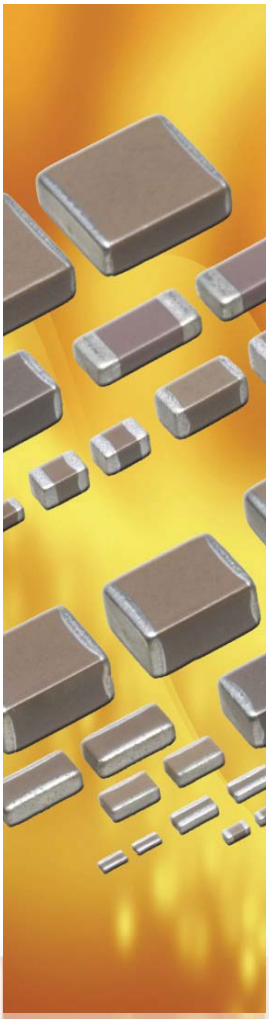
MULTILAYER CERAMIC CHIP CAPACITORS



# C Series
# Commercial Grade
# Low ESL Reverse Geometry

**Type:**

**C0510 [EIA CC0204]**
**C0816 [EIA CC0306]**
**C1220 [EIA CC0508]**
**C1632 [EIA CC0612]**

**Issue date:**
**Dec 2014**

# 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 | C1608C0G1E103JT000N |
| January 2013 and Later | C1608C0G1E103J080AA | C1608C0G1E103JT000N |

# C Series

## Low ESL Reverse Geometry

Type: C0510 [EIA CC0204], C0816 [EIA CC0306], C1220 [EIA CC0508], C1632 [EIA CC0612]

Lead Free | RoHS COMPLIANT | Ecological

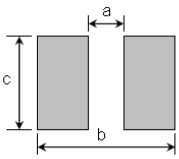
### Features

- Positioning the electrodes along the length of the chip device, reduces ESR and ESL components over conventional products.
- Provides high frequency noise suppression effect because the resonating frequency is high.
- Flipped geometry provides low inductance (less than 400 pH).
- Provides stabilization of power line voltage.
- Suitable for IC decoupling application.

### Applications

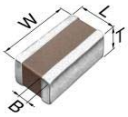
- Decoupling CPU power line
- Bias line in CPU
- High speed digital IC/decoupling
- PC, cell phones, camcorders, etc.

### PC Board Pattern




| Size | Dimensions (mm) | | |
|---|---|---|---|
| | a | b | c |
| C0510 | 0.2 | 0.6 | 1.0 |
| C0816 | 0.3 | 1.0 | 1.6 |
| C1220 | 0.5 | 1.6 | 2.0 |
| C1632 | 0.75 | 2.2 | 3.2 |

### Shape & Dimensions




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

### Catalog Number Construction

C • 1632 • X5R • 0J • 106 • M • 130 • A • C

**Series Name**

**Dimensions L x W (mm)**

| Code | Length | Width | Terminal |
|---|---|---|---|
| 0510 | 0.52 ± 0.05 | 1.00 ± 0.05 | 0.10 min. |
| 0816 | 0.80 ± 0.10 | 1.60 ± 0.10 | 0.10 min. |
| 1220 | 1.25 ± 0.20 | 2.00 ± 0.20 | 0.20 min. |
| 1632 | 1.60 ± 0.20 | 3.20 ± 0.20 | 0.20 min. |

**Temperature Characteristics**

| Temperature Characteristics | Capacitance Change | Temperature Range |
|---|---|---|
| JB | ±10% | -25 to +85°C |
| X5R | ±15% | -55 to +85°C |
| X6S | ±22% | -55 to +105°C |
| X7R | ±15% | -55 to +125°C |
| X7S | ±22% | -55 to +125°C |

**Rated Voltage (DC)**

| Code | Voltage (DC) | Code | Voltage (DC) |
|---|---|---|---|
| 0E | 2.5V | 1C | 16V |
| 0G | 4.0V | 1E | 25V |
| 0J | 6.3V | 1H | 50V |
| 1A | 10V | | |

