| 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      |              |           |           |           |

### Capacitance Range Chart

Temperature Characteristics: X7R ( $\pm 15\%$ ), X7S ( $\pm 22\%$ ), X7T ( $+22/-33\%$ )

Rated Voltage: 630V (2J), 450V (2W), 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance                      | X7R       |           |           | X7S       | X7T       |           |           |
|------------------|----------|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  |          |                                | 2J (630V) | 2E (250V) | 2A (100V) | 2A (100V) | 2J (630V) | 2W (450V) | 2E (250V) |
| 1,000            | 102      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |           |           |           |           |           |           |
| 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      |                                |           |           |           |           |           |           |           |
| 1,000,000        | 105      |                                |           |           |           |           |           |           |           |
| 2,200,000        | 225      |                                |           |           |           |           |           |           |           |

### Standard Thickness

0.60 mm
 0.85 mm
 1.15 mm
 1.30 mm
 1.60 mm



## Capacitance Range Table

## C3216 [EIA CC1206]

### Class 1 (Temperature Compensating)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C3216C0G2A392J                     | C0G                            | 100V             | 3,900               | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2A472J                     | C0G                            | 100V             | 4,700               | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2A562J                     | C0G                            | 100V             | 5,600               | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2A682J                     | C0G                            | 100V             | 6,800               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2A822J                     | C0G                            | 100V             | 8,200               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2A103J                     | C0G                            | 100V             | 10,000              | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2E332J                     | C0G                            | 250V             | 3,300               | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2E392J                     | C0G                            | 250V             | 3,900               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2E472J                     | C0G                            | 250V             | 4,700               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2E562J                     | C0G                            | 250V             | 5,600               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2E682J                     | C0G                            | 250V             | 6,800               | ± 5%                     | 1.60 ± 0.30       |
| C3216C0G2E822J                     | C0G                            | 250V             | 8,200               | ± 5%                     | 1.60 ± 0.30       |
| C3216C0G2J101J                     | C0G                            | 630V             | 100                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J121J                     | C0G                            | 630V             | 120                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J151J                     | C0G                            | 630V             | 150                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J181J                     | C0G                            | 630V             | 180                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J221J                     | C0G                            | 630V             | 220                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J271J                     | C0G                            | 630V             | 270                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J331J                     | C0G                            | 630V             | 330                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J391J                     | C0G                            | 630V             | 390                 | ± 5%                     | 0.60 ± 0.10       |
| C3216C0G2J471J                     | C0G                            | 630V             | 470                 | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2J561J                     | C0G                            | 630V             | 560                 | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2J681J                     | C0G                            | 630V             | 680                 | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2J821J                     | C0G                            | 630V             | 820                 | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2J102J                     | C0G                            | 630V             | 1,000               | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2J122J                     | C0G                            | 630V             | 1,200               | ± 5%                     | 0.85 ± 0.10       |
| C3216C0G2J152J                     | C0G                            | 630V             | 1,500               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2J182J                     | C0G                            | 630V             | 1,800               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2J222J                     | C0G                            | 630V             | 2,200               | ± 5%                     | 1.15 ± 0.10       |
| C3216C0G2J272J                     | C0G                            | 630V             | 2,700               | ± 5%                     | 1.60 ± 0.30       |
| C3216C0G2J332J                     | C0G                            | 630V             | 3,300               | ± 5%                     | 1.60 ± 0.30       |

### Class 2 (Temperature Stable)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C3216X7R2A333K                     | X7R                            | 100V             | 33,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2A333M                     | X7R                            | 100V             | 33,000              | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2A473K                     | X7R                            | 100V             | 47,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2A473M                     | X7R                            | 100V             | 47,000              | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2A683K                     | X7R                            | 100V             | 68,000              | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2A683M                     | X7R                            | 100V             | 68,000              | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2A104K                     | X7R                            | 100V             | 100,000             | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2A104M                     | X7R                            | 100V             | 100,000             | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2A154K                     | X7R                            | 100V             | 150,000             | ± 10%                    | 1.60 ± 0.30       |



## Capacitance Range Table

## C3216 [EIA CC1206]

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%), X7S (-55 to +125°C, ±22%), X7T (-55 to +125°C, +22/-33%)

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C3216X7R2A154M                     | X7R                            | 100V             | 150,000             | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2A224K                     | X7R                            | 100V             | 220,000             | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2A224M                     | X7R                            | 100V             | 220,000             | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2A334K                     | X7R                            | 100V             | 330,000             | ± 10%                    | 1.30 ± 0.15       |
| C3216X7R2A334M                     | X7R                            | 100V             | 330,000             | ± 20%                    | 1.30 ± 0.15       |
| C3216X7R2A474K                     | X7R                            | 100V             | 470,000             | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2A474M                     | X7R                            | 100V             | 470,000             | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2A105K                     | X7R                            | 100V             | 1,000,000           | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2A105M                     | X7R                            | 100V             | 1,000,000           | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2E153K                     | X7R                            | 250V             | 15,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2E153M                     | X7R                            | 250V             | 15,000              | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2E223K                     | X7R                            | 250V             | 22,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2E223M                     | X7R                            | 250V             | 22,000              | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2E333K                     | X7R                            | 250V             | 33,000              | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2E333M                     | X7R                            | 250V             | 33,000              | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2E473K                     | X7R                            | 250V             | 47,000              | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2E473M                     | X7R                            | 250V             | 47,000              | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2E683K                     | X7R                            | 250V             | 68,000              | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2E683M                     | X7R                            | 250V             | 68,000              | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2E104K                     | X7R                            | 250V             | 100,000             | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2E104M                     | X7R                            | 250V             | 100,000             | ± 20%                    | 1.60 ± 0.30       |
| C3216X7R2J102K                     | X7R                            | 630V             | 1,000               | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J102M                     | X7R                            | 630V             | 1,000               | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J152K                     | X7R                            | 630V             | 1,500               | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J152M                     | X7R                            | 630V             | 1,500               | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J222K                     | X7R                            | 630V             | 2,200               | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J222M                     | X7R                            | 630V             | 2,200               | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J332K                     | X7R                            | 630V             | 3,300               | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J332M                     | X7R                            | 630V             | 3,300               | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J472K                     | X7R                            | 630V             | 4,700               | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J472M                     | X7R                            | 630V             | 4,700               | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J682K                     | X7R                            | 630V             | 6,800               | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J682M                     | X7R                            | 630V             | 6,800               | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J103K                     | X7R                            | 630V             | 10,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7R2J103M                     | X7R                            | 630V             | 10,000              | ± 20%                    | 1.15 ± 0.10       |
| C3216X7R2J153K                     | X7R                            | 630V             | 15,000              | ± 10%                    | 1.30 ± 0.15       |
| C3216X7R2J153M                     | X7R                            | 630V             | 15,000              | ± 20%                    | 1.30 ± 0.15       |
| C3216X7R2J223K                     | X7R                            | 630V             | 22,000              | ± 10%                    | 1.30 ± 0.15       |
| C3216X7R2J223M                     | X7R                            | 630V             | 22,000              | ± 20%                    | 1.30 ± 0.15       |
| C3216X7R2J333K                     | X7R                            | 630V             | 33,000              | ± 10%                    | 1.60 ± 0.30       |
| C3216X7R2J333M                     | X7R                            | 630V             | 33,000              | ± 20%                    | 1.60 ± 0.30       |
| C3216X7S2A225K                     | X7S                            | 100V             | 2,200,000           | ± 10%                    | 1.60 ± 0.30       |
| C3216X7S2A225M                     | X7S                            | 100V             | 2,200,000           | ± 20%                    | 1.60 ± 0.30       |
| C3216X7T2E154K                     | X7T                            | 250V             | 150,000             | ± 10%                    | 1.30 ± 0.15       |



## Capacitance Range Table

## C3216 [EIA CC1206]

### Class 2 (Temperature Stable)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C3216X7T2E224K                     | X7T                            | 250V             | 220,000             | ± 10%                    | 1.60 ± 0.30       |
| C3216X7T2W683K                     | X7T                            | 450V             | 68,000              | ± 10%                    | 1.30 ± 0.15       |
| C3216X7T2W104K                     | X7T                            | 450V             | 100,000             | ± 10%                    | 1.60 ± 0.30       |
| C3216X7T2J103K                     | X7T                            | 630V             | 10,000              | ± 10%                    | 0.85 ± 0.10       |
| C3216X7T2J153K                     | X7T                            | 630V             | 15,000              | ± 10%                    | 0.85 ± 0.10       |
| C3216X7T2J223K                     | X7T                            | 630V             | 22,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7T2J333K                     | X7T                            | 630V             | 33,000              | ± 10%                    | 1.15 ± 0.10       |
| C3216X7T2J473K                     | X7T                            | 630V             | 47,000              | ± 10%                    | 1.60 ± 0.30       |



