

## MULTILAYER CERAMIC CHIP CAPACITORS

### **C Series Commercial Grade Soft Termination**

**Type:**

**C1005 [EIA CC0402]  
C1608 [EIA CC0603]  
C2012 [EIA CC0805]  
C3216 [EIA CC1206]  
C3225 [EIA CC1210]  
C4520 [EIA CC1808]  
C4532 [EIA CC1812]  
C5750 [EIA CC2220]  
C7563 [EIA CC3025]**



## REMINDERS

Please read before using this product

### SAFETY REMINDERS

#### REMINDERS

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(Example)

| Catalog Issued date    | Catalog Number        | Item Description (On Delivery Label) |
|------------------------|-----------------------|--------------------------------------|
| Prior to January 2013  | C1608C0G1E103J(080AA) | C1608C0G1E103JT000N                  |
| January 2013 and Later | C1608C0G1E103J080AA   | C1608C0G1E103JT000N                  |

# MULTILAYER CERAMIC CHIP CAPACITORS



## C Series Soft Termination

Type: C1005 [EIA CC0402], C1608 [EIA CC0603], C2012 [EIA CC0805], C3216 [EIA CC1206], C3225 [EIA CC1210], C4520 [EIA CC1808], C4532 [EIA CC1812], C5750 [EIA CC2220], C7563 [EIA CC3025]

### Features

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

#### Standard Product



#### Soft Termination



### Applications

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

### Shape & Dimensions



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

### Catalog Number Construction

C • 7563 • X7S • 1C • 107 • M • 280 • L • E

#### Series Name

#### Dimensions L x W (mm)

| Code  | Length            | Width             | Terminal  |
|-------|-------------------|-------------------|-----------|
| C1005 | 1.00 + 0.15/-0.05 | 0.50 + 0.10/-0.05 | 0.10 min. |
| C1608 | 1.60 + 0.20/-0.10 | 0.80 + 0.15/-0.10 | 0.20 min. |
| C2012 | 2.00 + 0.45/-0.20 | 1.25 + 0.25/-0.20 | 0.20 min. |
| C3216 | 3.20 + 0.40/-0.20 | 1.60 + 0.30/-0.20 | 0.20 min. |
| C3225 | 3.20 + 0.50/-0.40 | 2.50 ± 0.30       | 0.20 min. |
| C4520 | 4.50 + 0.30/-0.20 | 2.00 ± 0.15       | 0.20 min. |
| C4532 | 4.50 + 0.50/-0.40 | 3.20 ± 0.40       | 0.20 min. |
| C5750 | 5.70 + 0.50/-0.40 | 5.00 ± 0.40       | 0.20 min. |
| C7563 | 7.50 ± 0.50       | 6.30 ± 0.50       | 0.30 min. |

\*Dimension tolerance are typical values

#### Temperature Characteristics

| Temperature Characteristics | Temperature Coefficient or Capacitance Change | Temperature Range |
|-----------------------------|---|-------------------|
| C0G                         | 0 ±30ppm/°C                                   | -55 to +125°C     |
| X7R                         | ±15%  | -55 to +125°C     |
| X7S                         | ±22%  | -55 to +125°C     |
| X7T                         | +22/-33%                                      | -55 to +125°C     |
| X8R                         | ±15%  | -55 to +150°C     |

#### Rated Voltage (DC)

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

#### Nominal Capacitance (pF)

The capacitance is expressed in three digit codes and in units of pico Farads (pF). The first and second digits identify the first and second significant figures of the capacitance. The third digit identifies the multiplier. R designates a decimal point. Ex. 0R2 = 0.2pF; 103 = 10,000pF; 105 = 1,000,000pF = 1,000nF

#### Capacitance Tolerance

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

#### Nominal Thickness

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

#### Packaging Style

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

#### Special Reserved Code

| Code | Description      |
|------|------------------|
| E    | Soft Termination |

