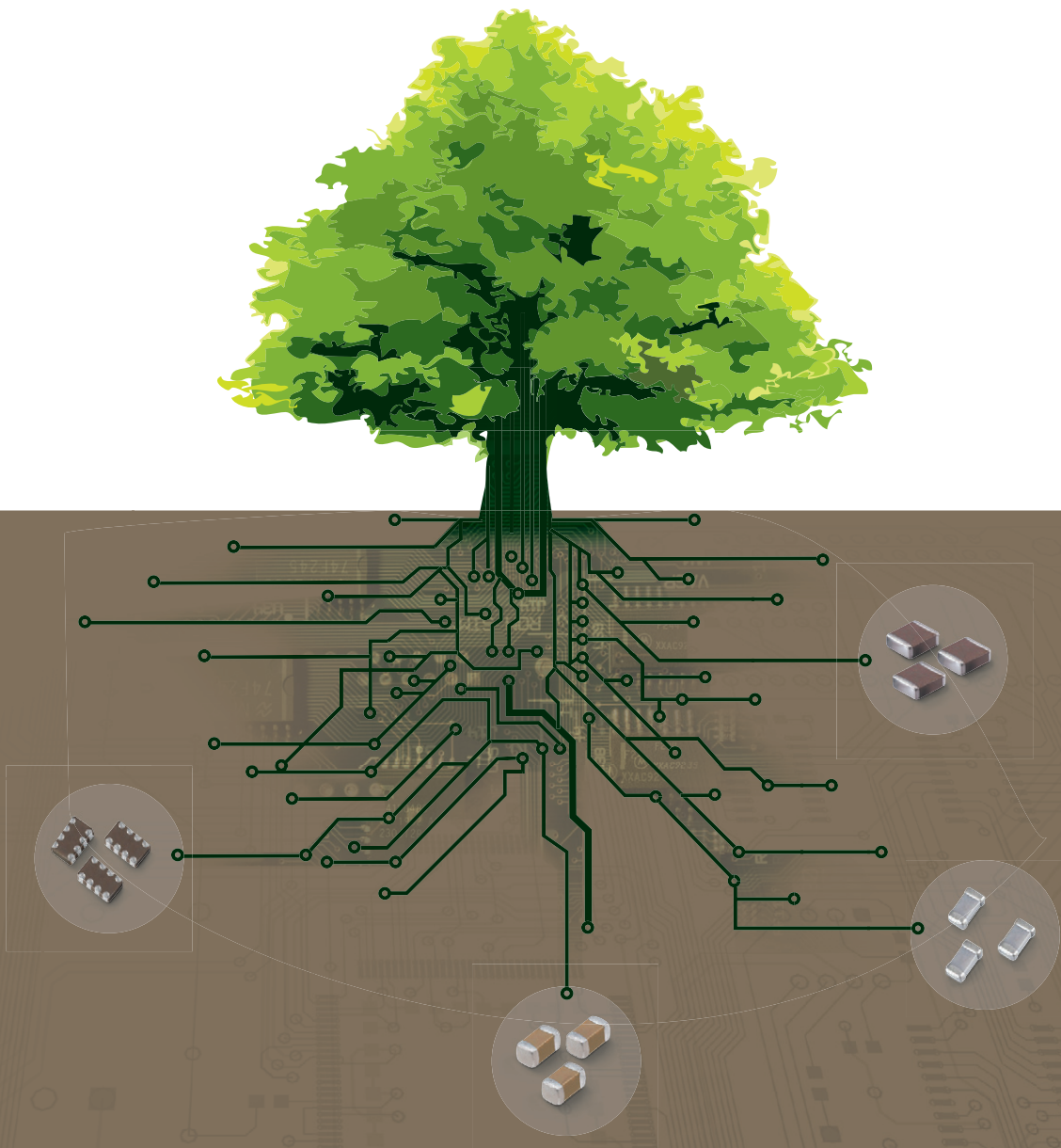


February 2012

기후변화 대응
CO₂ 3.75g
MLCC(CL03A104K) 1piece

RoHS+Halogen
Compliant
ecoparts

MULTILAYER CERAMIC CAPACITORS



SAMSUNG
ELECTRO-MECHANICS





We declare that all our MLCCs are produced in accordance with EU ROHS and REACH Directive.

1. RoHS Compliance and restriction of Br

The following restricted materials are not used in packaging materials as well as products in compliance with the law and restriction.

- Cd, Pb, Hg, Cr+6, As, Br and the compounds, PCB, asbestos
- Bromic materials : PBBs, PBBOs, PBDO, PBDE, PBB

2. No use of materials breaking Ozone layer

The following ODS materials are not used in our fabrication process.

- ODS material : Freon, Haron, 1-1-1 TCE, CCl₄, HCFC

If you want more detailed Information, Please Visit Samsung Electro-mechanics Website
[<http://www.semlcr.com>]

Please, see the last page of this catalog for our environmental certification list.

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Part Numbering System

CL 10 A 106 M P 8 N N N C
1 2 3 4 5 6 7 8 9 10 11

1. SERIES CODE _____

CL=Multi layer Ceramic Capacitors

2. SIZE CODE — inch(mm) _____

02=01005(0402) 21=0805(2012) 43=1812(4532)
 03=0201(0603) 31=1206(3216) 55=2220(5750)
 05=0402(1005) 32=1210(3225)
 10=0603(1608) 42=1808(4520)

3. DIELECTRIC CODE _____

| Class I | Class II |
|---------|---|
| C=COG | A=X5R F=Y5V B=X7R X=X6S Y=X7S Z=X7T |

4. CAPACITANCE CODE _____

Capacitance expressed in pF. 2 significant digits plus number of zeros.
 example) 106=10 × 10⁶=10000000pF
 For Values < 10pF, Letter R denotes decimal point
 example) 1R5=1.5pF

5. TOLERANCE CODE _____

B=±0.1pF F=±1pF, ±1%* K=±10%
 C=±0.25pF G=±2% M=±20%
 D=±0.5pF J=±5% Z=+80/-20%

*For Values ≤ 10pF, F=±1pF
 Values > 10pF, F=±1%

6. RATED VOLTAGE CODE _____

R=4V O=16V B=50V E=250V H=630V K=3000V
 Q=6.3V A=25V C=100V F=350V I=1000V
 P=10V L=35V D=200V G=500V J=2000V

7. THICKNESS CODE _____

3 = 0.30mm A = 0.65mm F = 1.25mm L = 3.20mm S = 1.35mm
 5 = 0.50mm C = 0.85mm H = 1.60mm M = 1.15mm U = 1.80mm
 8 = 0.80mm D = 1.00mm I = 2.00mm P = 1.15mm V = 2.50mm
 9 = 0.90mm E = 1.10mm J = 2.50mm Q = 1.25mm Y = 1.25mm

8. INNER ELECTRODE / TERMINATION / PLATING CODE _____

A= Normal Product Pd / Ag / Ni barrier / Sn 100%
 N= Normal Product Ni / Cu / Ni barrier / Sn 100%
 G= Normal Product Cu / Cu / Ni barrier / Sn 100%
 L= Low profile Ni / Cu / Ni barrier / Sn 100%
 S= Normal Product Ni / Cu / Soft termination / Ni barrier / Sn 100%

9. PRODUCT CODE _____

N= Normal
 A= Array(2-element)
 B= Array(4-element)
 L= LICC
 J= SLIC

*Size tolerance

| Size Code | 01005(0402) | 0201(0603) | 0402(1005) | 0603(1608) | 0805(2012) | 1206(3216) |
|-----------|-------------|------------|------------|------------|------------|------------|
| S | ±0.03 | ±0.05 | ±0.07 | ±0.07 | | ±0.30 |
| Q | ±0.05 | ±0.07 | ±0.10 | ±0.15 | ±0.15 | |
| R | ±0.07 | ±0.09 | ±0.15 | ±0.20 | ±0.20 | |
| U | ±0.09 | | ±0.20 | ±0.25 | ±0.30 | |
| Z | | | ±0.40 | ±0.30 | | |
| 9 | | | ±0.30 | | | |

10. CONTROL CODE _____

N= Reserved for future use

11. PACKAGING CODE _____

B = Bulk O = Cardboard Tape, 10" Reel E = Embossed Type, 7" Reel
 P = Bulk Case D = Cardboard Tape, 13" Reel(10,000ea) G = Embossed Type, 7" Reel(3,000ea)
 C = Cardboard Tape, 7" Reel L = Cardboard Tape, 13" Reel(15,000ea) F = Embossed Type, 13" Reel
 S = Embossed Type, 10" Reel

* Note : This catalog has only typical specifications because there is no space for detailed specifications.
 Please approve our product specifications or transact the approval sheet for product specifications before ordering.

Class I (Temperature Compensation)

| Symbol | EIA Code | Operation Temperature Range(°C) | Temperature Coefficient Range(ppm/°C) |
|--------|----------|---------------------------------|---------------------------------------|
| C | COG | -55 ~ +125 | 0 ±30 |

*** Class II (High Dielectric Constant)**

| Symbol | EIA Code | Operation Temperature Range(°C) | Capacitance Change(ΔC %) |
|--------|----------|---------------------------------|--------------------------|
| A | X5R | -55 ~ + 85 | ±15 |
| B | X7R | -55 ~ +125 | ±15 |
| X | X6S | -55 ~ +105 | ±22 |
| F | Y5V | -30 ~ + 85 | -82 ~ +22 |
| Y | X7S | -55 ~ +125 | ±22 |
| Z | X7T | -55 ~ +125 | -33 ~ +22 |

| Series | TC | Capacitance Step | | | | | | | | | | | |
|--------|-----|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| E-3 | Y5V | 1.0 | | | | 2.2 | | | | 4.7 | | | |
| | X5R | | | | | | | | | | | | |
| E-6 | X7R | | | | | | | | | | | | |
| | X6S | 1.0 | 1.5 | | | 2.2 | 3.3 | | | 4.7 | 6.8 | | |
| | X7S | | | | | | | | | | | | |
| | X7T | | | | | | | | | | | | |
| E-12 | COG | 1.0 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |

| Size | Code | Thickness(mm) | Spec(mm) | Size | Code | Thickness(mm) | Spec(mm) |
|-------------|------------|---------------|------------|------------|------------|---------------|----------|
| 01005(0402) | 2 | 0.20 | ±0.02 | 1210(3225) | C | 0.85 | ±0.10* |
| 0201(0603) | 3 | 0.30 | ±0.03 | | 9 | 0.90 | ±0.10* |
| 0402(1005) | 3 | 0.30 | ±0.03* | | F | 1.25 | ±0.20 |
| | 5 | 0.50 | ±0.05 | | S | 1.35 | ±0.15 |
| 0603(1608) | 5 | 0.50 | +0.0/-0.1* | | H | 1.60 | ±0.20 |
| | 8 | 0.80 | ±0.10 | | U | 1.80 | ±0.20* |
| 0805(2012) | A | 0.65 | ±0.10 | | I | 2.00 | ±0.20 |
| | C | 0.85 | ±0.10 | | J | 2.50 | ±0.20 |
| | C | 0.85 | ±0.10* | | V | 2.50 | ±0.30 |
| | M | 1.15 | ±0.10 | | 1808(4520) | F | 1.25 |
| | F | 1.25 | ±0.10 | H | | 1.60 | ±0.20 |
| | Q | 1.25 | ±0.15 | I | | 2.00 | ±0.20 |
| | 1206(3216) | Y | 1.25 | ±0.20 | 1812(4532) | F | 1.25 |
| C | | 0.85 | ±0.15 | H | | 1.60 | ±0.20 |
| | | C | 0.85 | ±0.10* | I | 2.00 | ±0.20 |
| E | | 1.10 | ±0.15 | J | 2.50 | ±0.20 | |
| E | | 1.10 | ±0.10* | L | 3.20 | ±0.30 | |
| P | | 1.15 | ±0.10* | 2220(5750) | H | 1.60 | ±0.20 |
| M | | 1.15 | ±0.15 | | I | 2.00 | ±0.20 |
| F | | 1.25 | ±0.15 | | J | 2.50 | ±0.20 |
| H | | 1.60 | ±0.20 | | L | 3.00 | ±0.30 |

- * Mark is only applicable to "L" code , 12th code in part number.
- Please discuss with sales person with regard to Pd products.

* Note : This catalog has only typical specifications because there is no space for detailed specifications.
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Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

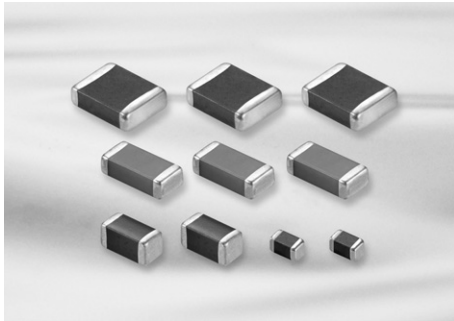
Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting

General Capacitors



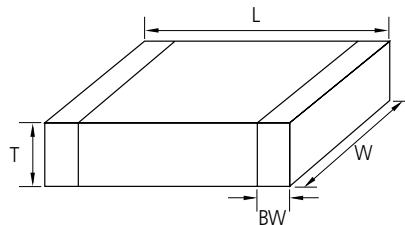
Feature

- Wide selection of size : from 0402 to 2220
- Highly reliable tolerance and high speed automatic chip placement on PCBs
- Wide capacitance range
- Wide temperature compensation and voltage range : from COG to Y5V and from 6.3V to 50V
- Highly reliable performance
- Highly resistant termination metal
- Tape & reel for surface mount assembly

Application

- HHP, DSC, DVC, LCD, TV, Memory Module, PDA, Game Machine
- Tuner (Product code C is suitable.)
- ※ For using special purpose like Military, Medical, Aviation, Automobile device should be following a special specification.

Structure and Dimensions



| Size Code | EIA Code | Dimension(mm) | | | | |
|-----------|----------|---------------|-----------|------------------|----------------|--------------|
| | | L | W | T | Thickness Code | BW |
| 05 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.50±0.05 | 5 | 0.25±0.10 |
| 10 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.50+0.0/-0.1(*) | 5 | 0.30±0.20 |
| | | 1.60±0.10 | 0.80±0.10 | 0.80±0.10 | 8 | |
| 21 | 0805 | 2.00±0.10 | 1.25±0.10 | 0.85±0.10 | C | 0.5+0.2/-0.3 |
| | | 2.00±0.10 | 1.25±0.10 | 1.15±0.10 | M | |
| | | 2.00±0.10 | 1.25±0.10 | 1.25±0.10 | F | |
| | | 2.00±0.15 | 1.25±0.15 | 1.25±0.15 | Q | |
| | | 2.00±0.20 | 1.25±0.20 | 1.25±0.20 | Y | |
| 31 | 1206 | 3.20±0.20 | 1.60±0.20 | 0.60±0.10(*) | 6 | 0.50±0.30 |
| | | 3.20±0.15 | 1.60±0.15 | 0.85±0.15 | C | |
| | | 3.20±0.20 | 1.60±0.20 | 0.85±0.10(*) | C | |
| | | 3.20±0.20 | 1.60±0.20 | 1.15±0.10(*) | P | |
| | | 3.20±0.15 | 1.60±0.15 | 1.25±0.15 | F | |
| 32 | 1210 | 3.20±0.30 | 2.50±0.20 | 0.85±0.10(*) | C | 0.60±0.30 |
| | | 3.20±0.30 | 2.50±0.20 | 0.90±0.10(*) | 9 | |
| | | 3.20±0.30 | 2.50±0.20 | 1.60±0.20 | H | |
| | | 3.20±0.30 | 2.50±0.20 | 1.80±0.20(*) | U | |
| | | 3.20±0.30 | 2.50±0.20 | 2.00±0.20 | I | |
| | | 3.20±0.30 | 2.50±0.20 | 2.50±0.20 | J | |
| | | 3.20±0.40 | 2.50±0.30 | 2.50±0.30 | V | |
| 42 | 1808 | 4.50±0.40 | 2.00±0.20 | 1.25±0.20 | F | 0.80±0.30 |
| | | 4.50±0.40 | 2.00±0.20 | 1.40±0.20 | G | |
| | | 4.50±0.40 | 2.00±0.20 | 2.00±0.20 | I | |
| 43 | 1812 | 4.50±0.40 | 3.20±0.30 | 1.25±0.20 | F | 0.80±0.30 |
| | | 4.50±0.40 | 3.20±0.30 | 2.50±0.20 | J | |
| | | 4.50±0.40 | 3.20±0.30 | 3.20±0.30 | L | |
| 55 | 2220 | 5.70±0.40 | 5.00±0.40 | 2.50±0.20 | J | 1.00±0.30 |
| | | 5.70±0.40 | 5.00±0.40 | 3.20±0.30 | L | |

■ * Mark is only applicable to "L" code , 12th code in part number.