## Capacitance Range Chart

## C3225 [EIA CC1210]

### Capacitance Range Chart

Temperature Characteristics: C0G ( $0 \pm 30\text{ppm}/^\circ\text{C}$ )  
 Rated Voltage: 630V (2J), 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance    | C0G       |           |           |
|------------------|----------|--------------|-----------|-----------|-----------|
|                  |          |              | 2J (630V) | 2E (250V) | 2A (100V) |
| 3,900            | 392      | J: $\pm 5\%$ |           |           |           |
| 4,700            | 472      |              |           |           |           |
| 5,600            | 562      |              |           |           |           |
| 6,800            | 682      |              |           |           |           |
| 10,000           | 103      |              |           |           |           |
| 15,000           | 153      |              |           |           |           |
| 22,000           | 223      |              |           |           |           |
| 33,000           | 333      |              |           |           |           |
| 47,000           | 473      |              |           |           |           |

### Capacitance Range Chart

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

| Capacitance (pF) | Cap Code | Tolerance                      | X7R       |           |           | X7S       | X7T       |           |           |
|------------------|----------|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  |          |                                | 2J (630V) | 2E (250V) | 2A (100V) | 2A (100V) | 2J (630V) | 2W (450V) | 2E (250V) |
| 47,000           | 473      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |           |           |           |           |           |           |
| 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      |                                |           |           |           |           |           |           |           |
| 2,200,000        | 225      |                                |           |           |           |           |           |           |           |
| 3,300,000        | 335      |                                |           |           |           |           |           |           |           |
| 4,700,000        | 475      |                                |           |           |           |           |           |           |           |

### Standard Thickness

|  |         |
|--|---------|
|  | 1.25 mm |
|  | 1.60 mm |
|  | 2.00 mm |
|  | 2.30 mm |



## Capacitance Range Table

## C3225 [EIA CC1210]

### Class 1 (Temperature Compensating)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C3225C0G2A153J                     | C0G                            | 100V             | 15,000              | ± 5%                     | 1.30 ± 0.15       |
| C3225C0G2A223J                     | C0G                            | 100V             | 22,000              | ± 5%                     | 1.60 ± 0.30       |
| C3225C0G2A333J                     | C0G                            | 100V             | 33,000              | ± 5%                     | 2.00 ± 0.20       |
| C3225C0G2A473J                     | C0G                            | 100V             | 47,000              | ± 5%                     | 2.30 ± 0.20       |
| C3225C0G2E103J                     | C0G                            | 250V             | 10,000              | ± 5%                     | 1.60 ± 0.30       |
| C3225C0G2E153J                     | C0G                            | 250V             | 15,000              | ± 5%                     | 2.00 ± 0.20       |
| C3225C0G2J392J                     | C0G                            | 630V             | 3,900               | ± 5%                     | 1.30 ± 0.15       |
| C3225C0G2J472J                     | C0G                            | 630V             | 4,700               | ± 5%                     | 1.60 ± 0.30       |
| C3225C0G2J562J                     | C0G                            | 630V             | 5,600               | ± 5%                     | 1.60 ± 0.30       |
| C3225C0G2J682J                     | C0G                            | 630V             | 6,800               | ± 5%                     | 2.00 ± 0.20       |

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%), X7S (-55 to +125°C, ±22%), X7T (-55 to +125°C, +22/-33%)

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C3225X7R2A334K                     | X7R                            | 100V             | 330,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2A334M                     | X7R                            | 100V             | 330,000             | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2A474K                     | X7R                            | 100V             | 470,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2A474M                     | X7R                            | 100V             | 470,000             | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2A684K                     | X7R                            | 100V             | 680,000             | ± 10%                    | 1.60 ± 0.30       |
| C3225X7R2A684M                     | X7R                            | 100V             | 680,000             | ± 20%                    | 1.60 ± 0.30       |
| C3225X7R2A105K                     | X7R                            | 100V             | 1,000,000           | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2A105M                     | X7R                            | 100V             | 1,000,000           | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2A225K                     | X7R                            | 100V             | 2,200,000           | ± 10%                    | 2.30 ± 0.20       |
| C3225X7R2A225M                     | X7R                            | 100V             | 2,200,000           | ± 20%                    | 2.30 ± 0.20       |
| C3225X7R2E104K                     | X7R                            | 250V             | 100,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2E104M                     | X7R                            | 250V             | 100,000             | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2E154K                     | X7R                            | 250V             | 150,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2E154M                     | X7R                            | 250V             | 150,000             | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2E224K                     | X7R                            | 250V             | 220,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2E224M                     | X7R                            | 250V             | 220,000             | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2J473K                     | X7R                            | 630V             | 47,000              | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2J473M                     | X7R                            | 630V             | 47,000              | ± 20%                    | 2.00 ± 0.20       |
| C3225X7R2J683K                     | X7R                            | 630V             | 68,000              | ± 10%                    | 2.00 ± 0.20       |
| C3225X7R2J683M                     | X7R                            | 630V             | 68,000              | ± 20%                    | 2.00 ± 0.20       |
| C3225X7S2A335K                     | X7S                            | 100V             | 3,300,000           | ± 10%                    | 2.00 ± 0.20       |
| C3225X7S2A335M                     | X7S                            | 100V             | 3,300,000           | ± 20%                    | 2.00 ± 0.20       |
| C3225X7S2A475K                     | X7S                            | 100V             | 4,700,000           | ± 10%                    | 2.00 ± 0.20       |
| C3225X7S2A475M                     | X7S                            | 100V             | 4,700,000           | ± 20%                    | 2.00 ± 0.20       |
| C3225X7T2E334K                     | X7T                            | 250V             | 330,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7T2W224K                     | X7T                            | 450V             | 220,000             | ± 10%                    | 2.00 ± 0.20       |
| C3225X7T2J104K                     | X7T                            | 630V             | 100,000             | ± 10%                    | 1.60 ± 0.30       |
| C3225X7T2J154K                     | X7T                            | 630V             | 150,000             | ± 10%                    | 2.00 ± 0.20       |



## Capacitance Range Chart

# C4532 [EIA CC1812]

### Capacitance Range Chart

Temperature Characteristics: C0G ( $0 \pm 30\text{ppm}/^\circ\text{C}$ )  
 Rated Voltage: 630V (2J), 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance    | C0G       |           |           |
|------------------|----------|--------------|-----------|-----------|-----------|
|                  |          |              | 2J (630V) | 2E (250V) | 2A (100V) |
| 8,200            | 822      | J: $\pm 5\%$ |           |           |           |
| 10,000           | 103      |              |           |           |           |
| 15,000           | 153      |              |           |           |           |
| 22,000           | 223      |              |           |           |           |
| 33,000           | 333      |              |           |           |           |
| 47,000           | 473      |              |           |           |           |
| 68,000           | 683      |              |           |           |           |
| 100,000          | 104      |              |           |           |           |

### Capacitance Range Chart

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

| Capacitance (pF) | Cap Code | Tolerance                      | X7R       |           |           | X7S       | X7T       |           |           |
|------------------|----------|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  |          |                                | 2J (630V) | 2E (250V) | 2A (100V) | 2A (100V) | 2J (630V) | 2W (450V) | 2E (250V) |
| 68,000           | 683      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |           |           |           |           |           |           |
| 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      |                                |           |           |           |           |           |           |           |
| 4,700,000        | 475      |                                |           |           |           |           |           |           |           |

### Standard Thickness

|  |         |
|--|---------|
|  | 1.60 mm |
|  | 2.00 mm |
|  | 2.30 mm |
|  | 2.50 mm |
|  | 3.20 mm |



## Capacitance Range Table

## C4532 [EIA CC1812]

### Class 1 (Temperature Compensating)

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

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C4532C0G2A473J                     | C0G                            | 100V             | 47,000              | ± 5%                     | 2.00 ± 0.20       |
| C4532C0G2A683J                     | C0G                            | 100V             | 68,000              | ± 5%                     | 2.50 ± 0.30       |
| C4532C0G2A104J                     | C0G                            | 100V             | 100,000             | ± 5%                     | 3.20 ± 0.30       |
| C4532C0G2E223J                     | C0G                            | 250V             | 22,000              | ± 5%                     | 1.60 ± 0.30       |
| C4532C0G2E333J                     | C0G                            | 250V             | 33,000              | ± 5%                     | 2.00 ± 0.20       |
| C4532C0G2E473J                     | C0G                            | 250V             | 47,000              | ± 5%                     | 3.20 ± 0.30       |
| C4532C0G2J822J                     | C0G                            | 630V             | 8,200               | ± 5%                     | 1.60 ± 0.30       |
| C4532C0G2J103J                     | C0G                            | 630V             | 10,000              | ± 5%                     | 1.60 ± 0.30       |
| C4532C0G2J153J                     | C0G                            | 630V             | 15,000              | ± 5%                     | 2.50 ± 0.30       |
| C4532C0G2J223J                     | C0G                            | 630V             | 22,000              | ± 5%                     | 3.20 ± 0.30       |