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Chart

## EIA CC0402[C1005]

### Capacitance Range Chart

Temperature Characteristics : C0G(0±30ppm/°C) , X7R(±15%) , X8R(±15%)  
Rated Voltage : 100V(2A) , 50V(1H) , 35V(1V) , 25V(1E) , 16V(1C)

| Capacitance |      | Tolerance                 | C0G      | X7R      |          |          |          |           | X8R      |          |          |   |
|-------------|------|---------------------------|----------|----------|----------|----------|----------|-----------|----------|----------|----------|---|
| (pF)        | Code |                           | 1H (50V) | 1H (50V) | 1V (35V) | 1E (25V) | 1C (16V) | 2A (100V) | 1H (50V) | 1E (25V) | 1C (16V) |   |
| 100         | 101  | J:±5%<br>K:±10%<br>M:±20% | ■        |          |          |          |          |           |          |          |          |   |
| 150         | 151  |                           |          |          |          |          |          | ■         | ■        |          |          |   |
| 220         | 221  |                           |          |          |          |          |          | ■         | ■        |          |          |   |
| 330         | 331  |                           |          |          |          |          |          |           |          |          |          |   |
| 470         | 471  |                           |          |          |          |          |          |           |          |          |          |   |
| 680         | 681  |                           |          |          |          |          |          |           |          |          |          |   |
| 1,000       | 102  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 1,500       | 152  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 2,200       | 222  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 3,300       | 332  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 4,700       | 472  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 6,800       | 682  |                           |          |          | ■        |          |          |           |          | ■        |          |   |
| 10,000      | 103  |                           |          |          | ■        |          |          |           |          | ■        |          |   |
| 15,000      | 153  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 22,000      | 223  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 33,000      | 333  |                           |          |          |          |          |          |           |          |          |          | ■ |
| 47,000      | 473  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 100,000     | 104  |                           |          |          | ■        |          |          |           |          |          |          |   |
| 220,000     | 224  |                           |          |          |          | ■        | ■        | ■         |          |          |          |   |

Standard Thickness  
■ 0.50 mm

## Capacitance Range Chart

## EIA CC0603 [C1608]

### Capacitance Range Chart

Temperature Characteristics : C0G(0±30ppm/°C) , X7R(±15%) , X7S(±22%) , X8R(±15%)  
Rated Voltage : 100V(2A) , 50V(1H) , 35V(1V) , 25V(1E) , 16V(1C) , 10V(1A)

| Capacitance |      | Tolerance                 | C0G      | X7R       |          |          |          |          | X7S       | X8R       |          |          |          |   |
|-------------|------|---------------------------|----------|-----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|---|
| (pF)        | Code |                           | 1H (50V) | 2A (100V) | 1H (50V) | 1V (35V) | 1E (25V) | 1A (10V) | 2A (100V) | 2A (100V) | 1H (50V) | 1E (25V) | 1C (16V) |   |
| 100         | 101  | J:±5%<br>K:±10%<br>M:±20% | ■        |           |          |          |          |          |           |           |          |          |          |   |
| 1,000       | 102  |                           |          | ■         | ■        |          |          |          |           |           | ■        | ■        |          |   |
| 1,500       | 152  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 2,200       | 222  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 3,300       | 332  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 4,700       | 472  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 6,800       | 682  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 10,000      | 103  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 15,000      | 153  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 22,000      | 223  |                           |          |           | ■        | ■        |          |          |           |           |          |          |          |   |
| 33,000      | 333  |                           |          |           |          |          |          |          |           |           |          |          |          |   |
| 47,000      | 473  |                           |          |           |          | ■        |          |          |           | ■         |          |          |          |   |
| 68,000      | 683  |                           |          |           |          | ■        |          |          |           |           |          | ■        |          |   |
| 100,000     | 104  |                           |          |           |          | ■        |          |          |           | ■         |          |          |          |   |
| 150,000     | 154  |                           |          |           |          |          |          |          |           |           | ■        |          |          |   |
| 220,000     | 224  |                           |          |           |          | ■        |          |          |           |           |          |          |          |   |
| 330,000     | 334  |                           |          |           |          |          |          |          |           |           |          |          |          | ■ |
| 470,000     | 474  |                           |          |           |          | ■        | ■        | ■        |           |           |          |          |          | ■ |
| 1,000,000   | 105  |                           |          |           |          |          | ■        | ■        |           |           |          |          |          |   |
| 2,200,000   | 225  |                           |          |           |          |          |          | ■        |           |           |          |          |          |   |