**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 = 1µF

**Capacitance Tolerance**

| Code | Tolerance |
|---|---|
| M | ± 20% |

**Nominal Thickness**

| Code | Thickness |
|---|---|
| 030 | 0.30 mm |
| 050 | 0.50 mm |
| 070 | 0.70 mm |
| 085 | 0.85 mm |
| 115 | 1.15 mm |
| 130 | 1.30 mm |

**Packaging Style**

| Code | Style |
|---|---|
| A | 178 mm Reel, 4 mm Pitch |

**Special Reserved Code**

| Code | Description |
|---|---|
| C | TDK Internal Code |

## Capacitance Range Chart

# EIA CC0204 [C0510]

**Capacitance Range Chart**

Temperature Characteristics: X5R (±15%), X6S (±22%), X7S (±22%)
Rated Voltage: 16V (1C), 10V (1A), 6.3V (0J), 4V (0G), 2.5V (0E)

| Capacitance (pF) | Code | Tolerance | X5R | | | X6S | | X7S | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1C (16V) | 1A (10V) | 0J (6.3V) | 0J (6.3V) | 0G (4V) | 0G (4V) | 0E (2.5V) |
| 100,000 | 104 | M: ± 20% | | | | | | | |
| 220,000 | 224 | | | | | | | | |
| 470,000 | 474 | | | | | | | | |
| 1,000,000 | 105 | | | | | | | | |

Standard Thickness

0.30 mm

## Capacitance Range Chart

# EIA CC0306 [C0816]

**Capacitance Range Chart**

Temperature Characteristics: X5R (±15%), X6S (±22%), X7R (±15%), X7S (±22%)
Rated Voltage: 16V (1C), 10V (1A), 6.3V (0J), 4V (0G)

| Capacitance (pF) | Code | Tolerance | X5R | | | X6S | X7R | | X7S |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1C (16V) | 1A (10V) | 0J (6.3V) | 0G (4V) | 1C (16V) | 0J (6.3V) | 0G (4V) |
| 10,000 | 103 | M: ± 20% | | | | | | | |
| 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 | | | | | | | | |

Standard Thickness

0.50 mm

## Capacitance Range Chart

# EIA CC0508 [C1220]

**Capacitance Range Chart**

Temperature Characteristics: X5R (±15%), X7R (±15%)
Rated Voltage: 50V (1H), 25V (1E), 16V (1C), 10V (1A), 6.3V (0J)

| Capacitance (pF) | Code | Tolerance | X5R | | | | X7R | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1H (50V) | 1E (25V) | 1C (16V) | 1A (10V) | 1H (50V) | 1E (25V) | 1C (16V) | 0J (6.3V) |
| 10,000 | 103 | M: ± 20% | | | | | | | | |
| 22,000 | 223 | | | | | | | | | |
| 47,000 | 473 | | | | | | | | | |
| 100,000 | 104 | | | | | | | | | |
| 220,000 | 224 | | | | | | | | | |
| 470,000 | 474 | | | | | | | | | |
| 1,000,000 | 105 | | | | | | | | | |

Standard Thickness

0.85 mm

## Capacitance Range Chart

# EIA CC0612 [C1632]

**Capacitance Range Chart**

Temperature Characteristics: X5R (±15%), X7R (±15%), X7S (±22%)
Rated Voltage: 50V (1H), 25V (1E), 16V (1C), 10V (1A), 6.3V (0J), 4V (0G)

| Capacitance (pF) | Code | Tolerance | X5R | | | | | X7R | | | | | X7S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1H (50V) | 1E (25V) | 1C (16V) | 1A (10V) | 0J (6.3V) | 1H (50V) | 1E (25V) | 1C (16V) | 1A (10V) | 0J (6.3V) | 0G (4V) |
| 10,000 | 103 | M: ± 20% | | | | | | | | | | | |
| 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