* Note : This catalog has only typical specifications because there is no space for detailed specifications.
Please approve our product specifications or transact the approval sheet for product specifications before ordering.



General Capacitors Table (X5R)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | | | | | |
|------------|-------|------------------------|------|------|---|-----|-----|----|----|----|-----|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 |
| 0402(1005) | 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | 6.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | 10 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | 16 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| | 25 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| 0603(1608) | 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | 6.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | 10 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | 16 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | 25 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | 50 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| 0805(2012) | 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 6.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 10 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 16 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 25 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 50 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1206(3216) | 6.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 10 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 16 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 25 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | 50 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1210(3225) | 6.3 | | | | | | | | ✓ | ✓ | ✓ |
| | 10 | | | | | | | ✓ | ✓ | ✓ | ✓ |
| | 16 | | | | | | | ✓ | ✓ | ✓ | ✓ |
| | 25 | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ |

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

General Capacitors Table -Low Profile (X5R)

| Size(mm) | Tmax (mm) | Vr(V) | Capacitance (μF) | | | | | |
|------------|--------------|-------|------------------|------------|-----|----|------------|----|
| | | | 1 | 2.2 | 4.7 | 10 | 22 | 47 |
| 0402(1005) | 0.3 | 6.3 | X6S | | | | | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| 0603(1608) | 0.5 | 6.3 | | | | | | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | | | | |
| 0805(2012) | 0.7 | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | | | | |
| | 0.95 | 4 | | | | | (Tmax=1.0) | |
| | | 6.3 | | | | | (Tmax=1.0) | |
| 10 | | | | | | | | |
| 16 | | | | | | | | |
| 25 | | | | | X6S | | | |
| 1206(3216) | 0.7 | 10 | | | | | | |
| | 0.95 | 6.3 | | | | | | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | X6S | | | |
| | | 50 | (Tmax=1.0) | (Tmax=1.0) | | | | |
| 1210(3225) | 0.95 | 16 | | | | | | |
| | 2.0 | 25 | | | | | | |
| | | 35 | | | | | | |
| | | 50 | | | | | | |

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

- Part Numbering System
- General Capacitors**
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



General Capacitors Table (X6S)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | | | | | |
|------------|-------|------------------------|------|------|---|-----|-----|----|----|----|-----|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 |
| 0402(1005) | 4 | | | | | | | | | | |
| | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| 0603(1608) | 4 | | | | | | | | | | |
| | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| 0805(2012) | 4 | | | | | | | | | | |
| | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| 1206(3216) | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| 1210(3225) | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

General Capacitors Table (X7R)

| Size(mm) | Vr(V) | Capacitance (μF) | | | | | | | | | |
|------------|-------|---|------|------|---|-----|-----|----|----|----|-----|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 |
| 0402(1005) | 6.3 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range for 0.1 to 100 μF, with 'X7S' label] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| 0603(1608) | 6.3 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| 0805(2012) | 6.3 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range for 0.1 to 100 μF, with 'X7S' label] | | | | | | | | | |
| | 35 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| 1206(3216) | 6.3 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 35 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| 1210(3225) | 6.3 | [Bar chart showing capacitance range for 0.1 to 100 μF, with 'X7T' label] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range for 0.1 to 100 μF] | | | | | | | | | |

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

- Part Numbering System
- General Capacitors**
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- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



General Capacitors Table (Y5V)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | | | | | |
|------------|-------|------------------------|------|------|---|-----|-----|----|----|----|--|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | |
| 0402(1005) | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| 0603(1608) | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| | 50 | | | | | | | | | | |
| 0805(2012) | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| | 50 | | | | | | | | | | |
| 1206(3216) | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| | 50 | | | | | | | | | | |
| 1210(3225) | 6.3 | | | | | | | | | | |
| | 10 | | | | | | | | | | |
| | 16 | | | | | | | | | | |
| | 25 | | | | | | | | | | |
| | 35 | | | | | | | | | | |
| | 50 | | | | | | | | | | |
| | 50 | | | | | | | | | | |

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Product Lineup (General Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05C0R5CB5NNN □ | 1.00×0.50 | 0.5pF | 50 | ±0.25pF | 0.55 |
| 2 | CL05CR75CB5NNN □ | | 0.75pF | 50 | ±0.25pF | 0.55 |
| 3 | CL05C010CB5NNN □ | | 1.0pF | 50 | ±0.25pF | 0.55 |
| 4 | CL05C1R2CB5NNN □ | | 1.2pF | 50 | ±0.25pF | 0.55 |
| 5 | CL05C1R5CB5NNN □ | | 1.5pF | 50 | ±0.25pF | 0.55 |
| 6 | CL05C1R8CB5NNN □ | | 1.8pF | 50 | ±0.25pF | 0.55 |
| 7 | CL05C020CB5NNN □ | | 2.0pF | 50 | ±0.25pF | 0.55 |
| 8 | CL05C2R2CB5NNN □ | | 2.2pF | 50 | ±0.25pF | 0.55 |
| 9 | CL05C2R4CB5NNN □ | | 2.4pF | 50 | ±0.25pF | 0.55 |
| 10 | CL05C2R5CB5NNN □ | | 2.5pF | 50 | ±0.25pF | 0.55 |
| 11 | CL05C2R7CB5NNN □ | | 2.7pF | 50 | ±0.25pF | 0.55 |
| 12 | CL05C030CB5NNN □ | | 3.0pF | 50 | ±0.25pF | 0.55 |
| 13 | CL05C3R3CB5NNN □ | | 3.3pF | 50 | ±0.25pF | 0.55 |
| 14 | CL05C3R5CB5NNN □ | | 3.5pF | 50 | ±0.25pF | 0.55 |
| 15 | CL05C3R6CB5NNN □ | | 3.6pF | 50 | ±0.25pF | 0.55 |
| 16 | CL05C3R9CB5NNN □ | | 3.9pF | 50 | ±0.25pF | 0.55 |
| 17 | CL05C040CB5NNN □ | | 4.0pF | 50 | ±0.25pF | 0.55 |
| 18 | CL05C4R3CB5NNN □ | | 4.3pF | 50 | ±0.25pF | 0.55 |
| 19 | CL05C4R7CB5NNN □ | | 4.7pF | 50 | ±0.25pF | 0.55 |
| 20 | CL05C050DB5NNN □ | | 5.0pF | 50 | ±0.5pF | 0.55 |
| 21 | CL05C5R6DB5NNN □ | | 5.6pF | 50 | ±0.5pF | 0.55 |
| 22 | CL05C060DB5NNN □ | | 6.0pF | 50 | ±0.5pF | 0.55 |
| 23 | CL05C6R2DB5NNN □ | | 6.2pF | 50 | ±0.5pF | 0.55 |
| 24 | CL05C6R8DB5NNN □ | | 6.8pF | 50 | ±0.5pF | 0.55 |
| 25 | CL05C070DB5NNN □ | | 7.0pF | 50 | ±0.5pF | 0.55 |
| 26 | CL05C080DB5NNN □ | | 8.0pF | 50 | ±0.5pF | 0.55 |
| 27 | CL05C8R2DB5NNN □ | | 8.2pF | 50 | ±0.5pF | 0.55 |
| 28 | CL05C090DB5NNN □ | | 9.0pF | 50 | ±0.5pF | 0.55 |
| 29 | CL05C9R1DB5NNN □ | | 9.1pF | 50 | ±0.5pF | 0.55 |
| 30 | CL05C100JB5NNN □ | | 10pF | 50 | ±5% | 0.55 |
| 31 | CL05C110JB5NNN □ | | 11pF | 50 | ±5% | 0.55 |
| 32 | CL05C120JB5NNN □ | | 12pF | 50 | ±5% | 0.55 |
| 33 | CL05C130JB5NNN □ | | 13pF | 50 | ±5% | 0.55 |
| 34 | CL05C150JB5NNN □ | | 15pF | 50 | ±5% | 0.55 |
| 35 | CL05C160JB5NNN □ | | 16pF | 50 | ±5% | 0.55 |
| 36 | CL05C180JB5NNN □ | | 18pF | 50 | ±5% | 0.55 |
| 37 | CL05C200JB5NNN □ | | 20pF | 50 | ±5% | 0.55 |
| 38 | CL05C220JA5NNN □ | | 22pF | 25 | ±5% | 0.55 |
| 39 | CL05C220JB5NNN □ | | 22pF | 50 | ±5% | 0.55 |
| 40 | CL05C240JB5NNN □ | | 24pF | 50 | ±5% | 0.55 |
| 41 | CL05C270JB5NNN □ | | 27pF | 50 | ±5% | 0.55 |
| 42 | CL05C270JA5NNN □ | | 27pF | 25 | ±5% | 0.55 |
| 43 | CL05C300JB5NNN □ | | 30pF | 50 | ±5% | 0.55 |
| 44 | CL05C330JB5NNN □ | | 33pF | 50 | ±5% | 0.55 |
| 45 | CL05C360JB5NNN □ | | 36pF | 50 | ±5% | 0.55 |
| 46 | CL05C390JB5NNN □ | | 39pF | 50 | ±5% | 0.55 |
| 47 | CL05C430JB5NNN □ | | 43pF | 50 | ±5% | 0.55 |
| 48 | CL05C470JB5NNN □ | | 47pF | 50 | ±5% | 0.55 |
| 49 | CL05C510JB5NNN □ | | 51pF | 50 | ±5% | 0.55 |
| 50 | CL05C560JB5NNN □ | | 56pF | 50 | ±5% | 0.55 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Product Lineup (General Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 51 | CL05C620JB5NNN □ | 1.00×0.50 | 62pF | 50 | ±5% | 0.55 |
| 52 | CL05C680JB5NNN □ | | 68pF | 50 | ±5% | 0.55 |
| 53 | CL05C750JB5NNN □ | | 75pF | 50 | ±5% | 0.55 |
| 54 | CL05C820JB5NNN □ | | 82pF | 50 | ±5% | 0.55 |
| 55 | CL05C910JB5NNN □ | | 91pF | 50 | ±5% | 0.55 |
| 56 | CL05C101JB5NNN □ | | 100pF | 50 | ±5% | 0.55 |
| 57 | CL05C121JB5NNN □ | | 120pF | 50 | ±5% | 0.55 |
| 58 | CL05C151JB5NNN □ | | 150pF | 50 | ±5% | 0.55 |
| 59 | CL05C181JB5NNN □ | | 180pF | 50 | ±5% | 0.55 |
| 60 | CL05C201JB5NNN □ | | 200pF | 50 | ±5% | 0.55 |
| 61 | CL05C221JB5NNN □ | | 220pF | 50 | ±5% | 0.55 |
| 62 | CL05C271JB5NNN □ | | 270pF | 50 | ±5% | 0.55 |
| 63 | CL05C331JB5NNN □ | | 330pF | 50 | ±5% | 0.55 |
| 64 | CL05C391JB5NNN □ | | 390pF | 50 | ±5% | 0.55 |
| 65 | CL05C471JB5NNN □ | | 470pF | 50 | ±5% | 0.55 |
| 66 | CL05C471JO5NNN □ | | 470pF | 16 | ±5% | 0.55 |
| 67 | CL05C681JB5NNN □ | | 680pF | 50 | ±5% | 0.55 |
| 68 | CL05C821JB5NNN □ | | 820pF | 50 | ±5% | 0.55 |
| 69 | CL05C102JB5NNN □ | | 1nF | 50 | ±5% | 0.55 |
| 70 | CL05C102JA5NNN □ | | 1nF | 25 | ±5% | 0.55 |
| 71 | CL05C102JO5NNN □ | | 1nF | 16 | ±5% | 0.55 |
| 1 | CL10C0R3CB8NNN □ | 1.60×0.80 | 0.3pF | 50 | ±0.25pF | 0.90 |
| 2 | CL10C0R5CB8NNN □ | | 0.5pF | 50 | ±0.25pF | 0.90 |
| 3 | CL10CR75CB8NNN □ | | 0.75pF | 50 | ±0.25pF | 0.90 |
| 4 | CL10C010CB8NNN □ | | 1.0pF | 50 | ±0.25pF | 0.90 |
| 5 | CL10C1R2CB8NNN □ | | 1.2pF | 50 | ±0.25pF | 0.90 |
| 6 | CL10C1R5CB8NNN □ | | 1.5pF | 50 | ±0.25pF | 0.90 |
| 7 | CL10C1R8CB8NNN □ | | 1.8pF | 50 | ±0.25pF | 0.90 |
| 8 | CL10C020CB8NNN □ | | 2.0pF | 50 | ±0.25pF | 0.90 |
| 9 | CL10C2R2CB8NNN □ | | 2.2pF | 50 | ±0.25pF | 0.90 |
| 10 | CL10C2R4CB8NNN □ | | 2.4pF | 50 | ±0.25pF | 0.90 |
| 11 | CL10C2R5CB8NNN □ | | 2.5pF | 50 | ±0.25pF | 0.90 |
| 12 | CL10C2R7CB8NNN □ | | 2.7pF | 50 | ±0.25pF | 0.90 |
| 13 | CL10C030CB8NNN □ | | 3.0pF | 50 | ±0.25pF | 0.90 |
| 14 | CL10C3R3CB8NNN □ | | 3.3pF | 50 | ±0.25pF | 0.90 |
| 15 | CL10C3R5CB8NNN □ | | 3.5pF | 50 | ±0.25pF | 0.90 |
| 16 | CL10C3R6CB8NNN □ | | 3.6pF | 50 | ±0.25pF | 0.90 |
| 17 | CL10C3R9CB8NNN □ | | 3.9pF | 50 | ±0.25pF | 0.90 |
| 18 | CL10C040CB8NNN □ | | 4.0pF | 50 | ±0.25pF | 0.90 |
| 19 | CL10C4R3CB8NNN □ | | 4.3pF | 50 | ±0.25pF | 0.90 |
| 20 | CL10C4R7CB8NNN □ | | 4.7pF | 50 | ±0.25pF | 0.90 |
| 21 | CL10C050DB8NNN □ | | 5.0pF | 50 | ±0.5pF | 0.90 |
| 22 | CL10C5R6DB8NNN □ | | 5.6pF | 50 | ±0.5pF | 0.90 |
| 23 | CL10C060DB8NNN □ | | 6.0pF | 50 | ±0.5pF | 0.90 |
| 24 | CL10C6R2DB8NNN □ | | 6.2pF | 50 | ±0.5pF | 0.90 |
| 25 | CL10C6R8DB8NNN □ | | 6.8pF | 50 | ±0.5pF | 0.90 |
| 26 | CL10C070DB8NNN □ | | 7.0pF | 50 | ±0.5pF | 0.90 |
| 27 | CL10C7R5DB8NNN □ | | 7.5pF | 50 | ±0.5pF | 0.90 |
| 28 | CL10C080DB8NNN □ | | 8.0pF | 50 | ±0.5pF | 0.90 |
| 29 | CL10C8R2DB8NNN □ | | 8.2pF | 50 | ±0.5pF | 0.90 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Product Lineup (General Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 30 | CL10C090DB8NNN □ | 1.60×0.80 | 9.0pF | 50 | ±0.5pF | 0.90 |
| 31 | CL10C9R1DB8NNN □ | | 9.1pF | 50 | ±0.5pF | 0.90 |
| 32 | CL10C100JB8NNN □ | | 10pF | 50 | ±5% | 0.90 |
| 33 | CL10C110JB8NNN □ | | 11pF | 50 | ±5% | 0.90 |
| 34 | CL10C120JB8NNN □ | | 12pF | 50 | ±5% | 0.90 |
| 35 | CL10C130JB8NNN □ | | 13pF | 50 | ±5% | 0.90 |
| 36 | CL10C140JB8NNN □ | | 14pF | 50 | ±5% | 0.90 |
| 37 | CL10C150JB8NNN □ | | 15pF | 50 | ±5% | 0.90 |
| 38 | CL10C160JB8NNN □ | | 16pF | 50 | ±5% | 0.90 |
| 39 | CL10C180JB8NNN □ | | 18pF | 50 | ±5% | 0.90 |
| 40 | CL10C200JB8NNN □ | | 20pF | 50 | ±5% | 0.90 |
| 41 | CL10C220JB8NNN □ | | 22pF | 50 | ±5% | 0.90 |
| 42 | CL10C240JB8NNN □ | | 24pF | 50 | ±5% | 0.90 |
| 43 | CL10C250JB8NNN □ | | 25pF | 50 | ±5% | 0.90 |
| 44 | CL10C270JB8NNN □ | | 27pF | 50 | ±5% | 0.90 |
| 45 | CL10C300JB8NNN □ | | 30pF | 50 | ±5% | 0.90 |
| 46 | CL10C330JB8NNN □ | | 33pF | 50 | ±5% | 0.90 |
| 47 | CL10C360JB8NNN □ | | 36pF | 50 | ±5% | 0.90 |
| 48 | CL10C390JB8NNN □ | | 39pF | 50 | ±5% | 0.90 |
| 49 | CL10C430JB8NNN □ | | 43pF | 50 | ±5% | 0.90 |
| 50 | CL10C470JB8NNN □ | | 47pF | 50 | ±5% | 0.90 |
| 51 | CL10C510JB8NNN □ | | 51pF | 50 | ±5% | 0.90 |
| 52 | CL10C560JB8NNN □ | | 56pF | 50 | ±5% | 0.90 |
| 53 | CL10C620JB8NNN □ | | 62pF | 50 | ±5% | 0.90 |
| 54 | CL10C680JB8NNN □ | | 68pF | 50 | ±5% | 0.90 |
| 55 | CL10C750JB8NNN □ | | 75pF | 50 | ±5% | 0.90 |
| 56 | CL10C820JB8NNN □ | | 82pF | 50 | ±5% | 0.90 |
| 57 | CL10C910JB8NNN □ | | 91pF | 50 | ±5% | 0.90 |
| 58 | CL10C101JB8NNN □ | | 100pF | 50 | ±5% | 0.90 |
| 59 | CL10C111JB8NNN □ | | 110pF | 50 | ±5% | 0.90 |
| 60 | CL10C121JB8NNN □ | | 120pF | 50 | ±5% | 0.90 |
| 61 | CL10C131JB8NNN □ | | 130pF | 50 | ±5% | 0.90 |
| 62 | CL10C151JB8NNN □ | | 150pF | 50 | ±5% | 0.90 |
| 63 | CL10C161JB8NNN □ | | 160pF | 50 | ±5% | 0.90 |
| 64 | CL10C181JB8NNN □ | | 180pF | 50 | ±5% | 0.90 |
| 65 | CL10C201JB8NNN □ | | 200pF | 50 | ±5% | 0.90 |
| 66 | CL10C221JB8NNN □ | | 220pF | 50 | ±5% | 0.90 |
| 67 | CL10C241JB8NNN □ | | 240pF | 50 | ±5% | 0.90 |
| 68 | CL10C271JB8NNN □ | | 270pF | 50 | ±5% | 0.90 |
| 69 | CL10C301JB8NNN □ | | 300pF | 50 | ±5% | 0.90 |
| 70 | CL10C331JB8NNN □ | | 330pF | 50 | ±5% | 0.90 |
| 71 | CL10C361JB8NNN □ | | 360pF | 50 | ±5% | 0.90 |
| 72 | CL10C391JB8NNN □ | | 390pF | 50 | ±5% | 0.90 |
| 73 | CL10C431JB8NNN □ | | 430pF | 50 | ±5% | 0.90 |
| 74 | CL10C471JB8NNN □ | | 470pF | 50 | ±5% | 0.90 |
| 75 | CL10C511JB8NNN □ | | 510pF | 50 | ±5% | 0.90 |
| 76 | CL10C561JB8NNN □ | | 560pF | 50 | ±5% | 0.90 |
| 77 | CL10C621JB8NNN □ | | 620pF | 50 | ±5% | 0.90 |
| 78 | CL10C681JB8NNN □ | | 680pF | 50 | ±5% | 0.90 |
| 79 | CL10C751JB8NNN □ | | 750pF | 50 | ±5% | 0.90 |