Standard Thickness  
■ 0.80 mm

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## Capacitance Range Chart

## EIA CC0805 [C2012]

### Capacitance Range Chart

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

Rated Voltage : 450V(2W), 250V(2E), 100V(2A), 50V(1H), 35V(1V), 25V(1E), 16V(1C), 10V(1A)

| Capacitance |      | Tolerance                      | X7R          |              |             |             |             |             |             | X7S          | X7T          |              |   |
|-------------|------|--------------------------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|---|
| (pF)        | Code |                                | 2E<br>(250V) | 2A<br>(100V) | 1H<br>(50V) | 1V<br>(35V) | 1E<br>(25V) | 1C<br>(16V) | 1A<br>(10V) | 2A<br>(100V) | 2W<br>(450V) | 2E<br>(250V) |   |
| 1,000       | 102  | K: $\pm 10\%$<br>M: $\pm 20\%$ | ■            | ■            |             |             |             |             |             |              |              |              |   |
| 2,200       | 222  |                                |              | ■            |             |             |             |             |             |              |              |              |   |
| 4,700       | 472  |                                |              | ■            |             |             |             |             |             |              |              |              |   |
| 10,000      | 103  |                                |              | ■            |             |             |             |             |             |              | ■            |              |   |
| 22,000      | 223  |                                |              | ■            |             |             |             |             |             |              | ■            |              |   |
| 47,000      | 473  |                                |              |              |             |             |             |             |             |              | ■            | ■            |   |
| 100,000     | 104  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |
| 220,000     | 224  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |
| 470,000     | 474  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |
| 1,000,000   | 105  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |
| 2,200,000   | 225  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |
| 4,700,000   | 475  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |
| 10,000,000  | 106  |                                |              |              |             | ■           |             |             |             |              |              |              | ■ |

Standard Thickness

■ 0.85 mm  
■ 1.25 mm

### Capacitance Range Chart

Temperature Characteristics : X8R( $\pm 15\%$ )

Rated Voltage : 100V(2A), 50V(1H), 25V(1E), 16V(1C)

| Capacitance |      | Tolerance                      | X8R          |             |             |             |
|-------------|------|--------------------------------|--------------|-------------|-------------|-------------|
| (pF)        | Code |                                | 2A<br>(100V) | 1H<br>(50V) | 1E<br>(25V) | 1C<br>(16V) |
| 22,000      | 223  | K: $\pm 10\%$<br>M: $\pm 20\%$ | ■            |             |             |             |
| 33,000      | 333  |                                | ■            |             |             |             |
| 47,000      | 473  |                                | ■            |             |             |             |
| 68,000      | 683  |                                | ■            | ■           |             |             |
| 100,000     | 104  |                                |              | ■           |             |             |
| 150,000     | 154  |                                |              | ■           |             |             |
| 220,000     | 224  |                                |              | ■           |             |             |
| 330,000     | 334  |                                |              | ■           |             |             |
| 470,000     | 474  |                                |              | ■           |             |             |
| 680,000     | 684  |                                |              | ■           |             |             |
| 1,000,000   | 105  |                                | ■            |             | ■           |             |

Standard Thickness

■ 0.85 mm  
■ 1.25 mm

## Capacitance Range Chart

## EIA CC1206 [C3216]

### Capacitance Range Chart

Temperature Characteristics : X7R( $\pm 15\%$ ), X7S( $\pm 22\%$ )

Rated Voltage : 630V(2J), 250V(2E), 100V(2A), 50V(1H), 35V(1V), 25V(1E), 16V(1C)



### Capacitance Range Chart

Temperature Characteristics : X7T(+22/-33%), X8R( $\pm 15\%$ )

Rated Voltage : 630V(2J), 450V(2W), 250V(2E), 100V(2A), 50V(1H), 25V(1E), 16V(1C)



# MULTILAYER CERAMIC CHIP CAPACITORS TDK

## Capacitance Range Chart

## EIA CC1210 [C3225]

### Capacitance Range Chart

Temperature Characteristics : X7R(±15%), X7S(±22%), X7T(+22/-33%), X8R(±15%)  
 Rated Voltage : 630V(2J), 450V(2W), 250V(2E), 100V(2A), 50V(1H), 25V(1E)

| Capacitance |      | Tolerance            | X7R       |           |           |          | X7S       |          | X7T       |           |           | X8R       |          |
|-------------|------|----------------------|-----------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|----------|
| (pF)        | Code |                      | 2J (630V) | 2E (250V) | 2A (100V) | 1H (50V) | 2A (100V) | 1H (50V) | 2J (630V) | 2W (450V) | 2E (250V) | 2A (100V) | 1E (25V) |
| 47,000      | 473  | K: ± 10%<br>M: ± 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  |                      |           |           |           |          |           |          | █         | █         |           |           |          |
| 10,000,000  | 106  |                      |           |           |           |          |           |          |           |           |           |           | █        |