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%), X7S (-55 to +125°C, ±22%), X7T (-55 to +125°C, +22/-33%)

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C4532X7R2A684K                     | X7R                            | 100V             | 680,000             | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2A684M                     | X7R                            | 100V             | 680,000             | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2A105K                     | X7R                            | 100V             | 1,000,000           | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2A105M                     | X7R                            | 100V             | 1,000,000           | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2A155K                     | X7R                            | 100V             | 1,500,000           | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2A155M                     | X7R                            | 100V             | 1,500,000           | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2A225K                     | X7R                            | 100V             | 2,200,000           | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2A225M                     | X7R                            | 100V             | 2,200,000           | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2E154K                     | X7R                            | 250V             | 150,000             | ± 10%                    | 1.60 ± 0.30       |
| C4532X7R2E154M                     | X7R                            | 250V             | 150,000             | ± 20%                    | 1.60 ± 0.30       |
| C4532X7R2E224K                     | X7R                            | 250V             | 220,000             | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2E224M                     | X7R                            | 250V             | 220,000             | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2E334K                     | X7R                            | 250V             | 330,000             | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2E334M                     | X7R                            | 250V             | 330,000             | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2E474K                     | X7R                            | 250V             | 470,000             | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2E474M                     | X7R                            | 250V             | 470,000             | ± 20%                    | 2.30 ± 0.20       |
| C4532X7R2J683K                     | X7R                            | 630V             | 68,000              | ± 10%                    | 1.60 ± 0.30       |
| C4532X7R2J683M                     | X7R                            | 630V             | 68,000              | ± 20%                    | 1.60 ± 0.30       |
| C4532X7R2J104K                     | X7R                            | 630V             | 100,000             | ± 10%                    | 2.30 ± 0.20       |
| C4532X7R2J104M                     | X7R                            | 630V             | 100,000             | ± 20%                    | 2.30 ± 0.20       |
| C4532X7S2A475M                     | X7S                            | 100V             | 4,700,000           | ± 20%                    | 2.30 ± 0.20       |
| C4532X7T2E684K                     | X7T                            | 250V             | 680,000             | ± 10%                    | 1.60 ± 0.30       |
| C4532X7T2E105K                     | X7T                            | 250V             | 1,000,000           | ± 10%                    | 2.50 ± 0.30       |
| C4532X7T2W334K                     | X7T                            | 450V             | 330,000             | ± 10%                    | 1.60 ± 0.30       |
| C4532X7T2W474K                     | X7T                            | 450V             | 470,000             | ± 10%                    | 2.30 ± 0.20       |
| C4532X7T2J154K                     | X7T                            | 630V             | 150,000             | ± 10%                    | 1.60 ± 0.30       |
| C4532X7T2J224K                     | X7T                            | 630V             | 220,000             | ± 10%                    | 2.00 ± 0.20       |



## Capacitance Range Chart

# C5750 [EIA CC2220]

### Capacitance Range Chart

Temperature Characteristics: X7R ( $\pm 15\%$ ), X7S ( $\pm 22\%$ ), X7T ( $+22/-33\%$ ), X6S ( $\pm 22\%$ )  
 Rated Voltage: 630V (2J), 450V (2W), 250V (2E), 100V (2A)

| Capacitance (pF) | Cap Code | Tolerance                      | X7R       |           |           | X7S       | X7T       |           |           | X6S       |
|------------------|----------|--------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  |          |                                | 2J (630V) | 2E (250V) | 2A (100V) | 2A (100V) | 2J (630V) | 2W (450V) | 2E (250V) | 2W (450V) |
| 150,000          | 154      | K: $\pm 10\%$<br>M: $\pm 20\%$ |           |           |           |           |           |           |           |           |
| 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      |                                |           |           |           |           |           |           |           |           |
| 10,000,000       | 106      |                                |           |           |           |           |           |           |           |           |
| 15,000,000       | 156      |                                |           |           |           |           |           |           |           |           |

### Standard Thickness

|  |         |
|--|---------|
|  | 1.60 mm |
|  | 2.00 mm |
|  | 2.30 mm |
|  | 2.50 mm |



## Capacitance Range Table

## C5750 [EIA CC2220]

### Class 2 (Temperature Stable)

Temperature Characteristics: X7R (-55 to +125°C, ±15%), X7S (-55 to +125°C, ±22%), X7T (-55 to +125°C, +22/-33%), X6S (-55 to +105°C, ±22%)

| TDK Part Number<br>(Ordering Code) | Temperature<br>Characteristics | Rated<br>Voltage | Capacitance<br>(pF) | Capacitance<br>Tolerance | Thickness<br>(mm) |
|------------------------------------|--------------------------------|------------------|---------------------|--------------------------|-------------------|
| C5750X7R2A105K                     | X7R                            | 100V             | 1,000,000           | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2A105M                     | X7R                            | 100V             | 1,000,000           | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2A155K                     | X7R                            | 100V             | 1,500,000           | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2A155M                     | X7R                            | 100V             | 1,500,000           | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2A225K                     | X7R                            | 100V             | 2,200,000           | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2A225M                     | X7R                            | 100V             | 2,200,000           | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2A335K                     | X7R                            | 100V             | 3,300,000           | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2A335M                     | X7R                            | 100V             | 3,300,000           | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2A475K                     | X7R                            | 100V             | 4,700,000           | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2A475M                     | X7R                            | 100V             | 4,700,000           | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2E334K                     | X7R                            | 250V             | 330,000             | ± 10%                    | 1.60 ± 0.30       |
| C5750X7R2E334M                     | X7R                            | 250V             | 330,000             | ± 20%                    | 1.60 ± 0.30       |
| C5750X7R2E474K                     | X7R                            | 250V             | 470,000             | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2E474M                     | X7R                            | 250V             | 470,000             | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2E684K                     | X7R                            | 250V             | 680,000             | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2E684M                     | X7R                            | 250V             | 680,000             | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2E105K                     | X7R                            | 250V             | 1,000,000           | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2E105M                     | X7R                            | 250V             | 1,000,000           | ± 20%                    | 2.30 ± 0.20       |
| C5750X7R2J154K                     | X7R                            | 630V             | 150,000             | ± 10%                    | 1.60 ± 0.30       |
| C5750X7R2J154M                     | X7R                            | 630V             | 150,000             | ± 20%                    | 1.60 ± 0.30       |
| C5750X7R2J224K                     | X7R                            | 630V             | 220,000             | ± 10%                    | 2.30 ± 0.20       |
| C5750X7R2J224M                     | X7R                            | 630V             | 220,000             | ± 20%                    | 2.30 ± 0.20       |
| C5750X7S2A106M                     | X7S                            | 100V             | 10,000,000          | ± 20%                    | 2.30 ± 0.20       |
| C5750X7S2A156M                     | X7S                            | 100V             | 15,000,000          | ± 20%                    | 2.50 ± 0.30       |
| C5750X7T2E155K                     | X7T                            | 250V             | 1,500,000           | ± 10%                    | 2.00 ± 0.20       |
| C5750X7T2E225K                     | X7T                            | 250V             | 2,200,000           | ± 10%                    | 2.50 ± 0.30       |
| C5750X7T2W684K                     | X7T                            | 450V             | 680,000             | ± 10%                    | 2.00 ± 0.20       |
| C5750X7T2W105K                     | X7T                            | 450V             | 1,000,000           | ± 10%                    | 2.50 ± 0.30       |
| C5750X7T2J334K                     | X7T                            | 630V             | 330,000             | ± 10%                    | 2.00 ± 0.20       |
| C5750X7T2J474K                     | X7T                            | 630V             | 470,000             | ± 10%                    | 2.50 ± 0.30       |
| C5750X6S2W105K                     | X6S                            | 450V             | 1,000,000           | ± 10%                    | 2.50 ± 0.30       |
| C5750X6S2W225K                     | X6S                            | 450V             | 2,200,000           | ± 10%                    | 2.50 ± 0.30       |