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.



Product Lineup (General Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 80 | CL10C821JB8NNN □ | 1.60×0.80 | 820pF | 50 | ±5% | 0.90 |
| 81 | CL10C102JB8NNN □ | | 1nF | 50 | ±5% | 0.90 |
| 82 | CL10C182JB8NNN □ | | 1.8nF | 50 | ±5% | 0.90 |
| 83 | CL10C222JB8NNN □ | | 2.2nF | 50 | ±5% | 0.90 |
| 84 | CL10C562JB8NNN □ | | 5.6nF | 50 | ±5% | 0.90 |
| 1 | CL21CR47CBANNN □ | 2.00×1.25 | 0.47pF | 50 | ±0.25pF | 0.75 |
| 2 | CL21COR5CBANNN □ | | 0.5pF | 50 | ±0.25pF | 0.75 |
| 3 | CL21C010CBANNN □ | | 1.0pF | 50 | ±0.25pF | 0.75 |
| 4 | CL21C1R2CBANNN □ | | 1.2pF | 50 | ±0.25pF | 0.75 |
| 5 | CL21C1R5CBANNN □ | | 1.5pF | 50 | ±0.25pF | 0.75 |
| 6 | CL21C1R8CBANNN □ | | 1.8pF | 50 | ±0.25pF | 0.75 |
| 7 | CL21C020CBANNN □ | | 2.0pF | 50 | ±0.25pF | 0.75 |
| 8 | CL21C2R2CBANNN □ | | 2.2pF | 50 | ±0.25pF | 0.75 |
| 9 | CL21C2R4CBANNN □ | | 2.4pF | 50 | ±0.25pF | 0.75 |
| 10 | CL21C2R5CBANNN □ | | 2.5pF | 50 | ±0.25pF | 0.75 |
| 11 | CL21C2R7CBANNN □ | | 2.7pF | 50 | ±0.25pF | 0.75 |
| 12 | CL21C030CBANNN □ | | 3.0pF | 50 | ±0.25pF | 0.75 |
| 13 | CL21C3R2CBANNN □ | | 3.2pF | 50 | ±0.25pF | 0.75 |
| 14 | CL21C3R3CBANNN □ | | 3.3pF | 50 | ±0.25pF | 0.75 |
| 15 | CL21C3R6CBANNN □ | | 3.6pF | 50 | ±0.25pF | 0.75 |
| 16 | CL21C3R9CBANNN □ | | 3.9pF | 50 | ±0.25pF | 0.75 |
| 17 | CL21C040CBANNN □ | | 4.0pF | 50 | ±0.25pF | 0.75 |
| 18 | CL21C4R7CBANNN □ | | 4.7pF | 50 | ±0.25pF | 0.75 |
| 19 | CL21C5R6DBANNN □ | | 5.6pF | 50 | ±0.5pF | 0.75 |
| 20 | CL21C060DBANNN □ | | 6.0pF | 50 | ±0.5pF | 0.75 |
| 21 | CL21C6R8DBANNN □ | | 6.8pF | 50 | ±0.5pF | 0.75 |
| 22 | CL21C070DBANNN □ | | 7.0pF | 50 | ±0.5pF | 0.75 |
| 23 | CL21C7R5DBANNN □ | | 7.5pF | 50 | ±0.5pF | 0.75 |
| 24 | CL21C080DBANNN □ | | 8.0pF | 50 | ±0.5pF | 0.75 |
| 25 | CL21C8R2DBANNN □ | | 8.2pF | 50 | ±0.5pF | 0.75 |
| 26 | CL21C090DBANNN □ | | 9.0pF | 50 | ±0.5pF | 0.75 |
| 27 | CL21C100JBANNN □ | | 10pF | 50 | ±5% | 0.75 |
| 28 | CL21C120JBANNN □ | | 12pF | 50 | ±5% | 0.75 |
| 29 | CL21C130JBANNN □ | | 13pF | 50 | ±5% | 0.75 |
| 30 | CL21C140JBANNN □ | | 14pF | 50 | ±5% | 0.75 |
| 31 | CL21C150JBANNN □ | | 15pF | 50 | ±5% | 0.75 |
| 32 | CL21C160JBANNN □ | | 16pF | 50 | ±5% | 0.75 |
| 33 | CL21C180JBANNN □ | | 18pF | 50 | ±5% | 0.75 |
| 34 | CL21C200JBANNN □ | | 20pF | 50 | ±5% | 0.75 |
| 35 | CL21C220JBANNN □ | | 22pF | 50 | ±5% | 0.75 |
| 36 | CL21C240JBANNN □ | | 24pF | 50 | ±5% | 0.75 |
| 37 | CL21C250JBANNN □ | | 25pF | 50 | ±5% | 0.75 |
| 38 | CL21C270JBANNN □ | | 27pF | 50 | ±5% | 0.75 |
| 39 | CL21C300JBANNN □ | | 30pF | 50 | ±5% | 0.75 |
| 40 | CL21C330JBANNN □ | | 33pF | 50 | ±5% | 0.75 |
| 41 | CL21C360JBANNN □ | | 36pF | 50 | ±5% | 0.75 |
| 42 | CL21C390JBANNN □ | | 39pF | 50 | ±5% | 0.75 |
| 43 | CL21C430JBANNN □ | | 43pF | 50 | ±5% | 0.75 |
| 44 | CL21C470JBANNN □ | | 47pF | 50 | ±5% | 0.75 |
| 45 | CL21C510JBANNN □ | | 51pF | 50 | ±5% | 0.75 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Product Lineup (General Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 46 | CL21C560JBANNN □ | 2.00×1.25 | 56pF | 50 | ±5% | 0.75 |
| 47 | CL21C620JBANNN □ | | 62pF | 50 | ±5% | 0.75 |
| 48 | CL21C680JBANNN □ | | 68pF | 50 | ±5% | 0.75 |
| 49 | CL21C750JBANNN □ | | 75pF | 50 | ±5% | 0.75 |
| 50 | CL21C820JBANNN □ | | 82pF | 50 | ±5% | 0.75 |
| 51 | CL21C910JBANNN □ | | 91pF | 50 | ±5% | 0.75 |
| 52 | CL21C101JBANNN □ | | 100pF | 50 | ±5% | 0.75 |
| 53 | CL21C111JBANNN □ | | 110pF | 50 | ±5% | 0.75 |
| 54 | CL21C121JBANNN □ | | 120pF | 50 | ±5% | 0.75 |
| 55 | CL21C131JBANNN □ | | 130pF | 50 | ±5% | 0.75 |
| 56 | CL21C151JBANNN □ | | 150pF | 50 | ±5% | 0.75 |
| 57 | CL21C161JBANNN □ | | 160pF | 50 | ±5% | 0.75 |
| 58 | CL21C181JBANNN □ | | 180pF | 50 | ±5% | 0.75 |
| 59 | CL21C201JBANNN □ | | 200pF | 50 | ±5% | 0.75 |
| 60 | CL21C221JBANNN □ | | 220pF | 50 | ±5% | 0.75 |
| 61 | CL21C241JBANNN □ | | 240pF | 50 | ±5% | 0.75 |
| 62 | CL21C271JBANNN □ | | 270pF | 50 | ±5% | 0.75 |
| 63 | CL21C301JBANNN □ | | 300pF | 50 | ±5% | 0.75 |
| 64 | CL21C331JBANNN □ | | 330pF | 50 | ±5% | 0.75 |
| 65 | CL21C361JBANNN □ | | 360pF | 50 | ±5% | 0.75 |
| 66 | CL21C391JBANNN □ | | 390pF | 50 | ±5% | 0.75 |
| 67 | CL21C431JBANNN □ | | 430pF | 50 | ±5% | 0.75 |
| 68 | CL21C471JBANNN □ | | 470pF | 50 | ±5% | 0.75 |
| 69 | CL21C511JBANNN □ | | 510pF | 50 | ±5% | 0.75 |
| 70 | CL21C561JBANNN □ | | 560pF | 50 | ±5% | 0.75 |
| 71 | CL21C621JBCNNN □ | | 620pF | 50 | ±5% | 0.95 |
| 72 | CL21C681JBCNNN □ | | 680pF | 50 | ±5% | 0.95 |
| 73 | CL21C751JBCNNN □ | | 750pF | 50 | ±5% | 0.95 |
| 74 | CL21C821JBCNNN □ | | 820pF | 50 | ±5% | 0.95 |
| 75 | CL21C102JBCNNN □ | | 1nF | 50 | ±5% | 0.95 |
| 76 | CL21C122JBFNNN □ | | 1.2nF | 50 | ±5% | 1.35 |
| 77 | CL21C152JBFNNN □ | | 1.5nF | 50 | ±5% | 1.35 |
| 78 | CL21C182JBFNNN □ | | 1.8nF | 50 | ±5% | 1.35 |
| 79 | CL21C222JBFNNN □ | | 2.2nF | 50 | ±5% | 1.35 |
| 80 | CL21C332JAFNNN □ | | 3.3nF | 25 | ±5% | 1.35 |
| 81 | CL21C332JBFNNN □ | | 3.3nF | 50 | ±5% | 1.35 |
| 82 | CL21C392JAFNNN □ | | 3.9nF | 25 | ±5% | 0.75 |
| 83 | CL21C392JBFNNN □ | | 3.9nF | 50 | ±5% | 1.35 |
| 84 | CL21C472JAFNNN □ | 4.7nF | 25 | ±5% | 1.35 | |
| 85 | CL21C472JBFNNN □ | 4.7nF | 50 | ±5% | 1.35 | |
| 86 | CL21C562JBFNNN □ | 5.6nF | 50 | ±5% | 1.35 | |
| 87 | CL21C822JAFNNN □ | 8.2nF | 25 | ±5% | 1.35 | |
| 88 | CL21C103JBFNNN □ | 10nF | 50 | ±5% | 1.35 | |
| 1 | CL31C0R5CBCNNN □ | 3.20×1.60 | 0.5pF | 50 | ±0.25pF | 1.0 |
| 2 | CL31C010CBCNNN □ | | 1.0pF | 50 | ±0.25pF | 1.0 |
| 3 | CL31C1R5CBCNNN □ | | 1.5pF | 50 | ±0.25pF | 1.0 |
| 4 | CL31C1R8CBCNNN □ | | 1.8pF | 50 | ±0.25pF | 1.0 |
| 5 | CL31C020CBCNNN □ | | 2.0pF | 50 | ±0.25pF | 1.0 |
| 6 | CL31C2R2CBCNNN □ | | 2.2pF | 50 | ±0.25pF | 1.0 |
| 7 | CL31C2R7CBCNNN □ | | 2.7pF | 50 | ±0.25pF | 1.0 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