Standard Thickness  1.60 mm  2.00 mm  2.30 mm  2.50 mm

## Capacitance Range Chart

## EIA CC1808 [C4520]

### Capacitance Range Chart

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

| Capacitance |      | Tolerance            | X7R        |
|-------------|------|----------------------|------------|
| (pF)        | Code |                      | 3D (2000V) |
| 1,000       | 102  | K: ± 10%<br>M: ± 20% | █          |

Standard Thickness  1.30 mm

## Capacitance Range Chart

## EIA CC1812 [C4532]

### Capacitance Range Chart

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

| Capacitance |      | Tolerance            | C0G        | X7R        |           |           |           | X7T       |           |  |
|-------------|------|----------------------|------------|------------|-----------|-----------|-----------|-----------|-----------|--|
| (pF)        | Code |                      | 3F (3000V) | 3D (2000V) | 2J (630V) | 2E (250V) | 2J (630V) | 2W (450V) | 2E (250V) |  |
| 330         | 331  | K: ± 10%<br>M: ± 20% | █          |            |           |           |           |           |           |  |
| 2,200       | 222  |                      |            | █          |           |           |           |           |           |  |
| 100,000     | 104  |                      |            |            | █         |           |           |           |           |  |
| 220,000     | 224  |                      |            |            |           |           | █         |           |           |  |
| 470,000     | 474  |                      |            |            |           | █         |           | █         |           |  |
| 1,000,000   | 105  |                      |            |            |           |           |           | █         |           |  |

Standard Thickness  1.30 mm  2.00 mm  2.30 mm  2.50 mm

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Chart

## EIA CC2220 [C5750]

### 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 |      | Tolerance                      | X7R   |   | X7S   | X7T   |   |   |
|-------------|------|--------------------------------|---|---|---|---|---|---|
| (pF)        | Code |                                | 2J<br>(630V)  | 2E<br>(250V)  | 2A<br>(100V)  | 2J<br>(630V)  | 2W<br>(450V)  | 2E<br>(250V)  |
| 220,000     | 224  | K: $\pm 10\%$<br>M: $\pm 20\%$ |  |   |   |  |   |   |
| 470,000     | 474  |                                |   |   |   |   |   |   |
| 1,000,000   | 105  |                                |   |  |   |   |  |   |
| 2,200,000   | 225  |                                |   |   |   |   |   |  |
| 10,000,000  | 106  |                                |   |   |  |   |   |   |

Standard Thickness

 2.30 mm

 2.50 mm

## Capacitance Range Chart

## EIA CC3025 [C7563]


### Capacitance Range Chart

Temperature Characteristics : X7S ( $\pm 22\%$ )

Rated Voltage : 50V (1H), 16V (1C)

| Capacitance |      | Tolerance     | X7S   |   |
|-------------|------|---------------|---|---|
| (pF)        | Code |               | 1H<br>(50V)   | 1C<br>(16V)   |
| 22,000,000  | 226  | M: $\pm 20\%$ |  |   |
| 100,000,000 | 107  |               |   |  |

Standard Thickness

 2.30 mm

 2.80 mm



# MULTILAYER CERAMIC CHIP CAPACITORS

## Capacitance Range Table

### Class 1 (Temperature Compensating)

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

| Capacitance | Size | Thickness (mm)  | Capacitance Tolerance | Catalog Number            |                         |
|-------------|------|-----------------|-----------------------|---------------------------|-------------------------|
|             |      |                 |                       | Rated Voltage Edc : 3000V | Rated Voltage Edc : 50V |
| 100pF       | 1005 | 0.50+0.10/-0.05 | ±5%                   |                           | C1005C0G1H101J050BE     |
|             | 1608 | 0.80+0.15/-0.10 | ±5%                   |                           | C1608C0G1H101J080AE     |
| 330pF       | 4532 | 2.50 ± 0.20     | ± 10%                 | C4532C0G3F331K250KE       |                         |