## General Specifications

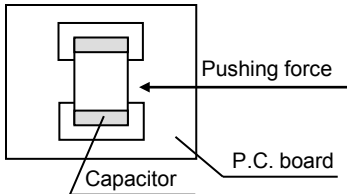
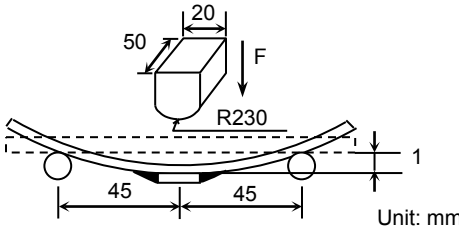
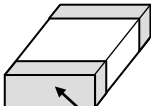
## C Series – Mid Voltage Application

| No.     | Item                                                 | Performance                                                                                                                                                              | Test or Inspection Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
|---------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------|------------|-------------------------------------------------|-------------|-----------|---------------------|----------------|---------------------|-------------------------|-----------|------------|-------------------------|--|--|--|--------------------------|
| 1       | External Appearance                                  | No defects which may affect performance.                                                                                                                                 | Inspect with magnifying glass (3×).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| 2       | Insulation Resistance                                | 10,000MΩ or 500MΩ•μF min. whichever smaller.                                                                                                                             | Apply rated voltage for 60s. As for the rated voltage 630V DC, apply 500V DC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| 3       | Voltage Proof                                        | Withstand test voltage without insulation breakdown or other damage.                                                                                                     | <table><tr><th>Class</th><th>Rated Voltage</th><th>Apply voltage</th></tr><tr><td rowspan="2">Class 1</td><td>100V</td><td>3 × rated voltage</td></tr><tr><td>Over 100V</td><td>1.5 × rated voltage</td></tr><tr><td rowspan="2">Class 2</td><td>100V</td><td>2.5 × rated voltage</td></tr><tr><td>Over 100V</td><td>1.5 × rated voltage</td></tr></table> <p>Above DC voltage shall be applied for 1 to 5s. Charge / discharge current shall not exceed 50mA.</p>                                                                                            | Class                   | Rated Voltage     | Apply voltage       | Class 1                                                                                                                                                            | 100V      | 3 × rated voltage | Over 100V  | 1.5 × rated voltage                             | Class 2     | 100V      | 2.5 × rated voltage | Over 100V      | 1.5 × rated voltage |                         |           |            |                         |  |  |  |                          |
| Class   | Rated Voltage                                        | Apply voltage                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| Class 1 | 100V                                                 | 3 × rated voltage                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
|         | Over 100V                                            | 1.5 × rated voltage                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| Class 2 | 100V                                                 | 2.5 × rated voltage                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
|         | Over 100V                                            | 1.5 × rated voltage                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| 4       | Capacitance                                          | Within the specified tolerance.                                                                                                                                          | <table><tr><th>Class</th><th>Rated Capacitance</th><th>Measuring Frequency</th><th>Measuring voltage</th></tr><tr><td rowspan="2">Class 1</td><td>1000pF and under</td><td>1MHz±10%</td><td rowspan="2">0.5 - 5 V<sub>rms</sub></td></tr><tr><td>Over 1000pF</td><td>1kHz± 10%</td></tr><tr><td rowspan="2">Class 2</td><td>10uF and under</td><td>1kHz±10%</td><td>0.5±0.2V<sub>rms</sub></td></tr><tr><td>Over 10uF</td><td>120Hz± 20%</td><td>1.0±0.2V<sub>rms</sub></td></tr><tr><td></td><td></td><td></td><td>0.5±0.2 V<sub>rms</sub></td></tr></table> | Class                   | Rated Capacitance | Measuring Frequency | Measuring voltage                                                                                                                                                  | Class 1   | 1000pF and under  | 1MHz±10%   | 0.5 - 5 V <sub>rms</sub>                        | Over 1000pF | 1kHz± 10% | Class 2             | 10uF and under | 1kHz±10%            | 0.5±0.2V <sub>rms</sub> | Over 10uF | 120Hz± 20% | 1.0±0.2V <sub>rms</sub> |  |  |  | 0.5±0.2 V <sub>rms</sub> |
| Class   | Rated Capacitance                                    | Measuring Frequency                                                                                                                                                      | Measuring voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| Class 1 | 1000pF and under                                     | 1MHz±10%                                                                                                                                                                 | 0.5 - 5 V <sub>rms</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
|         | Over 1000pF                                          | 1kHz± 10%                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| Class 2 | 10uF and under                                       | 1kHz±10%                                                                                                                                                                 | 0.5±0.2V <sub>rms</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
|         | Over 10uF                                            | 120Hz± 20%                                                                                                                                                               | 1.0±0.2V <sub>rms</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
|         |                                                      |                                                                                                                                                                          | 0.5±0.2 V <sub>rms</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| 5       | Q (Class 1)                                          | 1,000 min.                                                                                                                                                               | See No.4 in this table for measuring condition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| 6       | Dissipation Factor (Class 2)                         | <table><tr><th>T.C.</th><th>D.F.</th></tr><tr><td>X7R</td><td>0.05 max.</td></tr><tr><td>X7S</td><td>0.05 max.</td></tr><tr><td>X7T</td><td>0.025 max.</td></tr></table> | T.C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | D.F.                    | X7R               | 0.05 max.           | X7S                                                                                                                                                                | 0.05 max. | X7T               | 0.025 max. | See No.4 in this table for measuring condition. |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| T.C.    | D.F.                                                 |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| X7R     | 0.05 max.                                            |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| X7S     | 0.05 max.                                            |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| X7T     | 0.025 max.                                           |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| 7       | Temperature Characteristics of Capacitance (Class 1) | <table><tr><th>T.C.</th><th>Temperature Coefficient</th></tr><tr><td>C0G</td><td>0 ± 30 (ppm/°C)</td></tr></table> <p>Capacitance drift within ± 0.2%</p>                | T.C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Temperature Coefficient | C0G               | 0 ± 30 (ppm/°C)     | <p>Temperature coefficient shall be calculated based on values at 25°C and 85°C temperature.</p> <p>Measuring temperature below 20°C shall be -10°C and -25°C.</p> |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| T.C.    | Temperature Coefficient                              |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |
| C0G     | 0 ± 30 (ppm/°C)                                      |                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |                   |                     |                                                                                                                                                                    |           |                   |            |                                                 |             |           |                     |                |                     |                         |           |            |                         |  |  |  |                          |



## General Specifications

## C Series – Mid Voltage Application

| No.  | Item                                                 | Performance                                                                                                                                                                                                                                                                                                                          | Test or Inspection Method                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                  |   |                     |   |                          |   |                     |   |                          |
|------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|---|---------------------|---|--------------------------|---|---------------------|---|--------------------------|
| 8    | Temperature Characteristics of Capacitance (Class 2) | Capacitance Change (%)<br><div>No Voltage Applied<br/>X7R: ± 15%<br/>X7S: ± 22%<br/>X7T: +22/-33%</div>                                                                                                                                                                                                                              | Capacitance shall be measured by the steps shown in the following table after thermal equilibrium is obtained for each step.<br>ΔC be calculated ref. STEP 3 reading<br><table><tr><th>Step</th><th>Temperature (°C)</th></tr><tr><td>1</td><td>Reference temp. ± 2</td></tr><tr><td>2</td><td>Min. operating temp. ± 2</td></tr><tr><td>3</td><td>Reference temp. ± 2</td></tr><tr><td>4</td><td>Max. operating temp. ± 2</td></tr></table> | Step | Temperature (°C) | 1 | Reference temp. ± 2 | 2 | Min. operating temp. ± 2 | 3 | Reference temp. ± 2 | 4 | Max. operating temp. ± 2 |
| Step | Temperature (°C)                                     |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                  |   |                     |   |                          |   |                     |   |                          |
| 1    | Reference temp. ± 2                                  |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                  |   |                     |   |                          |   |                     |   |                          |
| 2    | Min. operating temp. ± 2                             |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                  |   |                     |   |                          |   |                     |   |                          |
| 3    | Reference temp. ± 2                                  |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                  |   |                     |   |                          |   |                     |   |                          |
| 4    | Max. operating temp. ± 2                             |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                  |   |                     |   |                          |   |                     |   |                          |
| 9    | Robustness of Terminations                           | No sign of termination coming off, breakage of ceramic, or other abnormal signs.                                                                                                                                                                                                                                                     | Reflow solder the capacitors on P.C. board (shown in Appendix 1a or Appendix 1b) and apply a pushing force of 2N (C1005) or 5N (C1608, C2012, C3216, C3225, C4532, C5750) with 10±1s.<br>                                                                                                                                                                  |      |                  |   |                     |   |                          |   |                     |   |                          |
| 10   | Bending                                              | No mechanical damage.                                                                                                                                                                                                                                                                                                                | Reflow solder the capacitors on P.C. board (shown in Appendix 2a or Appendix 2b) and bend 1mm.<br>                                                                                                                                                                                                                                                       |      |                  |   |                     |   |                          |   |                     |   |                          |
| 11   | Solderability                                        | New solder to cover over 75% of termination.<br><br>25% may have pin holes or rough spots but not concentrated in one spot.<br><br>Ceramic surface of A sections shall not be exposed due to melting or shifting of termination material.<br><br> | Completely soak both terminations in solder at 235±5°C for 2±0.5s.<br><br>Solder : H63A (JIS Z 3282)<br><br>Flux : Isopropyl alcohol (JIS K 8839)<br>Rosin (JIS K 5902) 25% solid solution.                                                                                                                                                                                                                                                  |      |                  |   |                     |   |                          |   |                     |   |                          |