- 0.70 mm
- 1.15 mm
- 1.30 mm

## Capacitance Range Table

### Class 2 (Temperature Stable)

Temperature Characteristics: X5R (-55 to +85ºC, ±15%)

| Capacitance | Size | Thickness (mm) | Capacitance Tolerance | Catalog Number | | | |
|---|---|---|---|---|---|---|---|
| | | | | Rated Voltage Edc: 50V | Rated Voltage Edc: 25V | Rated Voltage Edc: 16V | Rated Voltage Edc: 10V |
| 10 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X5R1C103M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X5R1H103M085AC | | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X5R1H103M070AC | | | |
| 22 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X5R1C223M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X5R1H223M085AC | | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X5R1H223M070AC | | | |
| 47 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X5R1C473M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X5R1H473M085AC | | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X5R1H473M070AC | | | |
| 100 nF | 0510 | 0.30 ± 0.05 | ± 20% | | | C0510X5R1C104M030AC | |
| | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X5R1C104M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | | C1220X5R1E104M085AC | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X5R1H104M070AC | | | |
| 220 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | | C0816X5R1A224M050AC |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | | | C1220X5R1C224M085AC | |
| | 1632 | 0.70 ± 0.10 | ± 20% | | C1632X5R1E224M070AC | | |
| | | 1.15 ± 0.15 | ± 20% | C1632X5R1H224M115AC | | | |
| 470 nF | 0510 | 0.30 ± 0.05 | ± 20% | | | C0510X5R1C474M030AC | C0510X5R1A474M030AC |
| | 0816 | 0.50 ± 0.10 | ± 20% | | | | C0816X5R1A474M050AC |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | | | | C1220X5R1A474M085AC |
| | 1632 | 0.70 ± 0.10 | ± 20% | | | C1632X5R1C474M070AC | |
| | | 1.15 ± 0.15 | ± 20% | | C1632X5R1E474M115AC | | |
| 1 µF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X5R1C105M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | | | | C1220X5R1A105M085AC |
| | 1632 | 0.70 ± 0.10 | ± 20% | | | | C1632X5R1A105M070AC |
| | | 1.15 ± 0.15 | ± 20% | | | C1632X5R1C105M115AC | |
| 2.2 µF | 1632 | 1.15 ± 0.15 | ± 20% | | | | C1632X5R1A225M115AC |

| Capacitance | Size | Thickness (mm) | Capacitance Tolerance | Catalog Number | |
|---|---|---|---|---|---|
| | | | | Rated Voltage Edc: 6.3V | Rated Voltage Edc: 4.0V |
| 470 nF | 0816 | 0.50 ± 0.10 | ± 20% | C0816X5R0J474M050AC | |
| 1 µF | 0510 | 0.30 ± 0.05 | ± 20% | C0510X5R0J105M030AC | |
| | 0816 | 0.50 ± 0.10 | ± 20% | C0816X5R0J105M050AC | |
| 2.2 µF | 0816 | 0.50 ± 0.10 | ± 20% | C0816X5R0J225M050AC | |
| 4.7 µF | 0816 | 0.50 ± 0.10 | ± 20% | C0816X5R0J475M050AC | |
| | 1632 | 1.30 ± 0.15 | ± 20% | C1632X5R0J475M130AC | |
| 10 µF | 1632 | 1.30 ± 0.15 | ± 20% | C1632X5R0J106M130AC | |

### Class 2 (Temperature Stable)

Temperature Characteristics: X6S (-55 to +105ºC, ±22%)

| Capacitance | Size | Thickness (mm) | Capacitance Tolerance | Catalog Number | |
|---|---|---|---|---|---|
| | | | | Rated Voltage Edc: 6.3V | Rated Voltage Edc: 4.0V |
| 100 nF | 0510 | 0.30 ± 0.05 | ± 20% | | C0510X6S0G104M030AC |
| 220 nF | 0510 | 0.30 ± 0.05 | ± 20% | | C0510X6S0G224M030AC |
| 470 nF | 0510 | 0.30 ± 0.05 | ± 20% | C0510X6S0J474M030AC | C0510X6S0G474M030AC |
| 1 µF | 0510 | 0.30 ± 0.05 | ± 20% | | C0510X6S0G105M030AC |
| 4.7 µF | 0816 | 0.50 ± 0.10 | ± 20% | | C0816X6S0G475M050AC |