### Class 2 (Temperature Stable)

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

| Capacitance | Size             | Thickness (mm)   | Capacitance Tolerance | Catalog Number            |                          |                          |                          |                         |
|-------------|------------------|------------------|-----------------------|---------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
|             |                  |                  |                       | Rated Voltage Edc : 2000V | Rated Voltage Edc : 630V | Rated Voltage Edc : 250V | Rated Voltage Edc : 100V | Rated Voltage Edc : 50V |
| 1nF         | 1005             | 0.50+0.10/-0.05  | ±10%                  |                           |                          |                          |                          | C1005X7R1H102K050BE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1005X7R1H102M050BE     |
|             | 1608             | 0.80 +0.15/-0.10 | ±10%                  |                           |                          |                          | C1608X7R2A102K080AE      | C1608X7R1H102K080AE     |
|             |                  |                  | ±20%                  |                           |                          |                          | C1608X7R2A102M080AE      | C1608X7R1H102M080AE     |
|             | 2012             | 0.85±0.15        | ±10%                  |                           |                          | C2012X7R2E102K085AE      | C2012X7R2A102K085AE      |                         |
|             |                  |                  | ±20%                  |                           |                          | C2012X7R2E102M085AE      | C2012X7R2A102M085AE      |                         |
| 3216        | 1.15±0.15        | ±10%             |                       | C3216X7R2J102K115AE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C3216X7R2J102M115AE       |                          |                          |                          |                         |
| 4520        | 1.30±0.15        | ±10%             |                       | C4520X7R3D102K130KE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C4520X7R3D102M130KE       |                          |                          |                          |                         |
| 2.2nF       | 1005             | 0.50+0.10/-0.05  | ±10%                  |                           |                          |                          |                          | C1005X7R1H222K050BE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1005X7R1H222M050BE     |
|             | 1608             | 0.80+0.15/-0.10  | ±10%                  |                           |                          |                          | C1608X7R2A222K080AE      | C1608X7R1H222K080AE     |
|             |                  |                  | ±20%                  |                           |                          |                          | C1608X7R2A222M080AE      | C1608X7R1H222M080AE     |
|             | 2012             | 0.85±0.15        | ±10%                  |                           |                          | C2012X7R2E222K085AE      | C2012X7R2A222K085AE      |                         |
|             |                  |                  | ±20%                  |                           |                          | C2012X7R2E222M085AE      | C2012X7R2A222M085AE      |                         |
| 3216        | 1.15±0.15        | ±10%             |                       | C3216X7R2J222K115AE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C3216X7R2J222M115AE       |                          |                          |                          |                         |
| 4532        | 1.30±0.15        | ±10%             |                       | C4532X7R3D222K130KE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C4532X7R3D222M130KE       |                          |                          |                          |                         |
| 3.3nF       | 3216             | 1.15±0.15        | ±10%                  |                           | C3216X7R2J332K115AE      |                          |                          |                         |
|             |                  |                  | ±20%                  |                           | C3216X7R2J332M115AE      |                          |                          |                         |
| 4.7nF       | 1005             | 0.50+0.10/-0.05  | ±10%                  |                           |                          |                          |                          | C1005X7R1H472K050BE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1005X7R1H472M050BE     |
|             | 1608             | 0.80+0.15/-0.10  | ±10%                  |                           |                          |                          | C1608X7R2A472K080AE      | C1608X7R1H472K080AE     |
|             |                  |                  | ±20%                  |                           |                          |                          | C1608X7R2A472M080AE      | C1608X7R1H472M080AE     |
|             | 2012             | 0.85±0.15        | ±10%                  |                           |                          | C2012X7R2E472K085AE      | C2012X7R2A472K085AE      |                         |
|             |                  |                  | ±20%                  |                           |                          | C2012X7R2E472M085AE      | C2012X7R2A472M085AE      |                         |
| 3216        | 1.15±0.15        | ±10%             |                       | C3216X7R2J472K115AE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C3216X7R2J472M115AE       |                          |                          |                          |                         |