## General Specifications

## C Series – Mid Voltage Application

| No. | Item                             | Performance                                                                          | Test or Inspection Method                                                                                                                                                                                                                   |
|-----|----------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12  | <b>Resistance to solder heat</b> |                                                                                      | Completely soak both terminations in solder at $260 \pm 5^\circ\text{C}$ for $5 \pm 1\text{s}$ .                                                                                                                                            |
|     | External appearance              | No cracks are allowed and terminations shall be covered at least 60% with new solder | Preheating condition<br>Temp. : $150 \pm 10^\circ\text{C}$<br>Time : 1 to 2min.                                                                                                                                                             |
|     | Capacitance                      | <b>Characteristics</b>                                                               | Flux: Isopropyl alcohol (JIS K 8839)<br>Rosin (JIS K 5902) 25% solid solution.<br><br>Solder: H63A (JIS Z 3282)<br><br>Leave the capacitor in ambient conditions for 6 to 24h (Class 1) or $24 \pm 2\text{h}$ (Class 2) before measurement. |
|     |                                  | <b>Change from the value before test</b>                                             |                                                                                                                                                                                                                                             |
|     |                                  | Class 1    C0G                                                                       |                                                                                                                                                                                                                                             |
|     |                                  | Class 2    X7R<br>X7S<br>X7T                                                         |                                                                                                                                                                                                                                             |
|     | Q (Class 1)                      | 1,000 min.                                                                           |                                                                                                                                                                                                                                             |
|     | D.F. (Class 2)                   | Meet the initial spec.                                                               |                                                                                                                                                                                                                                             |
|     | Insulation Resistance            | Meet the initial spec.                                                               |                                                                                                                                                                                                                                             |
|     | Voltage Proof                    | No insulation breakdown or other damage.                                             |                                                                                                                                                                                                                                             |
| 13  | <b>Vibration</b>                 |                                                                                      | Reflow solder the capacitor on a P.C. board (shown in Appendix 1a or Appendix 1b) before testing.                                                                                                                                           |
|     | External appearance              | No mechanical damage.                                                                | Vibrate the capacitor with amplitude of 1.5mm P-P sweeping the frequencies from 10Hz to 55Hz and back to 10Hz in about 1min.                                                                                                                |
|     | Capacitance                      | <b>Characteristics</b>                                                               | Repeat this for 2h each in 3 perpendicular directions.                                                                                                                                                                                      |
|     |                                  | <b>Change from the value before test</b>                                             |                                                                                                                                                                                                                                             |
|     |                                  | Class 1    C0G                                                                       |                                                                                                                                                                                                                                             |
|     |                                  | Class 2    X7R<br>X7S<br>X7T                                                         |                                                                                                                                                                                                                                             |
|     | Q (Class 1)                      | 1,000 min.                                                                           |                                                                                                                                                                                                                                             |
|     | D.F. (Class 2)                   | Meet the initial spec.                                                               |                                                                                                                                                                                                                                             |



| No.                   | Item                                       | Performance                                                                                                                                                                                                                                                                       | Test or Inspection Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|-----------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------|-----------------------------------|---------|-------------------------|--------|---------|-----------------|----------|-----|--------------------------|--------|---|-----------------|-------|
| 14                    | Temperature cycle                          |                                                                                                                                                                                                                                                                                   | Reflow solder the capacitors on a P.C. board (shown in Appendix 1a or Appendix 1b) before testing.<br><br>Expose the capacitor in the condition step1 through step 4, and repeat 5 times consecutively.<br><br>Leave the capacitor in ambient conditions for 6 to 24h (Class 1) or 24±2h (Class 2) before measurement.<br><table><tr><th>Step</th><th>Temperature (°C)</th><th>Time (min.)</th></tr><tr><td>1</td><td>Min. operating temp. ±3</td><td>30 ± 3</td></tr><tr><td>2</td><td>Reference Temp.</td><td>2 – 5</td></tr><tr><td>3</td><td>Max. operating temp. ± 2</td><td>30 ± 2</td></tr><tr><td>4</td><td>Reference Temp.</td><td>2 - 5</td></tr></table> | Step                              | Temperature (°C) | Time (min.)                       | 1       | Min. operating temp. ±3 | 30 ± 3 | 2       | Reference Temp. | 2 – 5    | 3   | Max. operating temp. ± 2 | 30 ± 2 | 4 | Reference Temp. | 2 - 5 |
|                       | Step                                       | Temperature (°C)                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Time (min.)                       |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | 1                                          | Min. operating temp. ±3                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 30 ± 3                            |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | 2                                          | Reference Temp.                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2 – 5                             |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | 3                                          | Max. operating temp. ± 2                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 30 ± 2                            |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | 4                                          | Reference Temp.                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2 - 5                             |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | External appearance                        | No mechanical damage.                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | Capacitance                                | <table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td>Class 1</td><td>C0G</td><td>±2.5 %</td></tr><tr><td rowspan="3">Class 2</td><td>X7R</td><td rowspan="3">± 7.5 %</td></tr><tr><td>X7S</td></tr><tr><td>X7T</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Characteristics                   |                  | Change from the value before test | Class 1 | C0G                     | ±2.5 % | Class 2 | X7R             | ± 7.5 %  | X7S | X7T                      |        |   |                 |       |
|                       |                                            | Characteristics                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Change from the value before test |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       |                                            | Class 1                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C0G                               | ±2.5 %           |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| Class 2               |                                            | X7R                                                                                                                                                                                                                                                                               | ± 7.5 %                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | X7S                                        |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | X7T                                        |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| Q (Class 1)           | 1,000 min.                                 |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| D.F. (Class 2)        | Meet the initial spec.                     |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| Insulation Resistance | Meet the initial spec.                     |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| Voltage Proof         | No insulation breakdown or other damage.   |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| 15                    | Moisture Resistance (Steady State)         |                                                                                                                                                                                                                                                                                   | Reflow solder the capacitor on P.C. board (shown in Appendix 1a or Appendix 1b) before testing.<br><br>Leave at temperature 40±2°C, 90 to 95%RH for 500 +24,0h.<br><br>Leave the capacitor in ambient condition for 6 to 24h (Class1) or 24±2h (Class 2) before measurement.                                                                                                                                                                                                                                                                                                                                                                                        |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | External appearance                        | No mechanical damage.                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | Capacitance                                | <table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td>Class 1</td><td>C0G</td><td>± 5 %</td></tr><tr><td rowspan="3">Class 2</td><td>X7R</td><td rowspan="3">± 12.5 %</td></tr><tr><td>X7S</td></tr><tr><td>X7T</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Characteristics                   |                  | Change from the value before test | Class 1 | C0G                     | ± 5 %  | Class 2 | X7R             | ± 12.5 % | X7S | X7T                      |        |   |                 |       |
|                       |                                            | Characteristics                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Change from the value before test |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       |                                            | Class 1                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C0G                               | ± 5 %            |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       |                                            | Class 2                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X7R                               | ± 12.5 %         |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | X7S                                        |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | X7T                                        |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | Q (Class 1)                                | 350 min.                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
|                       | D.F. (Class 2)                             | Characteristics<br>X7R: 200% of initial spec. max.<br>X7S: 200% of initial spec. max<br>X7T: 200% of initial spec. max                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |
| Insulation Resistance | 1,000MΩ or 50MΩ•μF min. whichever smaller. |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                  |                                   |         |                         |        |         |                 |          |     |                          |        |   |                 |       |