Product Lineup (General Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|------|
| 8 | CL31C030CBCNND □ | 3.20×1.60 | 3.0pF | 50 | ±0.25pF | 1.0 | |
| 9 | CL31C3R3CBCNND □ | | 3.3pF | 50 | ±0.25pF | 1.0 | |
| 10 | CL31C040CBCNND □ | | 4.0pF | 50 | ±0.25pF | 1.0 | |
| 11 | CL31C4R7CBCNND □ | | 4.7pF | 50 | ±0.25pF | 1.0 | |
| 12 | CL31C100JBCNND □ | | 10pF | 50 | ±5% | 1.0 | |
| 13 | CL31C120JBCNND □ | | 12pF | 50 | ±5% | 1.0 | |
| 14 | CL31C150JBCNND □ | | 15pF | 50 | ±5% | 1.0 | |
| 15 | CL31C180JBCNND □ | | 18pF | 50 | ±5% | 1.0 | |
| 16 | CL31C200JBCNND □ | | 20pF | 50 | ±5% | 1.0 | |
| 17 | CL31C220JBCNND □ | | 22pF | 50 | ±5% | 1.0 | |
| 18 | CL31C270JBCNND □ | | 27pF | 50 | ±5% | 1.0 | |
| 19 | CL31C300JBCNND □ | | 30pF | 50 | ±5% | 1.0 | |
| 20 | CL31C330JBCNND □ | | 33pF | 50 | ±5% | 1.0 | |
| 21 | CL31C390JBCNND □ | | 39pF | 50 | ±5% | 1.0 | |
| 22 | CL31C470JBCNND □ | | 47pF | 50 | ±5% | 1.0 | |
| 23 | CL31C510JBCNND □ | | 51pF | 50 | ±5% | 1.0 | |
| 24 | CL31C560JBCNND □ | | 56pF | 50 | ±5% | 1.0 | |
| 25 | CL31C680JBCNND □ | | 68pF | 50 | ±5% | 1.0 | |
| 26 | CL31C750JBCNND □ | | 75pF | 50 | ±5% | 1.0 | |
| 27 | CL31C820JBCNND □ | | 82pF | 50 | ±5% | 1.0 | |
| 28 | CL31C101JBCNND □ | | 100pF | 50 | ±5% | 1.0 | |
| 29 | CL31C121JBCNND □ | | 120pF | 50 | ±5% | 1.0 | |
| 30 | CL31C151JBCNND □ | | 150pF | 50 | ±5% | 1.0 | |
| 31 | CL31C181JBCNND □ | | 180pF | 50 | ±5% | 1.0 | |
| 32 | CL31C221JBCNND □ | | 220pF | 50 | ±5% | 1.0 | |
| 33 | CL31C271JBCNND □ | | 270pF | 50 | ±5% | 1.0 | |
| 34 | CL31C331JBCNND □ | | 330pF | 50 | ±5% | 1.0 | |
| 35 | CL31C391JBCNND □ | | 390pF | 50 | ±5% | 1.0 | |
| 36 | CL31C471JBCNND □ | | 470pF | 50 | ±5% | 1.0 | |
| 37 | CL31C561JBCNND □ | | 560pF | 50 | ±5% | 1.0 | |
| 38 | CL31C681JBCNND □ | | 680pF | 50 | ±5% | 1.0 | |
| 39 | CL31C821JBCNND □ | | 820pF | 50 | ±5% | 1.0 | |
| 40 | CL31C102JBCNND □ | | 1nF | 50 | ±5% | 1.0 | |
| 41 | CL31C122JBCNND □ | | 1.2nF | 50 | ±5% | 1.0 | |
| 42 | CL31C152JBCNND □ | | 1.5nF | 50 | ±5% | 1.0 | |
| 43 | CL31C182JBCNND □ | | 1.8nF | 50 | ±5% | 1.0 | |
| 44 | CL31C222JBCNND □ | | 2.2nF | 50 | ±5% | 1.0 | |
| 45 | CL31C272JBFNND □ | | 2.7nF | 50 | ±5% | 1.4 | |
| 46 | CL31C332JBFNND □ | | 3.3nF | 50 | ±5% | 1.4 | |
| 47 | CL31C472JBFNND □ | | 4.7nF | 50 | ±5% | 1.4 | |
| 48 | CL31C682JBHND □ | | 6.8nF | 50 | ±5% | 1.8 | |
| 49 | CL31C103JAFNND □ | | 10nF | 25 | ±5% | 1.4 | |
| 50 | CL31C223JBHND □ | | 22nF | 50 | ±5% | 1.8 | |
| 51 | CL31C333JBHND □ | | 33nF | 50 | ±5% | 1.8 | |
| 1 | CL32C472JBFNND □ | | 3.20×2.50 | 4.7nF | 50 | ±5% | 1.45 |
| 2 | CL32C103JBFNND □ | | | 10nF | 50 | ±5% | 1.45 |
| 3 | CL32C223JBHND □ | | | 22nF | 50 | ±5% | 1.80 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Product Lineup (General Capacitors-X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05B471KB5NNN □ | 1.00×0.50 | 470pF | 50 | ±10% | 0.55 |
| 2 | CL05B221KB5NNN □ | | 220pF | 50 | ±10% | 0.55 |
| 3 | CL05B681KB5NNN □ | | 680pF | 50 | ±10% | 0.55 |
| 4 | CL05B102KB5NNN □ | | 1nF | 50 | ±10% | 0.55 |
| 5 | CL05B102KA5NNN □ | | 1nF | 25 | ±10% | 0.55 |
| 6 | CL05B222KB5NNN □ | | 2.2nF | 50 | ±10% | 0.55 |
| 7 | CL05B472KB5NNN □ | | 4.7nF | 50 | ±10% | 0.55 |
| 8 | CL05B472KA5NNN □ | | 4.7nF | 25 | ±10% | 0.55 |
| 9 | CL05B682KB5NNN □ | | 6.8nF | 50 | ±10% | 0.55 |
| 10 | CL05B682KA5NNN □ | | 6.8nF | 25 | ±10% | 0.55 |
| 11 | CL05B103KB5NNN □ | | 10nF | 50 | ±10% | 0.55 |
| 12 | CL05B103KA5NNN □ | | 10nF | 25 | ±10% | 0.55 |
| 13 | CL05B223KA5NNN □ | | 22nF | 25 | ±10% | 0.55 |
| 14 | CL05B473KO5NNN □ | | 47nF | 16 | ±10% | 0.55 |
| 15 | CL05B473KP5NNN □ | | 47nF | 10 | ±10% | 0.55 |
| 16 | CL05B683KO5NNN □ | | 68nF | 16 | ±10% | 0.55 |
| 17 | CL05B683KP5NNN □ | | 68nF | 10 | ±10% | 0.55 |
| 18 | CL05B104KO5NNN □ | | 100nF | 16 | ±10% | 0.55 |
| 19 | CL05B104KP5NNN □ | | 100nF | 10 | ±10% | 0.55 |
| 20 | CL05B104KQ5NNN □ | | 100nF | 6.3 | ±10% | 0.55 |
| 1 | CL10B101KB8NNN □ | 1.60×0.80 | 100pF | 50 | ±10% | 0.9 |
| 2 | CL10B221KB8NNN □ | | 220pF | 50 | ±10% | 0.9 |
| 3 | CL10B471KB8NNN □ | | 470pF | 50 | ±10% | 0.9 |
| 4 | CL10B681KB8NNN □ | | 680pF | 50 | ±10% | 0.9 |
| 5 | CL10B102KB8NNN □ | | 1nF | 50 | ±10% | 0.9 |
| 6 | CL10B102KA8NNN □ | | 1nF | 25 | ±10% | 0.9 |
| 7 | CL10B222KB8NNN □ | | 2.2nF | 50 | ±10% | 0.9 |
| 8 | CL10B472KB8NNN □ | | 4.7nF | 50 | ±10% | 0.9 |
| 9 | CL10B472KA8NNN □ | | 4.7nF | 25 | ±10% | 0.9 |
| 10 | CL10B682KB8NNN □ | | 6.8nF | 50 | ±10% | 0.9 |
| 11 | CL10B103KB8NNN □ | | 10nF | 50 | ±10% | 0.9 |
| 12 | CL10B103KA8NNN □ | | 10nF | 25 | ±10% | 0.9 |
| 13 | CL10B223KA8NNN □ | | 22nF | 25 | ±10% | 0.9 |
| 14 | CL10B473KB8NNN □ | | 47nF | 50 | ±10% | 0.9 |
| 15 | CL10B473KA8NNN □ | | 47nF | 25 | ±10% | 0.9 |
| 16 | CL10B683KB8NNN □ | | 68nF | 50 | ±10% | 0.9 |
| 17 | CL10B683KA8NNN □ | | 68nF | 25 | ±10% | 0.9 |
| 18 | CL10B104KB8NNN □ | | 100nF | 50 | ±10% | 0.9 |
| 19 | CL10B224KA8NNN □ | | 220nF | 25 | ±10% | 0.9 |
| 20 | CL10B224KO8NNN □ | | 220nF | 16 | ±10% | 0.9 |
| 21 | CL10B225KQ8NNN □ | | 2.2μF | 6.3 | ±10% | 0.9 |
| 1 | CL21B221KBANNN □ | 2.00×1.25 | 220pF | 50 | ±10% | 0.75 |
| 2 | CL21B471KBANNN □ | | 470pF | 50 | ±10% | 0.75 |
| 3 | CL21B681KBANNN □ | | 680pF | 50 | ±10% | 0.75 |
| 4 | CL21B102KBANNN □ | | 1nF | 50 | ±10% | 0.75 |
| 5 | CL21B102KBCNNN □ | | 1nF | 50 | ±10% | 0.95 |
| 6 | CL21B222KBANNN □ | | 2.2nF | 50 | ±10% | 0.75 |
| 7 | CL21B222KBCNNN □ | | 2.2nF | 50 | ±10% | 0.95 |
| 8 | CL21B682KBANNN □ | | 6.8nF | 50 | ±10% | 0.75 |
| 9 | CL21B103KBANNN □ | | 10nF | 50 | ±10% | 0.75 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



Product Lineup (General Capacitors-X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|-----|
| 10 | CL21B103KBCNNN □ | 2.00×1.25 | 10nF | 50 | ±10% | 0.95 | |
| 11 | CL21B223KBANNN □ | | 22nF | 50 | ±10% | 0.75 | |
| 12 | CL21B223KBCNNN □ | | 22nF | 50 | ±10% | 0.95 | |
| 13 | CL21B473KBANNN □ | | 47nF | 50 | ±10% | 0.75 | |
| 14 | CL21B473KBCNNN □ | | 47nF | 50 | ±10% | 0.95 | |
| 15 | CL21B683KAANNN □ | | 68nF | 25 | ±10% | 0.75 | |
| 16 | CL21B683KBCNNN □ | | 68nF | 50 | ±10% | 0.95 | |
| 17 | CL21B683KBFNNN □ | | 68nF | 50 | ±10% | 1.35 | |
| 18 | CL21B104KBCNNN □ | | 100nF | 50 | ±10% | 0.95 | |
| 19 | CL21B104KBFNNN □ | | 100nF | 50 | ±10% | 1.35 | |
| 20 | CL21B224KBFNNN □ | | 220nF | 50 | ±10% | 1.35 | |
| 21 | CL21B224KAFNNN □ | | 220nF | 25 | ±10% | 1.35 | |
| 22 | CL21B224KOCNNN □ | | 220nF | 16 | ±10% | 0.95 | |
| 23 | CL21B224KOFNNN □ | | 220nF | 16 | ±10% | 1.35 | |
| 24 | CL21B474KBFNNN □ | | 470nF | 50 | ±10% | 1.35 | |
| 25 | CL21B474KAFNNN □ | | 470nF | 25 | ±10% | 1.35 | |
| 26 | CL21B474KOFNNN □ | | 470nF | 16 | ±10% | 1.35 | |
| 27 | CL21B684KOFNNN □ | | 680nF | 16 | ±10% | 1.35 | |
| 28 | CL21B684KPFNNN □ | | 680nF | 10 | ±10% | 1.35 | |
| 1 | CL31B221KBCNNN □ | | 3.20×1.60 | 220pF | 50 | ±10% | 1.0 |
| 2 | CL31B471KBCNNN □ | | | 470pF | 50 | ±10% | 1.0 |
| 3 | CL31B681KBCNNN □ | | | 680pF | 50 | ±10% | 1.0 |
| 4 | CL31B102KBCNNN □ | | | 1nF | 50 | ±10% | 1.0 |
| 5 | CL31B222KBCNNN □ | | | 2.2nF | 50 | ±10% | 1.0 |
| 6 | CL31B472KBCNNN □ | | | 4.7nF | 50 | ±10% | 1.0 |
| 7 | CL31B682KBCNNN □ | | | 6.8nF | 50 | ±10% | 1.0 |
| 8 | CL31B103KBCNNN □ | | | 10nF | 50 | ±10% | 1.0 |
| 9 | CL31B223KBCNNN □ | | | 22nF | 50 | ±10% | 1.0 |
| 10 | CL31B473KBCNNN □ | 47nF | | 50 | ±10% | 1.0 | |
| 11 | CL31B683KBCNNN □ | 68nF | | 50 | ±10% | 1.0 | |
| 12 | CL31B104KBCNNN □ | 100nF | | 50 | ±10% | 1.0 | |
| 13 | CL31B104KACNNN □ | 100nF | | 25 | ±10% | 1.0 | |
| 14 | CL31B224KBCNNN □ | 220nF | | 50 | ±10% | 1.0 | |
| 15 | CL31B224KAFNNN □ | 220nF | | 25 | ±10% | 1.4 | |
| 16 | CL31B474KBFNNN □ | 470nF | | 50 | ±10% | 1.4 | |
| 17 | CL31B474KAHNNN □ | 470nF | | 25 | ±10% | 1.8 | |
| 18 | CL31B474KOCNNN □ | 470nF | | 16 | ±10% | 1.0 | |
| 19 | CL31B684KBHNNN □ | 680nF | | 50 | ±10% | 1.8 | |
| 20 | CL31B684KAHNNN □ | 680nF | | 25 | ±10% | 1.8 | |
| 21 | CL31B105KBHNNN □ | 1μF | | 50 | ±10% | 1.8 | |
| 22 | CL31B105KAHNNN □ | 1μF | | 25 | ±10% | 1.8 | |
| 23 | CL31B105KOFNNN □ | 1μF | | 16 | ±10% | 1.4 | |
| 24 | CL31B225KBHNNN □ | 2.2μF | | 50 | ±10% | 1.8 | |
| 25 | CL31B225KAHNNN □ | 2.2μF | | 25 | ±10% | 1.8 | |
| 26 | CL31B225KOHNNN □ | 2.2μF | | 16 | ±10% | 1.8 | |
| 27 | CL31B225KPFNNN □ | 2.2μF | | 10 | ±10% | 1.4 | |
| 1 | CL32B104KBFNNN □ | 3.20×2.50 | 100nF | 50 | ±10% | 1.45 | |
| 2 | CL32B224KBFNNN □ | | 220nF | 50 | ±10% | 1.45 | |
| 3 | CL32B105KBFNNN □ | | 1μF | 50 | ±10% | 1.45 | |
| 4 | CL32B105KAHNNN □ | | 1μF | 25 | ±10% | 1.8 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Product Lineup (General Capacitors-X7R)

| | Part Number | Size L × W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|---|------------------|-----------------|-------------|---------------------|-----------------------|---------------------|
| 5 | CL32B225KBINNN □ | 3.20×2.50 | 2.2 μ F | 50 | ±10% | 2.2 |
| 6 | CL32B225KAJNNN □ | | 2.2 μ F | 25 | ±10% | 2.7 |
| 7 | CL32B474KBFNNN □ | | 470nF | 50 | ±10% | 1.45 |
| 8 | CL32B474KAFNNN □ | | 470nF | 25 | ±10% | 1.45 |
| 9 | CL32B475KOINNN □ | | 4.7 μ F | 16 | ±10% | 2.2 |
| 1 | CL43B224KBFNNN □ | 4.50×3.20 | 220nF | 50 | ±10% | 1.45 |
| 2 | CL43B474KBFNNN □ | | 470nF | 50 | ±10% | 1.45 |
| 3 | CL43B684KBFNNN □ | | 680nF | 50 | ±10% | 1.45 |
| 4 | CL43B105KBFNNN □ | | 1 μ F | 50 | ±10% | 1.45 |
| 5 | CL43B106KALNNN □ | | 10 μ F | 25 | ±10% | 3.5 |
| 6 | CL43B226KPJNNN □ | | 22 μ F | 10 | ±10% | 2.7 |
| 1 | CL55B475KBJNNN □ | 5.70×5.00 | 4.7 μ F | 50 | ±10% | 2.7 |

Product Lineup (General Capacitors-X5R)

| | Part Number | Size L × W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|---|------------------|-----------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05A223KO5NNN □ | 1.00×0.50 | 22nF | 16 | ±10% | 0.55 |
| 2 | CL05A104KA5NNN □ | | 100nF | 25 | ±10% | 0.55 |
| 3 | CL05A104KO5NNN □ | | 100nF | 16 | ±10% | 0.55 |
| 4 | CL05A104KP5NNN □ | | 100nF | 10 | ±10% | 0.55 |
| 5 | CL05A104KQ5NNN □ | | 100nF | 6.3 | ±10% | 0.55 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