| 10nF        | 1005             | 0.50+0.10/-0.05  | ±10%                  |                           |                          |                          |                          | C1005X7R1H103K050BE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1005X7R1H103M050BE     |
|             | 1608             | 0.80 +0.15/-0.10 | ±10%                  |                           |                          |                          | C1608X7R2A103K080AE      | C1608X7R1H103K080AE     |
|             |                  |                  | ±20%                  |                           |                          |                          | C1608X7R2A103M080AE      | C1608X7R1H103M080AE     |
|             | 2012             | 0.85±0.15        | ±10%                  |                           |                          |                          | C2012X7R2A103K085AE      |                         |
|             |                  |                  | ±20%                  |                           |                          |                          | C2012X7R2A103M085AE      |                         |
| 3216        | 1.15±0.15        | ±10%             |                       | C3216X7R2J103K115AE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C3216X7R2J103M115AE       |                          |                          |                          |                         |
| 22nF        | 1005             | 0.50+0.10/-0.05  | ±10%                  |                           |                          |                          |                          | C1005X7R1H223K050BE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1005X7R1H223M050BE     |
|             | 1608             | 0.80+0.15/-0.10  | ±10%                  |                           |                          |                          | C1608X7R2A223K080AE      | C1608X7R1H223K080AE     |
|             |                  |                  | ±20%                  |                           |                          |                          | C1608X7R2A223M080AE      | C1608X7R1H223M080AE     |
|             | 2012             | 1.25 +0.25/-0.20 | ±10%                  |                           |                          | C2012X7R2E223K125AE      | C2012X7R2A223K125AE      |                         |
|             |                  |                  | ±20%                  |                           |                          | C2012X7R2E223M125AE      | C2012X7R2A223M125AE      |                         |
| 3216        | 1.15±0.15        | ±10%             |                       |                           | C3216X7R2E223K115AE      |                          |                          |                         |
|             |                  | ±20%             |                       |                           | C3216X7R2E223M115AE      |                          |                          |                         |
| 3216        | 1.30±0.20        | ±10%             |                       | C3216X7R2J223K130AE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C3216X7R2J223M130AE       |                          |                          |                          |                         |
| 33nF        | 3216             | 1.60+0.30/-0.20  | ±10%                  |                           | C3216X7R2J333K160AE      |                          |                          |                         |
|             |                  |                  | ±20%                  |                           | C3216X7R2J333M160AE      |                          |                          |                         |
| 47nF        | 1005             | 0.50+0.10/-0.05  | ±10%                  |                           |                          |                          |                          | C1005X7R1H473K050BE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1005X7R1H473M050BE     |
|             | 1608             | 0.80+0.15/-0.10  | ±10%                  |                           |                          |                          |                          | C1608X7R1H473K080AE     |
|             |                  |                  | ±20%                  |                           |                          |                          |                          | C1608X7R1H473M080AE     |
|             | 2012             | 1.25+0.25/-0.20  | ±10%                  |                           |                          |                          | C2012X7R2A473K125AE      |                         |
|             |                  |                  | ±20%                  |                           |                          |                          | C2012X7R2A473M125AE      |                         |
| 3216        | 1.60+0.30/-0.20  | ±10%             |                       |                           | C3216X7R2E473K160AE      |                          |                          |                         |
|             |                  | ±20%             |                       |                           | C3216X7R2E473M160AE      |                          |                          |                         |
| 3225        | 2.00 +0.30/-0.20 | ±10%             |                       | C3225X7R2J473K200AE       |                          |                          |                          |                         |
|             |                  | ±20%             |                       | C3225X7R2J473M200AE       |                          |                          |                          |                         |