## General Specifications

## C Series – Mid Voltage Application

| No.                   | Item                                                                                                                   | Performance                                                                                                                                                                                                                                                                         | Test or Inspection Method                                                                                                                                                                                                                       |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|-----------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------|---------|-----|---------|---------|-----|----------|-----|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16                    | Moisture Resistance                                                                                                    |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | External appearance                                                                                                    | No mechanical damage.                                                                                                                                                                                                                                                               | Reflow solder the capacitors on P.C. board (shown in Appendix 1a or Appendix 1b) before testing.<br><br>Apply the rated voltage at temperature 40±2°C and 90 to 95%RH for 500 +24,0h.<br><br>Charge/discharge current shall not exceed 50mA.    |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | Capacitance                                                                                                            | <table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td>Class 1</td><td>C0G</td><td>± 7.5 %</td></tr><tr><td rowspan="3">Class 2</td><td>X7R</td><td rowspan="3">± 12.5 %</td></tr><tr><td>X7S</td></tr><tr><td>X7T</td></tr></table> | Characteristics                                                                                                                                                                                                                                 |  | Change from the value before test | Class 1 | C0G | ± 7.5 % | Class 2 | X7R | ± 12.5 % | X7S | X7T | Leave the capacitor in ambient conditions for 6 to 24h (Class 1) or 24±2h (Class 2) before measurement.<br><br>Voltage conditioning (only for class 2):<br>Voltage treat the capacitors under testing temperature and voltage for 1 hour.                                                       |
|                       | Characteristics                                                                                                        |                                                                                                                                                                                                                                                                                     | Change from the value before test                                                                                                                                                                                                               |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | Class 1                                                                                                                | C0G                                                                                                                                                                                                                                                                                 | ± 7.5 %                                                                                                                                                                                                                                         |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | Class 2                                                                                                                | X7R                                                                                                                                                                                                                                                                                 | ± 12.5 %                                                                                                                                                                                                                                        |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       |                                                                                                                        | X7S                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| X7T                   |                                                                                                                        |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| Q (Class 1)           | 200 min.                                                                                                               |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| D.F. (Class 2)        | Characteristics<br>X7R: 200% of initial spec. max.<br>X7S: 200% of initial spec. max<br>X7T: 200% of initial spec. max | Leave the capacitors in ambient condition for 24±2h before measurement.<br><br>Use this measurement for initial value.                                                                                                                                                              |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| Insulation Resistance | 500MΩ or 25MΩ•μF min.<br>whichever smaller.                                                                            |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| 17                    | Life                                                                                                                   |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | External appearance                                                                                                    | No mechanical damage.                                                                                                                                                                                                                                                               | Reflow solder the capacitor on P.C. board (shown in Appendix 1a or Appendix 1b) before testing.<br><br>Apply voltage at 125±2°C for 1,000 +48, 0h.<br>Applied voltage is 1xRV. Some items may be tested at higher voltage (1.2x, 1.5x or 2xRV). |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | Capacitance                                                                                                            | <table><tr><th colspan="2">Characteristics</th><th>Change from the value before test</th></tr><tr><td>Class 1</td><td>C0G</td><td>± 3 %</td></tr><tr><td rowspan="3">Class 2</td><td>X7R</td><td rowspan="3">± 15 %</td></tr><tr><td>X7S</td></tr><tr><td>X7T</td></tr></table>     | Characteristics                                                                                                                                                                                                                                 |  | Change from the value before test | Class 1 | C0G | ± 3 %   | Class 2 | X7R | ± 15 %   | X7S | X7T | Charge/discharge current shall not exceed 50mA.<br><br>Leave the capacitors in ambient condition for 6 to 24h (Class 1) or 24±2h (Class 2) before measurement.<br><br>Voltage conditioning (only for class 2):<br>Voltage treat the capacitor under testing temperature and voltage for 1 hour. |
|                       | Characteristics                                                                                                        |                                                                                                                                                                                                                                                                                     | Change from the value before test                                                                                                                                                                                                               |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | Class 1                                                                                                                | C0G                                                                                                                                                                                                                                                                                 | ± 3 %                                                                                                                                                                                                                                           |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       | Class 2                                                                                                                | X7R                                                                                                                                                                                                                                                                                 | ± 15 %                                                                                                                                                                                                                                          |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
|                       |                                                                                                                        | X7S                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| X7T                   |                                                                                                                        |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| Q (Class 1)           | 350 min.                                                                                                               |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| D.F. (Class 2)        | Characteristics<br>X7R: 200% of initial spec. max.<br>X7S: 200% of initial spec. max<br>X7T: 200% of initial spec. max | Leave the capacitor in ambient conditions for 24±2h before measurement.<br><br>Use this measurement for initial value.                                                                                                                                                              |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |
| Insulation Resistance | 1,000MΩ or 50MΩ•μF min.<br>whichever smaller.                                                                          |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                 |  |                                   |         |     |         |         |     |          |     |     |                                                                                                                                                                                                                                                                                                 |

\*As for the initial measurement of capacitors (Class 2) on number 8, 12, 13, 14 and 15, leave capacitor at  $150 \pm 10, 0^\circ\text{C}$  for 1 hour and measure the value after leaving capacitor for  $24 \pm 2\text{h}$  in ambient condition.



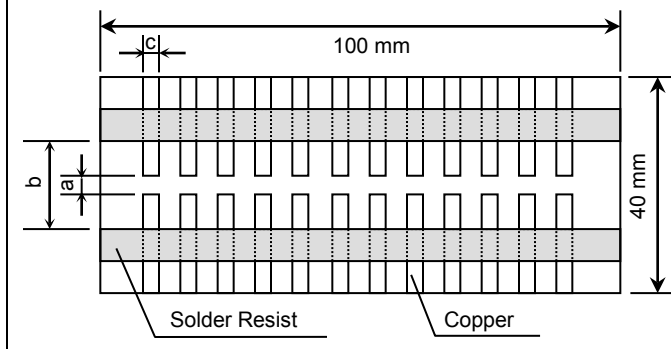
## General Specifications

## C Series – Mid Voltage Application

### Appendix - 1a

#### P.C. Board for reliability test

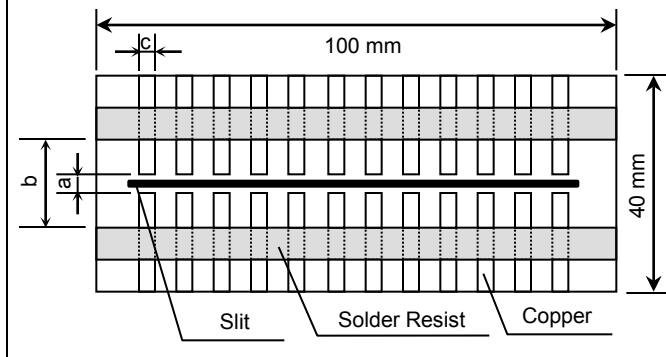
Applied for C1005, C1608, C2012, C3216



### Appendix - 1b

#### P.C. Board for reliability test

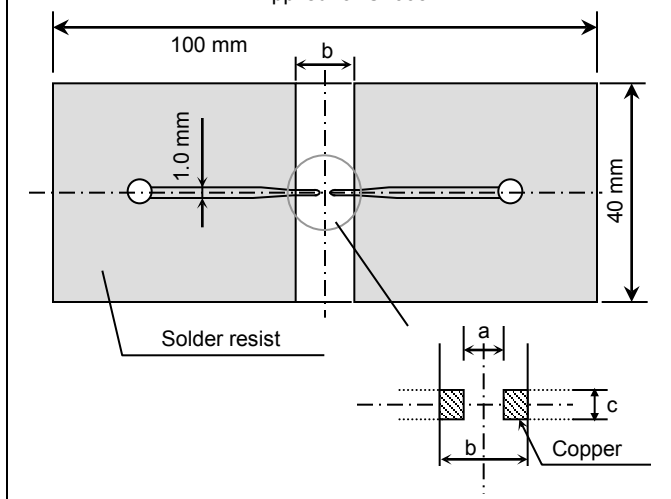
Applied for C3225, C4532, C5750



### Appendix - 2a

#### P.C. Board for bending test

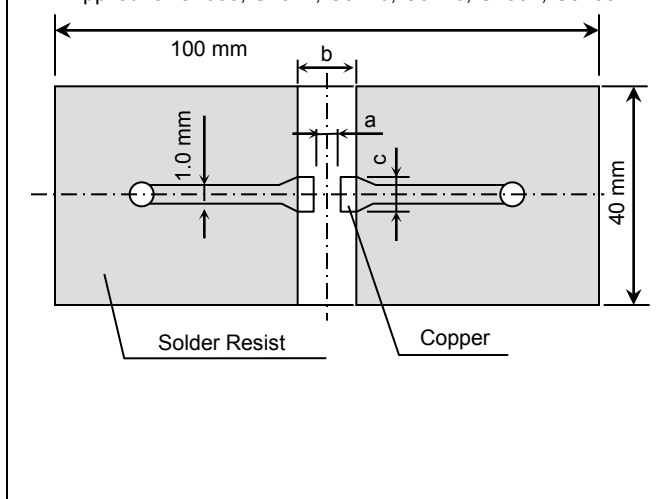
Applied for C1005



### Appendix - 2b

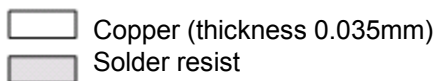
#### P.C. Board for bending test

Applied for C1608, C2012, C3216, C3225, C4532, C5750



Material : Glass Epoxy (As per JIS C6484 GE4)