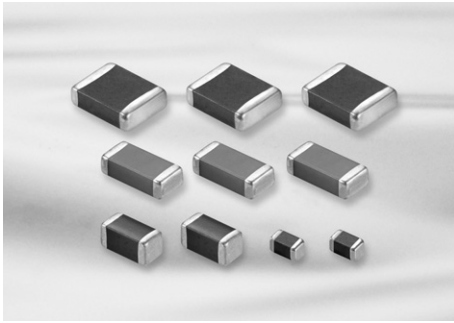
Application Manual for Surface Mounting

Product Lineup (General Capacitors-Y5V)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|------------------|-------------|---------------------------|--------------------------|------------------------|
| 1 | CL05F103ZB5NNN □ | 1.00×0.50 | 10nF | 50 | +80/-20% | 0.55 |
| 2 | CL05F103ZO5NNN □ | | 10nF | 16 | +80/-20% | 0.55 |
| 3 | CL05F223ZA5NNN □ | | 22nF | 25 | +80/-20% | 0.55 |
| 4 | CL05F223ZO5NNN □ | | 22nF | 16 | +80/-20% | 0.55 |
| 5 | CL05F473ZO5NNN □ | | 47nF | 16 | +80/-20% | 0.55 |
| 6 | CL05F683ZO5NNN □ | | 68nF | 16 | +80/-20% | 0.55 |
| 7 | CL05F104ZO5NNN □ | | 100nF | 16 | +80/-20% | 0.55 |
| 1 | CL10F103ZB8NNN □ | 1.60×0.80 | 10nF | 50 | +80/-20% | 0.9 |
| 2 | CL10F223ZB8NNN □ | | 22nF | 50 | +80/-20% | 0.9 |
| 3 | CL10F473ZB8NNN □ | | 47nF | 50 | +80/-20% | 0.9 |
| 4 | CL10F473ZA8NNN □ | | 47nF | 25 | +80/-20% | 0.9 |
| 5 | CL10F473ZO8NNN □ | | 47nF | 16 | +80/-20% | 0.9 |
| 6 | CL10F683ZB8NNN □ | | 68nF | 50 | +80/-20% | 0.9 |
| 7 | CL10F104ZB8NNN □ | | 100nF | 50 | +80/-20% | 0.9 |
| 8 | CL10F104ZA8NNN □ | | 100nF | 25 | +80/-20% | 0.9 |
| 9 | CL10F224ZB8NNN □ | | 220nF | 50 | +80/-20% | 0.9 |
| 10 | CL10F224ZA8NNN □ | | 220nF | 25 | +80/-20% | 0.9 |
| 11 | CL10F225ZP8NNN □ | | 2.2μF | 10 | +80/-20% | 0.9 |
| 12 | CL10F225ZQ8NNN □ | | 2.2μF | 6.3 | +80/-20% | 0.9 |
| 1 | CL21F103ZBANNN □ | 2.00×1.25 | 10nF | 50 | +80/-20% | 0.75 |
| 2 | CL21F223ZBANNN □ | | 22nF | 50 | +80/-20% | 0.75 |
| 3 | CL21F473ZBANNN □ | | 47nF | 50 | +80/-20% | 0.75 |
| 4 | CL21F683ZBANNN □ | | 68nF | 50 | +80/-20% | 0.75 |
| 5 | CL21F104ZBANNN □ | | 100nF | 50 | +80/-20% | 0.75 |
| 6 | CL21F104ZBCNNN □ | | 100nF | 50 | +80/-20% | 0.95 |
| 7 | CL21F224ZBCNNN □ | | 220nF | 50 | +80/-20% | 0.95 |
| 8 | CL21F224ZBFNNN □ | | 220nF | 50 | +80/-20% | 1.35 |
| 9 | CL21F224ZOANNN □ | | 220nF | 16 | +80/-20% | 0.75 |
| 10 | CL21F474ZACNNN □ | | 470nF | 25 | +80/-20% | 0.95 |
| 11 | CL21F474ZBFNNN □ | | 470nF | 50 | +80/-20% | 1.35 |
| 12 | CL21F474ZBFNNN □ | | 470nF | 50 | +80/-20% | 1.35 |
| 13 | CL21F684ZAFNNN □ | | 680nF | 25 | +80/-20% | 1.35 |
| 14 | CL21F684ZOANNN □ | | 680nF | 16 | +80/-20% | 0.75 |
| 15 | CL21F225ZAFNNN □ | | 2.2μF | 25 | +80/-20% | 1.35 |
| 16 | CL21F225ZOFNNN □ | | 2.2μF | 16 | +80/-20% | 1.35 |
| 1 | CL31F103ZBCNNN □ | 3.20×1.60 | 10nF | 50 | +80/-20% | 1.0 |
| 2 | CL31F104ZBCNNN □ | | 100nF | 50 | +80/-20% | 1.0 |
| 3 | CL31F224ZBCNNN □ | | 220nF | 50 | +80/-20% | 1.0 |
| 4 | CL31F474ZBCNNN □ | | 470nF | 50 | +80/-20% | 1.0 |
| 5 | CL31F105ZBCNNN □ | | 1μF | 50 | +80/-20% | 1.0 |
| 6 | CL31F105ZAFNNN □ | | 1μF | 25 | +80/-20% | 1.4 |
| 7 | CL31F105ZOCNNN □ | | 1μF | 16 | +80/-20% | 1.0 |
| 8 | CL31F225ZAFNNN □ | | 2.2μF | 25 | +80/-20% | 1.4 |
| 9 | CL31F225ZOCNNN □ | | 2.2μF | 16 | +80/-20% | 1.0 |
| 1 | CL32F475ZAHNNN □ | 3.20×2.50 | 4.7μF | 25 | +80/-20% | 1.8 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

※ For parts of higher capacitance than those above listed, refer to the product lineup of 'High Capacitance' subcategory.



Feature

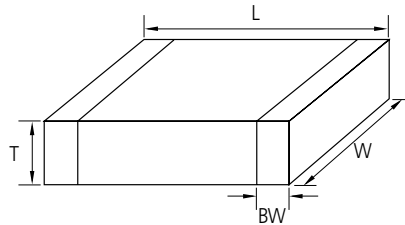
- Wide selection of size : from 0402 to 1812
- Highly reliable tolerance and high speed automatic chip placement on PCBs
- Wide capacitance range
- Highly reliable performance
- Highly resistant termination metal
- Tape & reel for surface mount assembly

Application

- Desktop PC, Note PC, HHP, DC-DC Converter, DSC
- LCD TV, LCD Monitor

※ For using special purpose like Military, Medical, Aviation, Automobile device should be following a special specification.

Structure and Dimensions



| Size Code | EIA Code | Dimension(mm) | | | | |
|-----------|----------|---------------|-----------|------------------|----------------|--------------|
| | | L | W | T | Thickness Code | BW |
| 05 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.50±0.05 | 5 | 0.25±0.10 |
| 10 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.50+0.0/-0.1(*) | 5 | 0.30±0.20 |
| | | 1.60±0.10 | 0.80±0.10 | 0.80±0.10 | 8 | |
| 21 | 0805 | 2.00±0.10 | 1.25±0.10 | 0.85±0.10 | C | 0.5+0.2/-0.3 |
| | | 2.00±0.10 | 1.25±0.10 | 1.15±0.10 | M | |
| | | 2.00±0.10 | 1.25±0.10 | 1.25±0.10 | F | |
| | | 2.00±0.15 | 1.25±0.15 | 1.25±0.15 | Q | |
| | | 2.00±0.20 | 1.25±0.20 | 1.25±0.20 | Y | |
| 31 | 1206 | 3.20±0.20 | 1.60±0.20 | 0.60±0.10(*) | 6 | 0.50±0.30 |
| | | 3.20±0.15 | 1.60±0.15 | 0.85±0.15 | C | |
| | | 3.20±0.20 | 1.60±0.20 | 0.85±0.10(*) | C | |
| | | 3.20±0.20 | 1.60±0.20 | 1.15±0.10(*) | P | |
| | | 3.20±0.15 | 1.60±0.15 | 1.25±0.15 | F | |
| 32 | 1210 | 3.20±0.20 | 1.60±0.20 | 1.60±0.20 | H | 0.60±0.30 |
| | | 3.20±0.30 | 2.50±0.20 | 0.85±0.10(*) | C | |
| | | 3.20±0.30 | 2.50±0.20 | 0.90±0.10(*) | 9 | |
| | | 3.20±0.30 | 2.50±0.20 | 1.60±0.20 | H | |
| | | 3.20±0.30 | 2.50±0.20 | 1.80±0.20(*) | U | |
| | | 3.20±0.30 | 2.50±0.20 | 2.00±0.20 | I | |
| 42 | 1808 | 3.20±0.30 | 2.50±0.20 | 2.50±0.20 | J | 0.80±0.30 |
| | | 3.20±0.40 | 2.50±0.30 | 2.50±0.30 | V | |
| | | 4.50±0.40 | 2.00±0.20 | 1.25±0.20 | F | |
| 43 | 1812 | 4.50±0.40 | 2.00±0.20 | 1.40±0.20 | G | 0.80±0.30 |
| | | 4.50±0.40 | 2.00±0.20 | 2.00±0.20 | I | |
| | | 4.50±0.40 | 3.20±0.30 | 1.25±0.20 | F | |
| 55 | 2220 | 4.50±0.40 | 3.20±0.30 | 2.50±0.20 | J | 0.80±0.30 |
| | | 4.50±0.40 | 3.20±0.30 | 3.20±0.30 | L | |
| | | 5.70±0.40 | 5.00±0.40 | 2.50±0.20 | J | |
| | | 5.70±0.40 | 5.00±0.40 | 3.20±0.30 | L | 1.00±0.30 |

※ * Mark is only applicable to "L" code , 12th code in part number.

* Note : This catalog has only typical specifications because there is no space for detailed specifications.

Please approve our product specifications or transact the approval sheet for product specifications before ordering.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting

High Capacitance Table_Low Profile (X5R)

| Size(mm) | Tmax (mm) | Vr(V) | Capacitance (μF) | | | | | |
|------------|--------------|-------|------------------|------------|-----|-----|------------|----|
| | | | 1 | 2.2 | 4.7 | 10 | 22 | 47 |
| 0402(1005) | 0.3 | 6.3 | X6S | | | | | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| 0603(1608) | 0.5 | 6.3 | | | | | | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | | | | |
| 0805(2012) | 0.7 | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | | | | |
| | 0.95 | 4 | | | | | (Tmax=1.0) | |
| | | 6.3 | | | | | (Tmax=1.0) | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | | X6S | | |
| 1206(3216) | 0.7 | 10 | | | | | | |
| | 0.95 | 6.3 | | | | | | |
| | | 10 | | | | | | |
| | | 16 | | | | | | |
| | | 25 | | | X6S | | | |
| | | 50 | (Tmax=1.0) | (Tmax=1.0) | | | | |
| | | 100 | (Tmax=1.0) | | | | | |
| 1210(3225) | 0.95 | 16 | | | | | | |
| | 2.0 | 25 | | | | | | |
| | | 35 | | | | | | |
| | | 50 | | | | | | |

- Part Numbering System
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- Application Manual for Surface Mounting



High Capacitance Table (X6S)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | | | | | |
|------------|-------|------------------------|------|------|---|-----|-----|----|----|----|-----|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 |
| 0402(1005) | 4 | | ■ | ■ | ■ | ■ | ■ | | | | |
| | 6.3 | | ■ | ■ | ■ | ■ | ■ | | | | |
| | 10 | | ■ | ■ | ■ | ■ | ■ | | | | |
| 0603(1608) | 4 | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| | 6.3 | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| | 10 | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| | 16 | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| | 25 | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| 0805(2012) | 4 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 6.3 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 10 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 16 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | 25 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1206(3216) | 6.3 | | | | | | ■ | ■ | ■ | ■ | ■ |
| | 10 | | | | | | ■ | ■ | ■ | ■ | ■ |
| | 16 | | | | | | ■ | ■ | ■ | ■ | ■ |
| | 25 | | | | | | ■ | ■ | ■ | ■ | ■ |
| 1210(3225) | 6.3 | | | | | | | ■ | ■ | ■ | ■ |
| | 10 | | | | | | | ■ | ■ | ■ | ■ |
| | 16 | | | | | | | ■ | ■ | ■ | ■ |
| | 25 | | | | | | | ■ | ■ | ■ | ■ |

High Capacitance Table (X7R)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | | | | | |
|------------|-------|---|------|------|---|-----|-----|----|----|----|-----|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 |
| 0402(1005) | 6.3 | [Bar chart showing capacitance range from 0.1 to 10 μ F] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range from 0.1 to 0.47 μ F, labeled X7S] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range from 0.1 to 0.22 μ F] | | | | | | | | | |
| 0603(1608) | 6.3 | [Bar chart showing capacitance range from 0.1 to 22 μ F] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range from 0.1 to 4.7 μ F] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range from 0.1 to 1 μ F] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range from 0.1 to 0.47 μ F] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range from 0.1 to 0.1 μ F] | | | | | | | | | |
| 0805(2012) | 6.3 | [Bar chart showing capacitance range from 0.1 to 47 μ F] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range from 0.1 to 10 μ F] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range from 0.1 to 4.7 μ F] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range from 0.1 to 2.2 μ F, labeled X7S] | | | | | | | | | |
| | 35 | [Bar chart showing capacitance range from 0.1 to 1 μ F] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range from 0.1 to 0.47 μ F] | | | | | | | | | |
| 1206(3216) | 6.3 | [Bar chart showing capacitance range from 0.1 to 100 μ F] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range from 0.1 to 22 μ F] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range from 0.1 to 10 μ F] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range from 0.1 to 4.7 μ F] | | | | | | | | | |
| | 35 | [Bar chart showing capacitance range from 0.1 to 2.2 μ F] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range from 0.1 to 1 μ F] | | | | | | | | | |
| 1210(3225) | 6.3 | [Bar chart showing capacitance range from 0.1 to 100 μ F, labeled X7T] | | | | | | | | | |
| | 10 | [Bar chart showing capacitance range from 0.1 to 47 μ F] | | | | | | | | | |
| | 16 | [Bar chart showing capacitance range from 0.1 to 22 μ F] | | | | | | | | | |
| | 25 | [Bar chart showing capacitance range from 0.1 to 10 μ F] | | | | | | | | | |
| | 50 | [Bar chart showing capacitance range from 0.1 to 4.7 μ F] | | | | | | | | | |

- Part Numbering System
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- Packaging Specification
- Application Manual for Surface Mounting



High Capacitance Table (Y5V)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | | | | |
|------------|-------|------------------------|------|------|---|-----|-----|----|----|----|
| | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 | 47 |
| 0402(1005) | 6.3 | | | | | | | | | |
| | 10 | | | | | | | | | |
| | 16 | | | | | | | | | |
| | 25 | | | | | | | | | |
| 0603(1608) | 6.3 | | | | | | | | | |
| | 10 | | | | | | | | | |
| | 16 | | | | | | | | | |
| | 25 | | | | | | | | | |
| | 50 | | | | | | | | | |
| 0805(2012) | 6.3 | | | | | | | | | |
| | 10 | | | | | | | | | |
| | 16 | | | | | | | | | |
| | 25 | | | | | | | | | |
| | 50 | | | | | | | | | |
| 1206(3216) | 10 | | | | | | | | | |
| | 16 | | | | | | | | | |
| | 25 | | | | | | | | | |
| | 50 | | | | | | | | | |
| 1210(3225) | 6.3 | | | | | | | | | |
| | 10 | | | | | | | | | |
| | 16 | | | | | | | | | |
| | 25 | | | | | | | | | |
| | 35 | | | | | | | | | |
| | 50 | | | | | | | | | |

High Capacitance Table -Low Profile (Y5V)

| Size(mm) | Vr(V) | Capacitance (μ F) | | | | | |
|------------|-------|------------------------|-----|-----|----|----|----|
| | | 1 | 2.2 | 4.7 | 10 | 22 | 47 |
| 0402(1005) | 6.3 | | | | | | |
| | 10 | | | | | | |