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

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

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

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

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

| Capacitance | Size             | Thickness (mm)   | Capacitance Tolerance | Catalog Number          |                         |                         |                         |
|-------------|------------------|------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|             |                  |                  |                       | Rated Voltage Edc : 35V | Rated Voltage Edc : 25V | Rated Voltage Edc : 16V | Rated Voltage Edc : 10V |
| 220nF       | 1005             | 0.50 +0.10/-0.05 | ±10%                  | C1005X7R1V224K050BE     | C1005X7R1E224K050BE     | C1005X7R1C224K050BE     |                         |
|             |                  |                  | ±20%                  | C1005X7R1V224M050BE     | C1005X7R1E224M050BE     | C1005X7R1C224M050BE     |                         |
| 470nF       | 1608             | 0.80 +0.15/-0.10 | ±10%                  | C1608X7R1V474K080AE     | C1608X7R1E474K080AE     |                         |                         |
|             |                  |                  | ±20%                  | C1608X7R1V474M080AE     | C1608X7R1E474M080AE     |                         |                         |
| 1µF         | 1608             | 0.80 +0.15/-0.10 | ±10%                  | C1608X7R1V105K080AE     | C1608X7R1E105K080AE     |                         |                         |
|             |                  |                  | ±20%                  | C1608X7R1V105M080AE     | C1608X7R1E105M080AE     |                         |                         |
|             | 2012             | 1.25 +0.25/-0.20 | ±10%                  | C2012X7R1V105K125AE     |                         |                         |                         |
|             |                  |                  | ±20%                  | C2012X7R1V105M125AE     |                         |                         |                         |
| 1608        | 0.80 +0.15/-0.10 | ±10%             |                       |                         |                         | C1608X7R1A225K080AE     |                         |
|             |                  | ±20%             |                       |                         |                         | C1608X7R1A225M080AE     |                         |
| 2.2µF       | 2012             | 1.25 +0.25/-0.20 | ±10%                  | C2012X7R1V225K125AE     | C2012X7R1E225K125AE     |                         |                         |
|             |                  |                  | ±20%                  | C2012X7R1V225M125AE     | C2012X7R1E225M125AE     |                         |                         |
| 4.7µF       | 2012             | 1.25 +0.25/-0.20 | ±10%                  | C2012X7R1V475K125AE     | C2012X7R1E475K125AE     | C2012X7R1C475K125AE     |                         |
|             |                  |                  | ±20%                  | C2012X7R1V475M125AE     | C2012X7R1E475M125AE     | C2012X7R1C475M125AE     |                         |
|             | 3216             | 1.60 +0.30/-0.20 | ±10%                  | C3216X7R1V475K160AE     | C3216X7R1E475K160AE     |                         |                         |
|             |                  |                  | ±20%                  | C3216X7R1V475M160AE     | C3216X7R1E475M160AE     |                         |                         |
| 10µF        | 2012             | 1.25 +0.25/-0.20 | ±10%                  |                         |                         |                         | C2012X7R1A106K125AE     |
|             |                  |                  | ±20%                  |                         |                         |                         | C2012X7R1A106M125AE     |
|             | 3216             | 1.60 +0.30/-0.20 | ±10%                  | C3216X7R1V106K160AE     | C3216X7R1E106K160AE     | C3216X7R1C106K160AE     |                         |
|             |                  |                  | ±20%                  | C3216X7R1V106M160AE     | C3216X7R1E106M160AE     | C3216X7R1C106M160AE     |                         |

### Class 2 (Temperature Stable)

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

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

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

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

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

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X8R (-55 to +150°C, ±15%)

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

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# MULTILAYER CERAMIC CHIP CAPACITORS



## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X8R (-55 to +150°C, ±15%)