P.C. Board thickness : Appendix-2a 0.8mm  
Appendix-1a, 1b, 2b 1.6mm



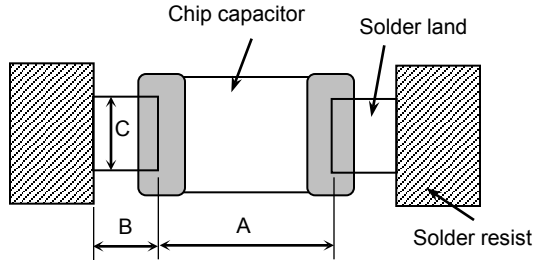
| Case Code |        | Dimensions (mm) |     |      |
|-----------|--------|-----------------|-----|------|
| JIS       | EIA    | a               | b   | c    |
| C1005     | CC0402 | 0.4             | 1.5 | 0.5  |
| C1608     | CC0603 | 1.0             | 3.0 | 1.2  |
| C2012     | CC0805 | 1.2             | 4.0 | 1.65 |
| C3216     | CC1206 | 2.2             | 5.0 | 2.0  |
| C3225     | CC1210 | 2.2             | 5.0 | 2.9  |
| C4532     | CC1812 | 3.5             | 7.0 | 3.7  |
| C5750     | CC2220 | 4.5             | 8.0 | 5.6  |



## Soldering Information

# C Series – Mid Voltage Application

### Recommended Soldering Land Pattern



#### Wave Soldering

Unit: mm

| Type   | C1608<br>[CC0603] | C2012<br>[CC0805] | C3216<br>[CC1206] |
|--------|-------------------|-------------------|-------------------|
| Symbol |                   |                   |                   |
| A      | 0.7 - 1.0         | 1.0 - 1.3         | 2.1 - 2.5         |
| B      | 0.8 - 1.0         | 1.0 - 1.2         | 1.1 - 1.3         |
| C      | 0.6 - 0.8         | 0.8 - 1.1         | 1.0 - 1.3         |

#### Reflow Soldering

Unit: mm

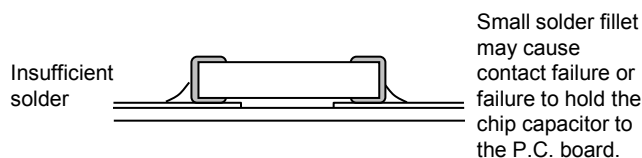
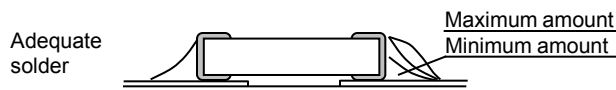
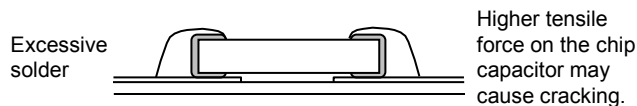
| Type   | C1005<br>[CC0402] | C1608<br>[CC0603] | C2012<br>[CC0805] |
|--------|-------------------|-------------------|-------------------|
| Symbol |                   |                   |                   |
| A      | 0.3 - 0.5         | 0.6 - 0.8         | 0.9 - 1.2         |
| B      | 0.35 - 0.45       | 0.6 - 0.8         | 0.7 - 0.9         |
| C      | 0.4 - 0.6         | 0.6 - 0.8         | 0.9 - 1.2         |

#### Reflow Soldering

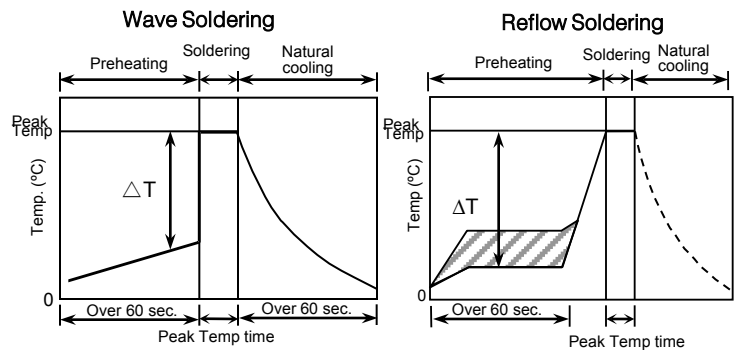
Unit: mm

| Type   | C3216<br>[CC1206] | C3225<br>[CC1210] | C4532<br>[CC1812] | C5750<br>[CC2220] |
|--------|-------------------|-------------------|-------------------|-------------------|
| Symbol |                   |                   |                   |                   |
| A      | 2.0 - 2.4         | 2.0 - 2.4         | 3.1 - 3.7         | 4.1 - 4.8         |
| B      | 1.0 - 1.2         | 1.0 - 1.2         | 1.2 - 1.4         | 1.2 - 1.4         |
| C      | 1.1 - 1.6         | 1.9 - 2.5         | 2.4 - 3.2         | 4.0 - 5.0         |

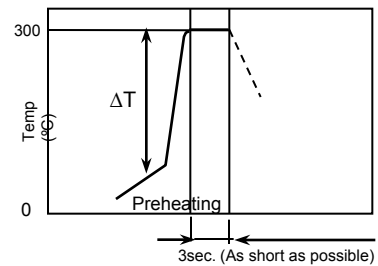
### Recommended Solder Amount



### Recommended Soldering Profile



#### Manual soldering (Solder iron)



### Recommended soldering duration

| Solder           | Temp./Dura. | Wave Soldering |                 | Reflow Soldering |                 |
|------------------|-------------|----------------|-----------------|------------------|-----------------|
|                  |             | Peak temp (°C) | Duration (sec.) | Peak temp (°C)   | Duration (sec.) |
| Sn-Pb Solder     |             | 250 max.       | 3 max.          | 230 max.         | 20 max.         |
| Lead-Free Solder |             | 260 max.       | 5 max.          | 260 max.         | 10 max.         |

#### Recommended solder compositions

Sn-37Pb (Sn-Pb solder)

Sn-3.0Ag-0.5Cu (Lead Free Solder)

### Preheating Condition

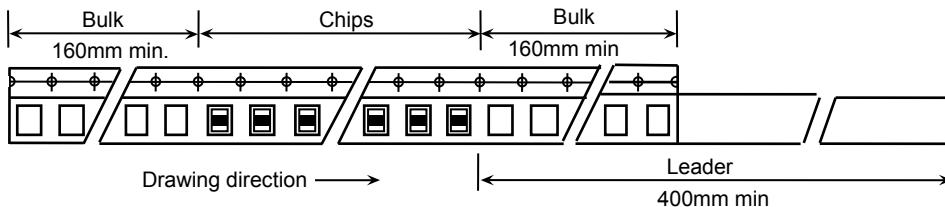
| Soldering        | Case Size - JIS (EIA)                                      | Temp. (°C)          |
|------------------|------------------------------------------------------------|---------------------|
| Wave soldering   | C1608(CC0603), C2012(CC0805), C3216(CC1206)                | $\Delta T \leq 150$ |
| Reflow soldering | C1005(CC0402), C1608(CC0603), C2012(CC0805), C3216(CC1206) | $\Delta T \leq 150$ |
|                  | C3225(CC1210), C4532(CC1812), C5750(CC2220)                | $\Delta T \leq 130$ |
| Manual soldering | C1005(CC0402), C1608(CC0603), C2012(CC0805), C3216(CC1206) | $\Delta T \leq 150$ |
|                  | C3225(CC1210), C4532(CC1812), C5750(CC2220)                | $\Delta T \leq 130$ |



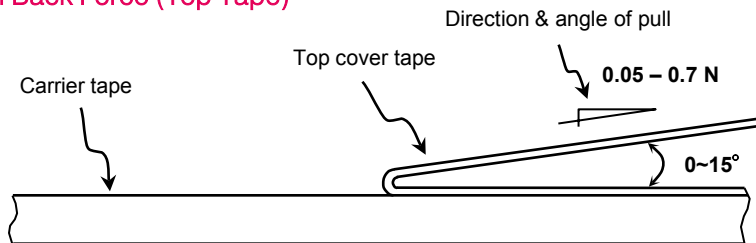
## Packaging Information

## C Series – Mid Voltage Application

### Carrier Tape Configuration

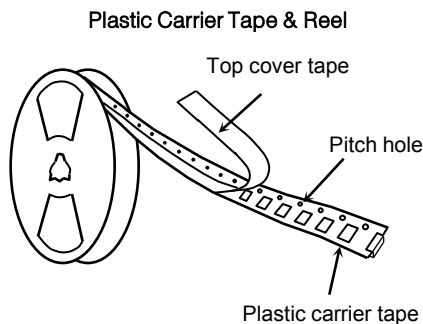
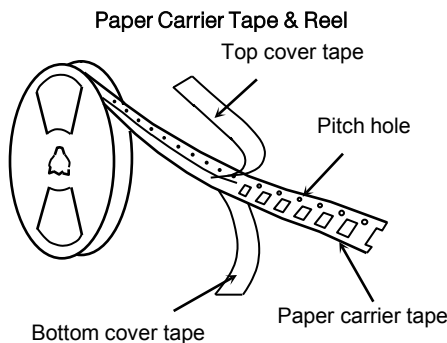


### Peel Back Force (Top Tape)



- Carrier tape shall be flexible enough to be wound around a minimum radius of 30mm with components in tape.
- The missing of components shall be less than 0.1%
- Components shall not stick to the cover tape.
- The cover tape shall not protrude beyond the edges of the carrier tape not shall cover the sprocket holes.