Product Lineup (High Capacitance-X5R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05A224KQ5NNN □ | 1.00×0.50 | 0.22 μF | 6.3 | ±10% | 0.55 |
| 2 | CL05A224KR5NNN □ | | 0.22 μF | 4 | ±10% | 0.55 |
| 3 | CL05A224KA5NNN □ | | 0.22 μF | 25 | ±10% | 0.55 |
| 4 | CL05A224KO5NNN □ | | 0.22 μF | 16 | ±10% | 0.55 |
| 5 | CL05A224KP5NNN □ | | 0.22 μF | 10 | ±10% | 0.55 |
| 6 | CL05A334KA5NNN □ | | 0.33 μF | 25 | ±10% | 0.55 |
| 7 | CL05A334KQ5NNN □ | | 0.33 μF | 6.3 | ±10% | 0.55 |
| 8 | CL05A334KR5NNN □ | | 0.33 μF | 4 | ±10% | 0.55 |
| 9 | CL05A474KA5NNN □ | | 0.47 μF | 25 | ±10% | 0.55 |
| 10 | CL05A474KO5NNN □ | | 0.47 μF | 16 | ±10% | 0.55 |
| 11 | CL05A474KP5NNN □ | | 0.47 μF | 10 | ±10% | 0.55 |
| 12 | CL05A474KQ5NNN □ | | 0.47 μF | 6.3 | ±10% | 0.55 |
| 13 | CL05A474KR5NNN □ | | 0.47 μF | 4 | ±10% | 0.55 |
| 14 | CL05A105KA5NQN □ | | 1 μF | 25 | ±10% | 0.60 |
| 15 | CL05A105KO5NNN □ | | 1 μF | 16 | ±10% | 0.55 |
| 16 | CL05A105KO3LQN □ | | 1 μF | 16 | ±10% | 0.33 |
| 17 | CL05A105KP5NNN □ | | 1 μF | 10 | ±10% | 0.55 |
| 18 | CL05A105KP3LNN □ | | 1 μF | 10 | ±10% | 0.33 |
| 19 | CL05A105KQ5NNN □ | | 1 μF | 6.3 | ±10% | 0.55 |
| 20 | CL05A105KQ3LNN □ | | 1 μF | 6.3 | ±10% | 0.33 |
| 21 | CL05A105KR5NNN □ | | 1 μF | 4 | ±10% | 0.55 |
| 22 | CL05A105KR3LNN □ | | 1 μF | 4 | ±10% | 0.33 |
| 23 | CL05A225MA5NUN □ | | 2.2 μF | 25 | ±20% | 0.70 |
| 24 | CL05A225KO5NQN □ | | 2.2 μF | 16 | ±10% | 0.60 |
| 25 | CL05A225MP5NSN □ | | 2.2 μF | 10 | ±20% | 0.57 |
| 26 | CL05A225KP3LRN □ | | 2.2 μF | 10 | ±10% | 0.33 |
| 27 | CL05A225MQ5NNN □ | | 2.2 μF | 6.3 | ±20% | 0.55 |
| 28 | CL05A225KQ3LRN □ | | 2.2 μF | 6.3 | ±10% | 0.33 |
| 29 | CL05A225MR5NNN □ | | 2.2 μF | 4 | ±20% | 0.55 |
| 30 | CL05A225KR3LRN □ | | 2.2 μF | 4 | ±10% | 0.33 |
| 31 | CL05A475MP5NRN □ | | 4.7 μF | 10 | ±20% | 0.65 |
| 32 | CL05A475MQ5NRN □ | | 4.7 μF | 6.3 | ±20% | 0.65 |
| 33 | CL05A475MR5NRN □ | | 4.7 μF | 4 | ±20% | 0.65 |
| 34 | CL05A106MP5NNN □ | | 10 μF | 10 | ±20% | 0.55 |
| 35 | CL05A106MQ5NUN □ | | 10 μF | 6.3 | ±20% | 0.70 |
| 36 | CL05A106MR5NRN □ | | 10 μF | 4 | ±20% | 0.65 |
| 37 | CL05A156MR5NUN □ | | 15 μF | 4 | ±20% | 0.70 |
| 1 | CL10A474KB8NNN □ | 1.60×0.80 | 0.47 μF | 50 | ±10% | 0.90 |
| 2 | CL10A474KA8NNN □ | | 0.47 μF | 25 | ±10% | 0.90 |
| 3 | CL10A474KP8NNN □ | | 0.47 μF | 10 | ±10% | 0.90 |
| 4 | CL10A474KQ8NNN □ | | 0.47 μF | 6.3 | ±10% | 0.90 |
| 5 | CL10A474KR8NNN □ | | 0.47 μF | 4 | ±10% | 0.90 |
| 6 | CL10A105KB8NNN □ | | 1 μF | 50 | ±10% | 0.90 |
| 7 | CL10A105KA5LNN □ | | 1 μF | 25 | ±10% | 0.50 |
| 8 | CL10A105KA8NNN □ | | 1 μF | 25 | ±10% | 0.90 |
| 9 | CL10A105KO8NNN □ | | 1 μF | 16 | ±10% | 0.90 |
| 10 | CL10A105KO5LNN □ | | 1 μF | 16 | ±10% | 0.50 |
| 11 | CL10A105KP8NNN □ | | 1 μF | 10 | ±10% | 0.90 |
| 12 | CL10A105KP5LNN □ | | 1 μF | 10 | ±10% | 0.50 |
| 13 | CL10A105KQ8NNN □ | | 1 μF | 6.3 | ±10% | 0.90 |
| 14 | CL10A105KQ5LNN □ | | 1 μF | 6.3 | ±10% | 0.50 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting

Product Lineup (High Capacitance-X5R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|------|
| 15 | CL10A105KR8NNN □ | 1.60×0.80 | 1 μF | 4 | ±10% | 0.90 | |
| 16 | CL10A105KR5LNN □ | | 1 μF | 4 | ±10% | 0.50 | |
| 17 | CL10A105KA5LNN □ | | 1 μF | 25 | ±10% | 0.50 | |
| 18 | CL10A225KA8NNN □ | | 2.2 μF | 25 | ±10% | 0.90 | |
| 19 | CL10A225KO8NNN □ | | 2.2 μF | 16 | ±10% | 0.90 | |
| 20 | CL10A225KO5LNN □ | | 2.2 μF | 16 | ±10% | 0.50 | |
| 21 | CL10A225KP8NNN □ | | 2.2 μF | 10 | ±10% | 0.90 | |
| 22 | CL10A225KP5LNN □ | | 2.2 μF | 10 | ±10% | 0.50 | |
| 23 | CL10A225KQ8NNN □ | | 2.2 μF | 6.3 | ±10% | 0.90 | |
| 24 | CL10A225KQ5LNN □ | | 2.2 μF | 6.3 | ±10% | 0.50 | |
| 25 | CL10A225KR8NNN □ | | 2.2 μF | 4 | ±10% | 0.90 | |
| 26 | CL10A225KR5LNN □ | | 2.2 μF | 4 | ±10% | 0.50 | |
| 27 | CL10A335KQ8NNN □ | | 3.3 μF | 6.3 | ±10% | 0.90 | |
| 28 | CL10A335KR8NNN □ | | 3.3 μF | 4 | ±10% | 0.90 | |
| 29 | CL10A475KA8NQ □ | | 4.7 μF | 25 | ±10% | 0.95 | |
| 30 | CL10A475KO8NNN □ | | 4.7 μF | 16 | ±10% | 0.90 | |
| 31 | CL10A475KP8NNN □ | | 4.7 μF | 10 | ±10% | 0.90 | |
| 32 | CL10A475KP5LNN □ | | 4.7 μF | 10 | ±10% | 0.50 | |
| 33 | CL10A475KQ5LNN □ | | 4.7 μF | 6.3 | ±10% | 0.50 | |
| 34 | CL10A475KQ8NNN □ | | 4.7 μF | 6.3 | ±10% | 0.90 | |
| 35 | CL10A475KR5LNN □ | | 4.7 μF | 4 | ±10% | 0.50 | |
| 36 | CL10A475KR8NNN □ | | 4.7 μF | 4 | ±10% | 0.90 | |
| 37 | CL10A106KR8NNN □ | | 10 μF | 4 | ±10% | 0.90 | |
| 38 | CL10A106MR5LRN □ | | 10 μF | 4 | ±20% | 0.50 | |
| 39 | CL10A106KQ8NNN □ | | 10 μF | 6.3 | ±10% | 0.90 | |
| 40 | CL10A106MQ5LRN □ | | 10 μF | 6.3 | ±20% | 0.50 | |
| 41 | CL10A106MP8NNN □ | | 10 μF | 10 | ±20% | 0.90 | |
| 42 | CL10A106MO8NQ □ | | 10 μF | 16 | ±20% | 0.95 | |
| 43 | CL10A106MA8NRN □ | | 10 μF | 25 | ±20% | 1.00 | |
| 44 | CL10A226MR8NRN □ | | 22 μF | 4 | ±20% | 1.00 | |
| 45 | CL10A226MQ8NRN □ | | 22 μF | 6.3 | ±20% | 1.00 | |
| 46 | CL10A226MP8NUN □ | | 22 μF | 10 | ±20% | 1.05 | |
| 47 | CL10A476MR8NZN □ | | 47 μF | 4 | ±20% | 1.10 | |
| 1 | CL21A105KBQNNN □ | | 2.00×1.25 | 1 μF | 50 | ±10% | 1.40 |
| 2 | CL21A105KAFNNN □ | | | 1 μF | 25 | ±10% | 1.35 |
| 3 | CL21A105KA6LNN □ | | | 1 μF | 25 | ±10% | 0.70 |
| 4 | CL21A105KOFNNN □ | | | 1 μF | 16 | ±10% | 1.35 |
| 5 | CL21A105KO6LNN □ | | | 1 μF | 16 | ±10% | 0.70 |
| 6 | CL21A105KQFNNN □ | | | 1 μF | 6.3 | ±10% | 1.35 |
| 7 | CL21A105KRFNNN □ | | | 1 μF | 4 | ±10% | 1.35 |
| 8 | CL21A225KBQNNN □ | | | 2.2 μF | 50 | ±10% | 1.40 |
| 9 | CL21A225KAFNNN □ | | | 2.2 μF | 25 | ±10% | 1.35 |
| 10 | CL21A225KO6LNN □ | | | 2.2 μF | 16 | ±10% | 0.70 |
| 11 | CL21A225KOFNNN □ | | | 2.2 μF | 16 | ±10% | 1.35 |
| 12 | CL21A225KPFNNN □ | | | 2.2 μF | 10 | ±10% | 1.35 |
| 13 | CL21A225KQFNNN □ | | | 2.2 μF | 6.3 | ±10% | 1.35 |
| 14 | CL21A225KRFNNN □ | | | 2.2 μF | 4 | ±10% | 1.35 |
| 15 | CL21A475KBQNNN □ | 4.7 μF | | 50 | ±10% | 1.40 | |
| 16 | CL21A475KAQNNN □ | 4.7 μF | | 25 | ±10% | 1.40 | |
| 17 | CL21A475KACLRN □ | 4.7 μF | | 25 | ±10% | 0.95 | |
| 18 | CL21A475KOFNNN □ | 4.7 μF | | 16 | ±10% | 1.35 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p 80.

Product Lineup (High Capacitance-X5R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 19 | CL21A475KOCLNN □ | 2.00×1.25 | 4.7 μF | 16 | ±10% | 0.95 |
| 20 | CL21A475KPFNNN □ | | 4.7 μF | 10 | ±10% | 1.35 |
| 21 | CL21A475KPCLNN □ | | 4.7 μF | 10 | ±10% | 0.95 |
| 22 | CL21A475KQFNNN □ | | 4.7 μF | 6.3 | ±10% | 1.35 |
| 23 | CL21A475KQCLNN □ | | 4.7 μF | 6.3 | ±10% | 0.95 |
| 24 | CL21A475KRFNNN □ | | 4.7 μF | 4 | ±10% | 1.35 |
| 25 | CL21A475KRCLNN □ | | 4.7 μF | 4 | ±10% | 0.95 |
| 26 | CL21A106KAYNNN □ | | 10 μF | 25 | ±10% | 1.45 |
| 27 | CL21A106KACLNN □ | | 10 μF | 25 | ±10% | 0.95 |
| 28 | CL21A106KOFNNN □ | | 10 μF | 16 | ±10% | 1.35 |
| 29 | CL21A106KOQNNN □ | | 10 μF | 16 | ±10% | 1.40 |
| 30 | CL21A106KOCLRN □ | | 10 μF | 16 | ±10% | 0.95 |
| 31 | CL21A106KOCL3R □ | | 10 μF | 16 | ±10% | 0.95 |
| 32 | CL21A106KPFNNN □ | | 10 μF | 10 | ±10% | 1.35 |
| 33 | CL21A106KPCLQN □ | | 10 μF | 10 | ±10% | 0.95 |
| 34 | CL21A106KQFNNN □ | | 10 μF | 6.3 | ±10% | 1.35 |
| 35 | CL21A106KQCLNN □ | | 10 μF | 6.3 | ±10% | 0.95 |
| 36 | CL21A106KRFNNN □ | | 10 μF | 4 | ±10% | 1.35 |
| 37 | CL21A106KRCLNN □ | | 10 μF | 4 | ±10% | 0.95 |
| 38 | CL21A226MAQNNN □ | | 22 μF | 25 | ±20% | 1.40 |
| 39 | CL21A226MPQNNN □ | | 22 μF | 10 | ±20% | 1.40 |
| 40 | CL21A226MPCLRN □ | | 22 μF | 10 | ±20% | 0.95 |
| 41 | CL21A226MQQNNN □ | | 22 μF | 6.3 | ±20% | 1.40 |
| 42 | CL21A226MQCLRN □ | | 22 μF | 6.3 | ±20% | 0.95 |
| 43 | CL21A226MRQNNN □ | | 22 μF | 4 | ±20% | 1.40 |
| 44 | CL21A226MRCLRN □ | | 22 μF | 4 | ±20% | 0.95 |
| 45 | CL21A336MQELNN □ | | 33 μF | 6.3 | ±20% | 1.20 |
| 46 | CL21A336MQ9LNN □ | | 33 μF | 6.3 | ±20% | 1.00 |
| 47 | CL21A336MRELNN □ | | 33 μF | 4 | ±20% | 1.20 |
| 48 | CL21A336MR9LNN □ | | 33 μF | 4 | ±20% | 1.00 |
| 49 | CL21A476MQYNNN □ | | 47 μF | 6.3 | ±20% | 1.45 |
| 50 | CL21A476MRYNNN □ | 47 μF | 4 | ±20% | 1.45 | |
| 51 | CL21A476MQ9LRN □ | 47 μF | 6.3 | ±20% | 1.00 | |
| 1 | CL31A225KC9LNN □ | 3.20×1.60 | 2.2 μF | 100 | ±10% | 1.00 |
| 2 | CL31A475KBHNNN □ | | 4.7 μF | 50 | ±10% | 1.80 |
| 3 | CL31A475KB9LNN □ | | 4.7 μF | 50 | ±10% | 1.00 |
| 4 | CL31A475KAHNNN □ | | 4.7 μF | 25 | ±10% | 1.80 |
| 5 | CL31A475KACLNN □ | | 4.7 μF | 25 | ±10% | 0.95 |
| 6 | CL31A475KOHNNN □ | | 4.7 μF | 16 | ±10% | 1.80 |
| 7 | CL31A475KOCLNN □ | | 4.7 μF | 16 | ±10% | 0.95 |
| 8 | CL31A475KPHNNN □ | | 4.7 μF | 10 | ±10% | 1.80 |
| 9 | CL31A475KQHNNN □ | | 4.7 μF | 6.3 | ±10% | 1.80 |
| 10 | CL31A475KRHNNN □ | | 4.7 μF | 4 | ±10% | 1.80 |
| 11 | CL31A106KBHNNN □ | | 10 μF | 50 | ±10% | 1.80 |
| 12 | CL31A106KAHNNN □ | | 10 μF | 25 | ±10% | 1.80 |
| 13 | CL31A106KACLNN □ | | 10 μF | 25 | ±10% | 0.95 |
| 14 | CL31A106KOHNNN □ | | 10 μF | 16 | ±10% | 1.80 |
| 15 | CL31A106KOCLNN □ | | 10 μF | 16 | ±10% | 0.95 |
| 16 | CL31A106KPHNNN □ | | 10 μF | 10 | ±10% | 1.80 |
| 17 | CL31A106KPCLNN □ | | 10 μF | 10 | ±10% | 0.95 |
| 18 | CL31A106KQHNNN □ | | 10 μF | 6.3 | ±10% | 1.80 |
| 19 | CL31A106KRHNNN □ | | 10 μF | 4 | ±10% | 1.80 |
| 20 | CL31A156KQHNNN □ | | 15 μF | 6.3 | ±10% | 1.80 |

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p 80.



Product Lineup (High Capacitance-X5R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|------------------|-------------|---------------------------|--------------------------|------------------------|------|
| 21 | CL31A156KRHNNN □ | 3.20×1.60 | 15 μ F | 4 | ±10% | 1.80 | |
| 22 | CL31A226KAHNNN □ | | 22 μ F | 25 | ±10% | 1.80 | |
| 23 | CL31A226KOHNNN □ | | 22 μ F | 16 | ±10% | 1.80 | |
| 24 | CL31A226KOCLNN □ | | 22 μ F | 16 | ±10% | 0.95 | |
| 25 | CL31A226KPHNNN □ | | 22 μ F | 10 | ±10% | 1.80 | |
| 26 | CL31A226KPCLNN □ | | 22 μ F | 10 | ±10% | 0.95 | |
| 27 | CL31A226KQHNNN □ | | 22 μ F | 6.3 | ±10% | 1.80 | |
| 28 | CL31A226KRHNNN □ | | 22 μ F | 4 | ±10% | 1.80 | |
| 29 | CL31A476MQHNNN □ | | 47 μ F | 6.3 | ±20% | 1.80 | |
| 30 | CL31A476MRHNNN □ | | 47 μ F | 4 | ±20% | 1.80 | |
| 31 | CL31A107MQHNNN □ | | 100 μ F | 6.3 | ±20% | 1.80 | |
| 32 | CL31A107MRHNNN □ | | 100 μ F | 4 | ±20% | 1.80 | |
| 1 | CL32A106KQCLNN □ | | 3.20×2.50 | 10 μ F | 6.3 | ±10% | 0.95 |
| 2 | CL32A106KRCLNN □ | | | 10 μ F | 4 | ±10% | 0.95 |
| 3 | CL32A106KBULNN □ | 10 μ F | | 50 | ±10% | 2.00 | |
| 4 | CL32A106KAJNNN □ | 10 μ F | | 25 | ±10% | 2.70 | |
| 5 | CL32A106KAULNN □ | 10 μ F | | 25 | ±10% | 2.00 | |
| 6 | CL32A106KOJNNN □ | 10 μ F | | 16 | ±10% | 2.70 | |
| 7 | CL32A106KPJNNN □ | 10 μ F | | 10 | ±10% | 2.70 | |
| 8 | CL32A226KAJNNN □ | 22 μ F | | 25 | ±10% | 2.70 | |
| 9 | CL32A226KOJNNN □ | 22 μ F | | 16 | ±10% | 2.70 | |
| 10 | CL32A226KOCLNN □ | 22 μ F | | 16 | ±10% | 0.95 | |
| 11 | CL32A226KPJNNN □ | 22 μ F | | 10 | ±10% | 2.70 | |
| 12 | CL32A226KQJNNN □ | 22 μ F | | 6.3 | ±10% | 2.70 | |
| 13 | CL32A226MQCLNN □ | 22 μ F | | 6.3 | ±20% | 0.95 | |
| 14 | CL32A226KRJNNN □ | 22 μ F | | 4 | ±10% | 2.70 | |
| 15 | CL32A226MRCLNN □ | 22 μ F | | 4 | ±20% | 0.95 | |
| 16 | CL32A476KOJNNN □ | 47 μ F | | 16 | ±10% | 2.70 | |
| 17 | CL32A476KPJNNN □ | 47 μ F | | 10 | ±10% | 2.70 | |
| 18 | CL32A476MQJNNN □ | 47 μ F | | 6.3 | ±20% | 2.70 | |
| 19 | CL32A476MRJNNN □ | 47 μ F | | 4 | ±20% | 2.70 | |
| 20 | CL32A107MPVNNN □ | 100 μ F | | 10 | ±20% | 2.80 | |
| 21 | CL32A107MQVNNN □ | 100 μ F | | 6.3 | ±20% | 2.80 | |
| 22 | CL32A107MRVNNN □ | 100 μ F | | 4 | ±20% | 2.80 | |
| 23 | CL32A157MQVNNN □ | 150 μ F | | 6.3 | ±20% | 2.80 | |
| 24 | CL32A227MQVNNN □ | 220 μ F | | 6.3 | ±20% | 2.80 | |
| 1 | CL43A476MQJNNN □ | 4.50×3.20 | 47 μ F | 6.3 | ±20% | 2.70 | |
| 2 | CL43A476MRJNNN □ | | 47 μ F | 4 | ±20% | 2.70 | |
| 3 | CL43A107KQLNNN □ | | 100 μ F | 6.3 | ±10% | 3.50 | |
| 4 | CL43A107KRLNNN □ | | 100 μ F | 4 | ±10% | 3.50 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p 80.