## Capacitance Range Table

### Class 2 (Temperature Stable)

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

| Capacitance | Size | Thickness (mm) | Capacitance Tolerance | Catalog Number | | | |
|---|---|---|---|---|---|---|---|
| | | | | Rated Voltage Edc: 50V | Rated Voltage Edc: 25V | Rated Voltage Edc: 16V | Rated Voltage Edc: 10V |
| 10 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X7R1C103M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X7R1H103M085AC | | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X7R1H103M070AC | | | |
| 22 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X7R1C223M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X7R1H223M085AC | | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X7R1H223M070AC | | | |
| 47 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X7R1C473M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X7R1H473M085AC | | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X7R1H473M070AC | | | |
| 100 nF | 0816 | 0.50 ± 0.10 | ± 20% | | | C0816X7R1C104M050AC | |
| | 1220 | 0.85 +0.15/-0.25 | ± 20% | | C1220X7R1E104M085AC | | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X7R1H104M070AC | | | |
| 220 nF | 1220 | 0.85 +0.15/-0.25 | ± 20% | | | C1220X7R1C224M085AC | |
| | 1632 | 0.70 ± 0.10 | ± 20% | | C1632X7R1E224M070AC | | |
| | | 1.15 ± 0.15 | ± 20% | C1632X7R1H224M115AC | | | |
| 470 nF | 1632 | 0.70 ± 0.10 | ± 20% | | | C1632X7R1C474M070AC | |
| | | 1.15 ± 0.15 | ± 20% | | C1632X7R1E474M115AC | | |
| 1 µF | 1632 | 0.70 ± 0.10 | ± 20% | | | | C1632X7R1A105M070AC |
| | | 1.15 ± 0.15 | ± 20% | | | C1632X7R1C105M115AC | |
| 2.2 µF | 1632 | 1.15 ± 0.15 | ± 20% | | | | C1632X7R1A225M115AC |

| Capacitance | Size | Thickness (mm) | Capacitance Tolerance | Catalog Number | |
|---|---|---|---|---|---|
| | | | | Rated Voltage Edc: 6.3V | Rated Voltage Edc: 4.0V |
| 220 nF | 0816 | 0.50 ± 0.10 | ± 20% | C0816X7R0J224M050AC | |
| 470 nF | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X7R0J474M085AC | |
| 1 µF | 1220 | 0.85 +0.15/-0.25 | ± 20% | C1220X7R0J105M085AC | |
| | 1632 | 0.70 ± 0.10 | ± 20% | C1632X7R0J105M070AC | |
| 2.2 µF | 1632 | 1.15 ± 0.15 | ± 20% | C1632X7R0J225M115AC | |

### Class 2 (Temperature Stable)

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

| Capacitance | Size | Thickness (mm) | Capacitance Tolerance | Catalog Number | | |
|---|---|---|---|---|---|---|
| | | | | Rated Voltage Edc: 6.3V | Rated Voltage Edc: 4.0V | Rated Voltage Edc: 2.5V |
| 470 nF | 0510 | 0.30 ± 0.05 | ± 20% | | C0510X7S0G474M030AC | |
| | 0816 | 0.50 ± 0.10 | ± 20% | | C0816X7S0G474M050AC | |
| 1 µF | 0510 | 0.30 ± 0.05 | ± 20% | | | C0510X7S0E105M030AC |
| | 0816 | 0.50 ± 0.10 | ± 20% | | C0816X7S0G105M050AC | |
| 2.2 µF | 0816 | 0.50 ± 0.10 | ± 20% | | C0816X7S0G225M050AC | |
| 4.7 µF | 1632 | 1.30 ± 0.15 | ± 20% | | C1632X7S0G475M130AC | |
| 10 µF | 1632 | 1.30 ± 0.15 | ± 20% | | C1632X7S0G106M130AC | |