### Chip Quantity Per Reel and Structure of Reel (Paper & Plastic)



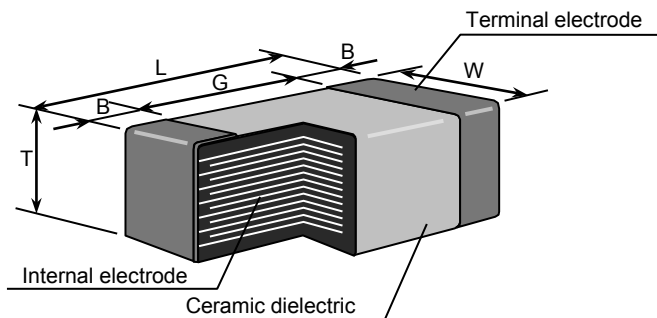
| Case Code |        | Chip Thickness | Taping Material | Chip quantity (pcs.) |                   |         |       |       |
|-----------|--------|----------------|-----------------|----------------------|-------------------|---------|-------|-------|
| JIS       | EIA    |                |                 | φ178mm (7") reel     | φ330mm (13") reel |         |       |       |
| C1005     | CC0402 | 0.50 mm        | Paper           | 10,000               | 50,000            |         |       |       |
| C1608     | CC0603 | 0.80 mm        | Paper           | 4,000                | 10,000            |         |       |       |
| C2012     | CC0805 | 0.60 mm        | Paper/Plastic   | 4,000                | 20,000            |         |       |       |
|           |        | 0.85 mm        |                 |                      | 10,000            |         |       |       |
|           |        | 1.25 mm        | Plastic         | 2,000                |                   |         |       |       |
| C3216     | CC1206 | 0.60 mm        | Paper           | 4,000                | 10,000            |         |       |       |
|           |        | 0.85 mm        | Paper/Plastic   |                      |                   |         |       |       |
|           |        | 1.15 mm        | Plastic         | 2,000                |                   | 8,000   |       |       |
|           |        | 1.30 mm        |                 |                      |                   |         |       |       |
|           |        | 1.60 mm        |                 |                      |                   |         |       |       |
| C3225     | CC1210 | 1.15 mm        | Plastic         | 2,000                | 10,000            |         |       |       |
|           |        | 1.25 mm        |                 | 2,000                | 8,000             |         |       |       |
|           |        | 1.30 mm        |                 |                      |                   |         |       |       |
|           |        | 1.60 mm        |                 | 1,000                | 5,000             |         |       |       |
|           |        | 2.00 mm        |                 |                      |                   |         |       |       |
|           |        | 2.30 mm        |                 |                      |                   |         |       |       |
| C4532     | CC1812 | 2.50 mm        | Plastic         | 1,000                | 3,000             |         |       |       |
|           |        | 2.80 mm        |                 |                      |                   |         |       |       |
|           |        | 3.20 mm        |                 | 500                  | 2,000             |         |       |       |
|           |        | 1.60 mm        |                 |                      |                   | Plastic | 1,000 | 3,000 |
|           |        | 2.00 mm        |                 |                      |                   |         |       |       |
| 2.30 mm   |        |                |                 |                      |                   |         |       |       |
| 2.50 mm   |        |                |                 |                      |                   |         |       |       |
| C5750     | CC2220 | 2.80 mm        | Plastic         | 500                  | 2,000             |         |       |       |
|           |        | 2.00 mm        |                 |                      |                   |         |       |       |
|           |        | 2.30 mm        |                 | 500                  |                   | 3,000   |       |       |
|           |        | 2.50 mm        |                 |                      |                   |         |       |       |
|           |        | 2.80 mm        |                 |                      |                   |         |       |       |



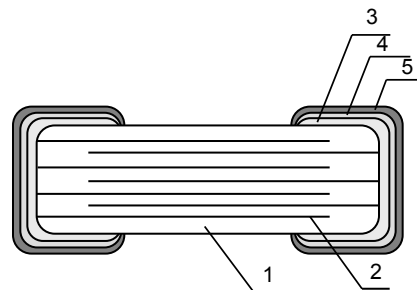
## Additional Information

# C Series – Mid Voltage Application

### • Shape & Dimensions



### • Inside Structure & Material System



| Case Code |        | Dimensions (mm) |      |      |           |           |
|-----------|--------|-----------------|------|------|-----------|-----------|
| JIS       | EIA    | L               | W    | T    | B         | G         |
| C1005     | CC0402 | 1.00            | 0.50 | 0.50 | 0.25      | 0.35 min. |
| C1608     | CC0603 | 1.60            | 0.80 | 0.80 | 0.20      | 0.30 min. |
| C2012     | CC0805 | 2.00            | 1.20 | 0.60 | 0.20 min. | 0.50 min. |
|           |        |                 |      | 0.85 |           |           |
|           |        |                 |      | 1.25 |           |           |
| C3216     | CC1206 | 3.20            | 1.60 | 0.60 | 0.20 min. | 1.00 min. |
|           |        |                 |      | 0.85 |           |           |
|           |        |                 |      | 1.15 |           |           |
|           |        |                 |      | 1.30 |           |           |
| C3225     | CC1210 | 3.20            | 2.50 | 1.60 | 0.20 min. | 1.00 min  |
|           |        |                 |      | 1.15 |           |           |
|           |        |                 |      | 1.25 |           |           |
|           |        |                 |      | 1.30 |           |           |
|           |        |                 |      | 1.60 |           |           |
|           |        |                 |      | 2.00 |           |           |
| C4532     | CC1812 | 4.50            | 3.20 | 2.30 | 0.30 min. | 2.00 min  |
|           |        |                 |      | 2.50 |           |           |
|           |        |                 |      | 2.80 |           |           |
|           |        |                 |      | 3.20 |           |           |
|           |        |                 |      | 1.60 |           |           |
| C5750     | CC2220 | 5.70            | 5.00 | 2.00 | 0.20 min. | 2.00 min. |
|           |        |                 |      | 2.30 |           |           |
|           |        |                 |      | 2.50 |           |           |
|           |        |                 |      | 2.80 |           |           |
|           |        |                 |      | 1.60 |           |           |

| No. | NAME               | MATERIAL           |                    |
|-----|--------------------|--------------------|--------------------|
|     |                    | Class 1            | Class 2            |
| (1) | Ceramic Dielectric | CaZrO <sub>3</sub> | BaTiO <sub>3</sub> |
| (2) | Internal Electrode | Nickel (Ni)        |                    |
| (3) | Termination        | Copper (Cu)        |                    |
| (4) |                    | Nickel (Ni)        |                    |
| (5) |                    | Tin (Sn)           |                    |

### • Environmental Information

TDK Corporation established internal product environmental assurance standards that include the six hazardous substances banned by the EU RoHS Directive<sup>1</sup> enforced on July 1, 2006 along with additional substances independently banned by TDK and has successfully completed making general purpose electronic components conform to the RoHS Directive<sup>2</sup>.

1. Abbreviation for Restriction on Hazardous Substances, which refers to the regulation EU Directive 2002/95/EC on hazardous substances by the European Union (EU) effective from July 1, 2006. The Directive bans the use of six specific hazardous substances in electric and electronic devices and products handled within the EU. The six substances are lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls), and PBDE (polybrominated diphenyl ethers).
2. This means that, in conformity with the EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

For REACH (SVHC : 15 substances according to ECHA / October 2008) : All TDK MLCC do not contain these 15 substances.

For European Directive 2000/53/CE and 2005/673/CE : Cadmium, Hexavalent Chromium, Mercury, Lead are not contained in all TDK MLCC.

For European Directive 2003/11/CE : Pentabromodiphenyl-ether, Octabromodiphenyl-ether are not contained in all TDK MLCC.