Product Lineup (High Capacitance-X6S)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05X224KP5NNN □ | 1.00×0.50 | 0.22 μF | 10 | ±10% | 0.55 |
| 2 | CL05X224KQ5NNN □ | | 0.22 μF | 6.3 | ±10% | 0.55 |
| 3 | CL05X224KR5NNN □ | | 0.22 μF | 4 | ±10% | 0.55 |
| 4 | CL05X474KP5NNN □ | | 0.47 μF | 10 | ±10% | 0.55 |
| 5 | CL05X474KQ5NNN □ | | 0.47 μF | 6.3 | ±10% | 0.55 |
| 6 | CL05X474KR5NNN □ | | 0.47 μF | 4 | ±10% | 0.55 |
| 7 | CL05X105KP5NNN □ | | 1 μF | 10 | ±10% | 0.55 |
| 8 | CL05X105MQ3LNN □ | | 1 μF | 6.3 | ±20% | 0.33 |
| 9 | CL05X105KQ5NNN □ | | 1 μF | 6.3 | ±10% | 0.55 |
| 10 | CL05X105MR3LNN □ | | 1 μF | 4 | ±20% | 0.33 |
| 11 | CL05X105KR5NNN □ | | 1 μF | 4 | ±10% | 0.55 |
| 12 | CL05X225MQ5NSN □ | | 2.2 μF | 6.3 | ±20% | 0.57 |
| 13 | CL05X225MR5NSN □ | | 2.2 μF | 4 | ±20% | 0.57 |
| 1 | CL10X474KA8NNN □ | 1.60×0.80 | 0.47 μF | 25 | ±10% | 0.90 |
| 2 | CL10X474KO8NNN □ | | 0.47 μF | 16 | ±10% | 0.90 |
| 3 | CL10X474KP8NNN □ | | 0.47 μF | 10 | ±10% | 0.90 |
| 4 | CL10X474KQ8NNN □ | | 0.47 μF | 6.3 | ±10% | 0.90 |
| 5 | CL10X474KR8NNN □ | | 0.47 μF | 4 | ±10% | 0.90 |
| 6 | CL10X105KA8NNN □ | | 1 μF | 25 | ±10% | 0.90 |
| 7 | CL10X105KO8NNN □ | | 1 μF | 16 | ±10% | 0.90 |
| 8 | CL10X105KP8NNN □ | | 1 μF | 10 | ±10% | 0.90 |
| 9 | CL10X105KQ8NNN □ | | 1 μF | 6.3 | ±10% | 0.90 |
| 10 | CL10X105KR8NNN □ | | 1 μF | 4 | ±10% | 0.90 |
| 11 | CL10X225KA8NQN □ | | 2.2 μF | 25 | ±10% | 0.95 |
| 12 | CL10X225KO8NNN □ | | 2.2 μF | 16 | ±10% | 0.90 |
| 13 | CL10X225KP8NNN □ | | 2.2 μF | 10 | ±10% | 0.90 |
| 14 | CL10X225KQ8NNN □ | | 2.2 μF | 6.3 | ±10% | 0.90 |
| 15 | CL10X225KR8NNN □ | | 2.2 μF | 4 | ±10% | 0.90 |
| 16 | CL10X475KA8NQN □ | | 4.7 μF | 25 | ±10% | 0.95 |
| 17 | CL10X475KO8NQN □ | | 4.7 μF | 16 | ±10% | 0.95 |
| 18 | CL10X475KP5NNN □ | | 4.7 μF | 10 | ±10% | 0.90 |
| 19 | CL10X475KQ8NNN □ | | 4.7 μF | 6.3 | ±10% | 0.90 |
| 20 | CL10X475KR8NNN □ | | 4.7 μF | 4 | ±10% | 0.90 |
| 21 | CL10X106MP8NNN □ | | 10 μF | 10 | ±20% | 0.90 |
| 22 | CL10X106KQ8NNN □ | | 10 μF | 6.3 | ±10% | 0.90 |
| 23 | CL10X106KR8NNN □ | | 10 μF | 4 | ±10% | 0.90 |
| 1 | CL21X105KAFNNN □ | 2.00×1.25 | 1 μF | 25 | ±10% | 1.35 |
| 2 | CL21X105KOFNNN □ | | 1 μF | 16 | ±10% | 1.35 |
| 3 | CL21X105KPFNNN □ | | 1 μF | 10 | ±10% | 1.35 |
| 4 | CL21X105KQFNNN □ | | 1 μF | 6.3 | ±10% | 1.35 |
| 5 | CL21X105KRFNNN □ | | 1 μF | 4 | ±10% | 1.35 |
| 6 | CL21X225KAFNNN □ | | 2.2 μF | 25 | ±10% | 1.35 |
| 7 | CL21X225KOFNNN □ | | 2.2 μF | 16 | ±10% | 1.35 |
| 8 | CL21X225KPFNNN □ | | 2.2 μF | 10 | ±10% | 1.35 |
| 9 | CL21X225KQFNNN □ | | 2.2 μF | 6.3 | ±10% | 1.35 |
| 10 | CL21X225KRFNNN □ | | 2.2 μF | 4 | ±10% | 1.35 |
| 11 | CL21X475KAQNNN □ | | 4.7 μF | 25 | ±10% | 1.40 |
| 12 | CL21X475KOFNNN □ | | 4.7 μF | 16 | ±10% | 1.35 |
| 13 | CL21X475KPFNNN □ | | 4.7 μF | 10 | ±10% | 1.35 |
| 14 | CL21X475KQFNNN □ | | 4.7 μF | 6.3 | ±10% | 1.35 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p 80.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Product Lineup (High Capacitance -X6S)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|------|
| 15 | CL21X475KRFNNN □ | 2.00×1.25 | 4.7μF | 4 | ±10% | 1.35 | |
| 16 | CL21X106KACLRN □ | | 10μF | 25 | ±10% | 0.95 | |
| 17 | CL21X106KAYNNN □ | | 10μF | 25 | ±10% | 1.45 | |
| 18 | CL21X106KOYNNN □ | | 10μF | 16 | ±10% | 1.45 | |
| 19 | CL21X106KPCLNN □ | | 10μF | 10 | ±10% | 0.95 | |
| 20 | CL21X106KPYNNN □ | | 10μF | 10 | ±10% | 1.45 | |
| 21 | CL21X106KQQNNN □ | | 10μF | 6.3 | ±10% | 1.40 | |
| 22 | CL21X106KRQNNN □ | | 10μF | 4 | ±10% | 1.40 | |
| 23 | CL21X106KRCLNN □ | | 10μF | 4 | ±10% | 0.95 | |
| 24 | CL21X226MQQNNN □ | | 22μF | 6.3 | ±20% | 1.40 | |
| 25 | CL21X226MRQNNN □ | | 22μF | 4 | ±20% | 1.40 | |
| 26 | CL21X476MRYNNN □ | | 47μF | 4 | ±20% | 1.45 | |
| 1 | CL31X475KAHNNN □ | | 3.20×1.60 | 4.7μF | 25 | ±10% | 1.80 |
| 2 | CL31X475KACLNN □ | | | 4.7μF | 25 | ±10% | 0.95 |
| 3 | CL31X475KOHNNN □ | 4.7μF | | 16 | ±10% | 1.80 | |
| 4 | CL31X475KPHNNN □ | 4.7μF | | 10 | ±10% | 1.80 | |
| 5 | CL31X475MQHNNN □ | 4.7μF | | 6.3 | ±20% | 1.80 | |
| 6 | CL31X475KRHNNN □ | 4.7μF | | 4 | ±10% | 1.80 | |
| 7 | CL31X106KACLNN □ | 10μF | | 25 | ±10% | 0.95 | |
| 8 | CL31X106KAHNNN □ | 10μF | | 25 | ±10% | 1.80 | |
| 9 | CL31X106KOHNNN □ | 10μF | | 16 | ±10% | 1.80 | |
| 10 | CL31X106KPHNNN □ | 10μF | | 10 | ±10% | 1.80 | |
| 11 | CL31X106KQHNNN □ | 10μF | | 6.3 | ±10% | 1.80 | |
| 12 | CL31X106KRHNNN □ | 10μF | | 4 | ±10% | 1.80 | |
| 13 | CL31X226KOHNNN □ | 22μF | | 16 | ±10% | 1.80 | |
| 14 | CL31X226KPHNNN □ | 22μF | | 10 | ±10% | 1.80 | |
| 15 | CL31X226KQHNNN □ | 22μF | | 6.3 | ±10% | 1.80 | |
| 16 | CL31X226KRHNNN □ | 22μF | | 4 | ±10% | 1.80 | |
| 17 | CL31X107MQHNNN □ | 100μF | | 6.3 | ±20% | 1.80 | |
| 18 | CL31X107MRHNNN □ | 100μF | | 4 | ±20% | 1.80 | |
| 1 | CL32X106KAUNNN □ | 3.20×2.50 | 10μF | 25 | ±10% | 2.00 | |
| 2 | CL32X106KOJNNN □ | | 10μF | 16 | ±10% | 2.70 | |
| 3 | CL32X106KPJNNN □ | | 10μF | 10 | ±10% | 2.70 | |
| 4 | CL32X106KQJNNN □ | | 10μF | 6.3 | ±10% | 2.70 | |
| 5 | CL32X106KRJNNN □ | | 10μF | 4 | ±10% | 2.70 | |
| 6 | CL32X226KAJNNN □ | | 22μF | 25 | ±10% | 2.70 | |
| 7 | CL32X226KOJNNN □ | | 22μF | 16 | ±10% | 2.70 | |
| 8 | CL32X226KPJNNN □ | | 22μF | 10 | ±10% | 2.70 | |
| 9 | CL32X226KQJNNN □ | | 22μF | 6.3 | ±10% | 2.70 | |
| 10 | CL32X226KRJNNN □ | | 22μF | 4 | ±10% | 2.70 | |
| 11 | CL32X476MPJNNN □ | | 47μF | 10 | ±20% | 2.70 | |
| 12 | CL32X476KQJNNN □ | | 47μF | 6.3 | ±10% | 2.70 | |
| 13 | CL32X476KRJNNN □ | | 47μF | 4 | ±10% | 2.70 | |
| 14 | CL32X107MQVNNN □ | | 100μF | 6.3 | ±20% | 2.80 | |
| 15 | CL32X107MRVNNN □ | | 100μF | 4 | ±20% | 2.80 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (High Capacitance -X7R, X7S)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|-------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05B224KO5NNN □ | 1.00×0.50 | 0.22 μF | 16 | ±10% | 0.55 |
| 2 | CL05B224KP5NNN □ | | 0.22 μF | 10 | ±10% | 0.55 |
| 3 | CL05B224KQ5NNN □ | | 0.22 μF | 6.3 | ±10% | 0.55 |
| 4 | CL05B474KP5NNN □ | | 0.47 μF | 10 | ±10% | 0.55 |
| 5 | CL05B105KQ5NQN □ | | 1 μF | 6.3 | ±10% | 0.60 |
| 1 | CL05Y474KP5NNN □ | 1.00×0.50 | 0.47 μF | 10 | ±10% | 0.55 |
| 1 | CL10B474KA8NNN □ | 1.60×0.80 | 0.47 μF | 25 | ±10% | 0.90 |
| 2 | CL10B474KO8NNN □ | | 0.47 μF | 16 | ±10% | 0.90 |
| 3 | CL10B474KP8NNN □ | | 0.47 μF | 10 | ±10% | 0.90 |
| 4 | CL10B474KQ8NNN □ | | 0.47 μF | 6.3 | ±10% | 0.90 |
| 5 | CL10B105KA8NNN □ | | 1 μF | 25 | ±10% | 0.90 |
| 6 | CL10B105KO8NNN □ | | 1 μF | 16 | ±10% | 0.90 |
| 7 | CL10B105KP8NNN □ | | 1 μF | 10 | ±10% | 0.90 |
| 8 | CL10B105KQ8NNN □ | | 1 μF | 6.3 | ±10% | 0.90 |
| 9 | CL10B225KP8NNN □ | | 2.2 μF | 10 | ±10% | 0.90 |
| 10 | CL10B225KQ8NNN □ | | 2.2 μF | 6.3 | ±10% | 0.90 |
| 11 | CL10B106MQ8NRN □ | 2.00×1.25 | 10 μF | 6.3 | ±20% | 1.00 |
| 1 | CL21B105KBFNNN □ | | 1 μF | 50 | ±10% | 1.35 |
| 2 | CL21B105KLFNNN □ | | 1 μF | 35 | ±10% | 1.35 |
| 3 | CL21B105KAFNNN □ | | 1 μF | 25 | ±10% | 1.35 |
| 4 | CL21B105KOFNNN □ | | 1 μF | 16 | ±10% | 1.35 |
| 5 | CL21B105KPFNNN □ | | 1 μF | 10 | ±10% | 1.35 |
| 6 | CL21B105KQFNNN □ | | 1 μF | 6.3 | ±10% | 1.35 |
| 7 | CL21B225KAFNNN □ | | 2.2 μF | 25 | ±10% | 1.35 |
| 8 | CL21B225KOFNNN □ | | 2.2 μF | 16 | ±10% | 1.35 |
| 9 | CL21B225KPFNNN □ | | 2.2 μF | 10 | ±10% | 1.35 |
| 10 | CL21B225KQFNNN □ | | 2.2 μF | 6.3 | ±10% | 1.35 |
| 11 | CL21B475KOFNFN □ | | 4.7 μF | 16 | ±10% | 1.35 |
| 12 | CL21B475KPFNFN □ | | 4.7 μF | 10 | ±10% | 1.35 |
| 13 | CL21B475KQQNNN □ | | 4.7 μF | 6.3 | ±10% | 1.40 |
| 14 | CL21B106KAYNNN □ | | 10 μF | 25 | ±10% | 1.45 |
| 15 | CL21B106KOQNNN □ | | 10 μF | 16 | ±10% | 1.40 |
| 16 | CL21B106KPQNNN □ | | 10 μF | 10 | ±10% | 1.40 |
| 17 | CL21B106KQQNNN □ | 10 μF | 6.3 | ±10% | 1.40 | |
| 18 | CL21B226MQQNN □ | 3.20×1.60 | 22 μF | 6.3 | ±20% | 1.40 |
| 1 | CL31B475KBHNNN □ | | 4.7 μF | 50 | ±10% | 1.80 |
| 2 | CL31B475KLHNNN □ | | 4.7 μF | 35 | ±10% | 1.80 |
| 3 | CL31B475KAHNNN □ | | 4.7 μF | 25 | ±10% | 1.80 |
| 4 | CL31B475KOHNNN □ | | 4.7 μF | 16 | ±10% | 1.80 |
| 5 | CL31B475KPHNNN □ | | 4.7 μF | 10 | ±10% | 1.80 |
| 6 | CL31B475KQHNNN □ | | 4.7 μF | 6.3 | ±10% | 1.80 |
| 7 | CL31B106KLHNNN □ | | 10 μF | 35 | ±10% | 1.80 |
| 8 | CL31B106KAHNNN □ | | 10 μF | 25 | ±10% | 1.80 |
| 9 | CL31B106KOHNNN □ | | 10 μF | 16 | ±10% | 1.80 |
| 10 | CL31B106KPHNNN □ | | 10 μF | 10 | ±10% | 1.80 |
| 11 | CL31B106KQHNNN □ | 10 μF | 6.3 | ±10% | 1.80 | |
| 12 | CL31B226KPHNNN □ | 3.20×2.50 | 22 μF | 10 | ±10% | 1.80 |
| 1 | CL32B106KBJNNN □ | | 10 μF | 50 | ±10% | 2.70 |
| 2 | CL32B106KAJNNN □ | | 10 μF | 25 | ±10% | 2.70 |
| 3 | CL32B106KOJNNN □ | | 10 μF | 16 | ±10% | 2.70 |
| 4 | CL32B106KPIJNNN □ | | 10 μF | 10 | ±10% | 2.20 |
| 5 | CL32B106KQJNNN □ | | 10 μF | 6.3 | ±10% | 2.70 |
| 6 | CL32B226KAJNNN □ | | 22 μF | 25 | ±10% | 2.70 |
| 7 | CL32B226KOJNNN □ | | 22 μF | 16 | ±10% | 2.70 |
| 8 | CL32B226KPIJNNN □ | | 22 μF | 10 | ±10% | 2.70 |
| 9 | CL32B226KQJNNN □ | | 22 μF | 6.3 | ±10% | 2.70 |
| 10 | CL32B476MQJNNN □ | 47 μF | 6.3 | ±20% | 2.70 | |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