| Capacitance | Size            | Thickness (mm)  | Capacitance Tolerance | Catalog Number           |                         |                         |                         |
|-------------|-----------------|-----------------|-----------------------|--------------------------|-------------------------|-------------------------|-------------------------|
|             |                 |                 |                       | Rated Voltage Edc : 100V | Rated Voltage Edc : 50V | Rated Voltage Edc : 25V | Rated Voltage Edc : 16V |
| 68nF        | 1608            | 0.80+0.15/-0.10 | ±10%                  |                          | C1608X8R1H683K080AE     | C1608X8R1E683K080AE     |                         |
|             |                 |                 | ±20%                  |                          | C1608X8R1H683M080AE     | C1608X8R1E683M080AE     |                         |
|             | 2012            | 1.25+0.25/-0.20 | ±10%                  | C2012X8R2A683K125AE      | C2012X8R1H683K125AE     |                         |                         |
|             |                 |                 | ±20%                  | C2012X8R2A683M125AE      | C2012X8R1H683M125AE     |                         |                         |
| 100nF       | 1608            | 0.80+0.15/-0.10 | ±10%                  |                          | C1608X8R1H104K080AE     | C1608X8R1E104K080AE     |                         |
|             |                 |                 | ±20%                  |                          | C1608X8R1H104M080AE     | C1608X8R1E104M080AE     |                         |
|             | 2012            | 1.25+0.25/-0.20 | ±10%                  |                          | C2012X8R1H104K125AE     |                         |                         |
|             |                 |                 | ±20%                  |                          | C2012X8R1H104M125AE     |                         |                         |
|             | 3216            | 1.15±0.15       | ±10%                  | C3216X8R2A104K115AE      |                         |                         |                         |
|             |                 |                 | ±20%                  | C3216X8R2A104M115AE      |                         |                         |                         |
| 150nF       | 1608            | 0.80+0.15/-0.10 | ±10%                  |                          |                         | C1608X8R1E154K080AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C1608X8R1E154M080AE     |                         |
|             | 2012            | 0.85±0.15       | ±10%                  |                          |                         | C2012X8R1E154K085AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C2012X8R1E154M085AE     |                         |
|             | 3216            | 1.60+0.30/-0.20 | ±10%                  | C3216X8R2A154K160AE      |                         |                         |                         |
|             |                 |                 | ±20%                  | C3216X8R2A154M160AE      |                         |                         |                         |
| 220nF       | 1608            | 0.80+0.15/-0.10 | ±10%                  |                          |                         | C1608X8R1E224K080AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C1608X8R1E224M080AE     |                         |
|             | 2012            | 1.25+0.25/-0.20 | ±10%                  |                          | C2012X8R1H224K125AE     | C2012X8R1E224K125AE     |                         |
|             |                 |                 | ±20%                  |                          | C2012X8R1H224M125AE     | C2012X8R1E224M125AE     |                         |
|             | 3216            | 1.60+0.30/-0.20 | ±10%                  | C3216X8R2A224K160AE      |                         |                         |                         |
|             |                 |                 | ±20%                  | C3216X8R2A224M160AE      |                         |                         |                         |
| 330nF       | 1608            | 0.80+0.15/-0.10 | ±10%                  |                          |                         |                         | C1608X8R1C334K080AE     |
|             |                 |                 | ±20%                  |                          |                         |                         | C1608X8R1C334M080AE     |
|             | 2012            | 1.25+0.25/-0.20 | ±10%                  |                          |                         | C2012X8R1E334K125AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C2012X8R1E334M125AE     |                         |
|             | 3216            | 1.60+0.30/-0.20 | ±10%                  | C3216X8R2A334K160AE      | C3216X8R1H334K160AE     |                         |                         |
|             |                 |                 | ±20%                  | C3216X8R2A334M160AE      | C3216X8R1H334M160AE     |                         |                         |
| 470nF       | 1608            | 0.80+0.15/-0.10 | ±10%                  |                          |                         |                         | C1608X8R1C474K080AE     |
|             |                 |                 | ±20%                  |                          |                         |                         | C1608X8R1C474M080AE     |
|             | 2012            | 1.25+0.25/-0.20 | ±10%                  |                          |                         | C2012X8R1E474K125AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C2012X8R1E474M125AE     |                         |
|             | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          | C3216X8R1H474K160AE     |                         |                         |
|             |                 |                 | ±20%                  |                          | C3216X8R1H474M160AE     |                         |                         |
| 3225        | 2.00+0.30/-0.20 | ±10%            | C3225X8R2A474K200AE   |                          |                         |                         |                         |
|             |                 | ±20%            | C3225X8R2A474M200AE   |                          |                         |                         |                         |
| 680nF       | 2012            | 1.25+0.25/-0.20 | ±10%                  |                          |                         |                         | C2012X8R1C684K125AE     |
|             |                 |                 | ±20%                  |                          |                         |                         | C2012X8R1C684M125AE     |
|             | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          | C3216X8R1H684K160AE     |                         |                         |
|             |                 |                 | ±20%                  |                          | C3216X8R1H684M160AE     |                         |                         |
|             | 3225            | 2.50±0.30       | ±10%                  | C3225X8R2A684K250AE      |                         |                         |                         |
|             |                 |                 | ±20%                  | C3225X8R2A684M250AE      |                         |                         |                         |
| 1uF         | 2012            | 1.25+0.25/-0.20 | ±10%                  |                          |                         |                         | C2012X8R1C105K125AE     |
|             |                 |                 | ±20%                  |                          |                         |                         | C2012X8R1C105M125AE     |
| 1.5uF       | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          | C3216X8R1H105K160AE     | C3216X8R1E105K160AE     |                         |
|             |                 |                 | ±20%                  |                          | C3216X8R1H105M160AE     | C3216X8R1E105M160AE     |                         |
| 2.2uF       | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          |                         | C3216X8R1E155K160AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C3216X8R1E155M160AE     |                         |
| 3.3uF       | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          |                         | C3216X8R1E225K160AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C3216X8R1E225M160AE     |                         |
| 4.7uF       | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          |                         |                         | C3216X8R1C335K160AE     |
|             |                 |                 | ±20%                  |                          |                         |                         | C3216X8R1C335M160AE     |
|             | 3216            | 1.60+0.30/-0.20 | ±10%                  |                          |                         |                         | C3216X8R1C475K160AE     |
|             |                 |                 | ±20%                  |                          |                         |                         | C3216X8R1C475M160AE     |
|             | 3225            | 2.50±0.30       | ±10%                  |                          |                         | C3225X8R1E475K250AE     |                         |
|             |                 |                 | ±20%                  |                          |                         | C3225X8R1E475M250AE     |                         |

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