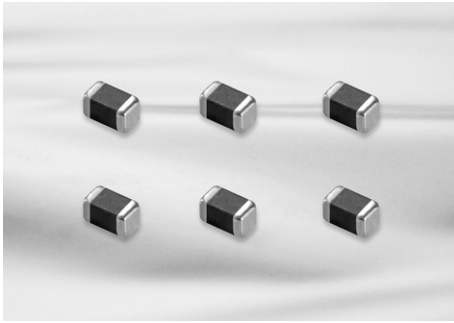
Packaging Specification

Application Manual for Surface Mounting

Product Lineup (High Capacitance -Y5V)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|------------------|--------------|---------------------------|--------------------------|------------------------|
| 1 | CL05F224ZO5NNN □ | 1.00×0.50 | 0.22 μ F | 16 | +80/-20% | 0.55 |
| 2 | CL05F224ZP5NNN □ | | 0.22 μ F | 10 | +80/-20% | 0.55 |
| 3 | CL05F224ZQ5NNN □ | | 0.22 μ F | 6.3 | +80/-20% | 0.55 |
| 4 | CL05F474ZP5NNN □ | | 0.47 μ F | 10 | +80/-20% | 0.55 |
| 5 | CL05F474ZQ5NNN □ | | 0.47 μ F | 6.3 | +80/-20% | 0.55 |
| 6 | CL05F105ZQ5NNN □ | | 1 μ F | 6.3 | +80/-20% | 0.55 |
| 1 | CL10F474ZB8NNN □ | 1.60×0.80 | 0.47 μ F | 50 | +80/-20% | 0.90 |
| 2 | CL10F474ZA8NNN □ | | 0.47 μ F | 25 | +80/-20% | 0.90 |
| 3 | CL10F474ZO8NNN □ | | 0.47 μ F | 16 | +80/-20% | 0.90 |
| 4 | CL10F474ZP8NNN □ | | 0.47 μ F | 10 | +80/-20% | 0.90 |
| 5 | CL10F105ZO8NNN □ | | 1 μ F | 16 | +80/-20% | 0.90 |
| 6 | CL10F105ZP8NNN □ | | 1 μ F | 10 | +80/-20% | 0.90 |
| 7 | CL10F225ZP8NNN □ | | 2.2 μ F | 10 | +80/-20% | 0.90 |
| 8 | CL10F225ZQ8NNN □ | | 2.2 μ F | 6.3 | +80/-20% | 0.90 |
| 9 | CL10F475ZQ8NNN □ | | 4.7 μ F | 6.3 | +80/-20% | 0.90 |
| 1 | CL21F105ZBFNNN □ | 2.00×1.25 | 1 μ F | 50 | +80/-20% | 1.35 |
| 2 | CL21F105ZAFNNN □ | | 1 μ F | 25 | +80/-20% | 1.35 |
| 3 | CL21F105ZOFNNN □ | | 1 μ F | 16 | +80/-20% | 1.35 |
| 4 | CL21F225ZAFNNN □ | | 2.2 μ F | 25 | +80/-20% | 1.35 |
| 5 | CL21F225ZOFNNN □ | | 2.2 μ F | 16 | +80/-20% | 1.35 |
| 6 | CL21F475ZQFNNN □ | | 4.7 μ F | 6.3 | +80/-20% | 1.35 |
| 7 | CL21F475ZOFNNN □ | | 4.7 μ F | 16 | +80/-20% | 1.35 |
| 8 | CL21F475ZPFNNN □ | | 4.7 μ F | 10 | +80/-20% | 1.35 |
| 9 | CL21F106ZPFNNN □ | | 10 μ F | 10 | +80/-20% | 1.35 |
| 10 | CL21F106ZPCLNN □ | | 10 μ F | 10 | +80/-20% | 0.95 |
| 11 | CL21F106ZQFNNN □ | | 10 μ F | 6.3 | +80/-20% | 1.35 |
| 12 | CL21F106ZQCLNN □ | | 10 μ F | 6.3 | +80/-20% | 0.95 |
| 1 | CL31F475ZOHNNN □ | 3.20×1.60 | 4.7 μ F | 16 | +80/-20% | 1.80 |
| 2 | CL31F475ZPHNNN □ | | 4.7 μ F | 10 | +80/-20% | 1.80 |
| 3 | CL31F475ZQHNNN □ | | 4.7 μ F | 6.3 | +80/-20% | 1.80 |
| 4 | CL31F106ZOHNNN □ | | 10 μ F | 16 | +80/-20% | 1.80 |
| 5 | CL31F106ZPHNNN □ | | 10 μ F | 10 | +80/-20% | 1.80 |
| 6 | CL31F106ZQHNNN □ | | 10 μ F | 6.3 | +80/-20% | 1.80 |
| 7 | CL31F226ZPHNNN □ | | 22 μ F | 10 | +80/-20% | 1.80 |
| 8 | CL31F226ZQHNNN □ | | 22 μ F | 6.3 | +80/-20% | 1.80 |
| 1 | CL32F106ZAHNNN □ | 3.20×2.50 | 10 μ F | 25 | +80/-20% | 1.80 |
| 2 | CL32F106ZOELNN □ | | 10 μ F | 16 | +80/-20% | 2.00 |
| 3 | CL32F226ZPJNNN □ | | 22 μ F | 10 | +80/-20% | 2.70 |
| 4 | CL32F226ZPULNN □ | | 22 μ F | 10 | +80/-20% | 2.00 |
| 5 | CL32F476ZQJNNN □ | | 47 μ F | 6.3 | +80/-20% | 2.70 |
| 6 | CL32F107ZQJNNN □ | | 100 μ F | 6.3 | +80/-20% | 2.70 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.



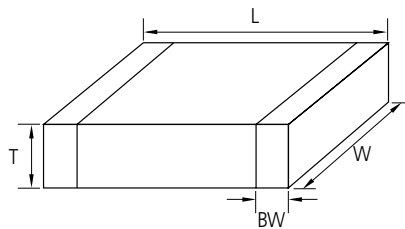
Feature

- Small chip size
- 03 Series(COG) MLCC shows very low ESR value.
- 02 and 03 Series are suited to only reflow soldering
- 02 and 03 Series are suited to miniature RF module, portable equipment and high frequency circuit

Application

- VCO, Tuner, RF Module
 - MCM Module
 - Mobile phone, Wireless LAN, Note PC
- ※ For using special purpose like Military, Medical, Aviation, Automobile device should be following a special specification.

Structure and Dimensions



| Code | EIA Code | Dimension(mm) | | | |
|------|----------|----------------|----------------|----------------|-----------------|
| | | L | W | T | BW |
| 02 | 01005 | 0.4 ± 0.02 | 0.2 ± 0.02 | 0.2 ± 0.02 | 0.07~0.14 |
| 03 | 0201 | 0.6 ± 0.03 | 0.3 ± 0.03 | 0.3 ± 0.03 | 0.15 ± 0.05 |

* Note : This catalog has only typical specifications because there is no space for detailed specifications.
Please approve our product specifications or transact the approval sheet for product specifications before ordering.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Super Small Size Capacitance Table (C0G)

| TC | Size (mm) | Vr(V) | Capacitance (pF) | | | | | | | |
|-----|-------------|-------|------------------|---|----|------|----|-----|-----|-----|
| | | | 0.5 | 1 | 10 | 22 | 47 | 100 | 220 | 330 |
| C0G | 01005(0402) | 6.3 | | | | | | | | |
| | | 16 | | | | | | | | |
| | 0201(0603) | 25 | | | | | | | | |
| | | 50 | | | | 20pF | | | | |

Super Small Size Capacitance Table (X7R)

| TC | Size (mm) | Vr(V) | Capacitance (nF) | | | | | | | |
|-----|-------------|-------|------------------|------|------|---|-----|-----|----|----|
| | | | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | 22 |
| X7R | 01005(0402) | 10 | | | | | | | | |
| | | 10 | | | | | | | | |
| | 0201(0603) | 10 | | | | | | | | |
| 16 | | | | | | | | | | |

Super Small Size Capacitance Table (X5R, Y5V)

| TC | Size (mm) | Vr(V) | Capacitance (μF) | | | | | | | |
|-----|-------------|-------|------------------|-----|------------|------|---|-----|-----|----|
| | | | 0.01 | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 |
| X5R | 01005(0402) | 6.3 | | | | | | | | |
| | | 10 | | | | | | | | |
| | | 16 | | | | | | | | |
| | 0201(0603) | 4 | | | X5R or X6S | | | | | |
| | | 6.3 | | | | | | | | |
| | | 10 | | | | | | | | |
| | | 16 | | | | | | | | |
| | 25 | | | | | | | | | |
| Y5V | 0201(0603) | 6.3 | | | | | | | | |

Product Lineup (Super Small Size Capacitors -C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|--------|
| 1 | CL02C0R5CO2ANN □ | 0.40×0.20 | 0.5pF | 16 | ±0.25pF | 0.22 | |
| 2 | CL02C010CO2ANN □ | | 1.0pF | 16 | ±0.25pF | 0.22 | |
| 3 | CL02C1R2CO2ANN □ | | 1.2pF | 16 | ±0.25pF | 0.22 | |
| 4 | CL02C1R5CO2ANN □ | | 1.5pF | 16 | ±0.25pF | 0.22 | |
| 5 | CL02C1R8CO2ANN □ | | 1.8pF | 16 | ±0.25pF | 0.22 | |
| 6 | CL02C020CO2ANN □ | | 2.0pF | 16 | ±0.25pF | 0.22 | |
| 7 | CL02C2R2CO2ANN □ | | 2.2pF | 16 | ±0.25pF | 0.22 | |
| 8 | CL02C2R7CO2ANN □ | | 2.7pF | 16 | ±0.25pF | 0.22 | |
| 9 | CL02C030CO2ANN □ | | 3.0pF | 16 | ±0.25pF | 0.22 | |
| 10 | CL02C3R3CO2ANN □ | | 3.3pF | 16 | ±0.25pF | 0.22 | |
| 11 | CL02C3R9CO2ANN □ | | 3.9pF | 16 | ±0.25pF | 0.22 | |
| 12 | CL02C4R7CO2ANN □ | | 4.7pF | 16 | ±0.25pF | 0.22 | |
| 13 | CL02C5R6DO2ANN □ | | 5.6pF | 16 | ±0.5pF | 0.22 | |
| 14 | CL02C6R8DO2ANN □ | | 6.8pF | 16 | ±0.5pF | 0.22 | |
| 15 | CL02C8R2DO2ANN □ | | 8.2pF | 16 | ±0.5pF | 0.22 | |
| 16 | CL02C090DO2ANN □ | | 9.0pF | 16 | ±0.5pF | 0.22 | |
| 17 | CL02C100JO2ANN □ | | 10pF | 16 | ±5% | 0.22 | |
| 18 | CL02C150JO2ANN □ | | 15pF | 16 | ±5% | 0.22 | |
| 19 | CL02C180JO2ANN □ | | 18pF | 16 | ±5% | 0.22 | |
| 20 | CL02C220JO2ANN □ | | 22pF | 16 | ±5% | 0.22 | |
| 21 | CL02C270JO2ANN □ | | 27pF | 16 | ±5% | 0.22 | |
| 22 | CL02C330JO2ANN □ | | 33pF | 16 | ±5% | 0.22 | |
| 23 | CL02C390JO2ANN □ | | 39pF | 16 | ±5% | 0.22 | |
| 24 | CL02C470JO2ANN □ | | 47pF | 16 | ±5% | 0.22 | |
| 25 | CL02C560JQ2ANN □ | | 56pF | 6.3 | ±5% | 0.22 | |
| 26 | CL02C680JQ2ANN □ | | 68pF | 6.3 | ±5% | 0.22 | |
| 27 | CL02C820JQ2ANN □ | | 82pF | 6.3 | ±5% | 0.22 | |
| 28 | CL02C101JQ2ANN □ | | 100pF | 6.3 | ±5% | 0.22 | |
| 1 | CL03C0R5CA3GNN □ | 0.60×0.30 | 0.5pF | 25 | ±0.25pF | 0.33 | High-Q |
| 2 | CL03C010CA3GNN □ | | 1.0pF | 25 | ±0.25pF | 0.33 | High-Q |
| 3 | CL03C1R2CA3GNN □ | | 1.2pF | 25 | ±0.25pF | 0.33 | High-Q |
| 4 | CL03C1R5CA3GNN □ | | 1.5pF | 25 | ±0.25pF | 0.33 | High-Q |
| 5 | CL03C1R8CA3GNN □ | | 1.8pF | 25 | ±0.25pF | 0.33 | High-Q |
| 6 | CL03C020CA3GNN □ | | 2.0pF | 25 | ±0.25pF | 0.33 | High-Q |
| 7 | CL03C2R2CA3GNN □ | | 2.2pF | 25 | ±0.25pF | 0.33 | High-Q |
| 8 | CL03C2R7CA3GNN □ | | 2.7pF | 25 | ±0.25pF | 0.33 | High-Q |
| 9 | CL03C030CA3GNN □ | | 3.0pF | 25 | ±0.25pF | 0.33 | High-Q |
| 10 | CL03C3R3CA3GNN □ | | 3.3pF | 25 | ±0.25pF | 0.33 | High-Q |
| 11 | CL03C3R9CA3GNN □ | | 3.9pF | 25 | ±0.25pF | 0.33 | High-Q |
| 12 | CL03C4R7CA3GNN □ | | 4.7pF | 25 | ±0.25pF | 0.33 | High-Q |
| 13 | CL03C5R6DA3GNN □ | | 5.6pF | 25 | ±0.5pF | 0.33 | High-Q |
| 14 | CL03C6R8DA3GNN □ | | 6.8pF | 25 | ±0.5pF | 0.33 | High-Q |
| 15 | CL03C8R2DA3GNN □ | | 8.2pF | 25 | ±0.5pF | 0.33 | High-Q |
| 16 | CL03C090DA3GNN □ | | 9.0pF | 25 | ±0.5pF | 0.33 | High-Q |
| 17 | CL03C100JA3GNN □ | | 10pF | 25 | ±5% | 0.33 | High-Q |
| 18 | CL03C150JA3ANN □ | | 15pF | 25 | ±5% | 0.33 | High-Q |
| 19 | CL03C180JA3ANN □ | | 18pF | 25 | ±5% | 0.33 | High-Q |
| 20 | CL03C220JA3ANN □ | | 22pF | 25 | ±5% | 0.33 | High-Q |
| 21 | CL03C270JA3ANN □ | | 27pF | 25 | ±5% | 0.33 | High-Q |
| 22 | CL03C330JA3ANN □ | | 33pF | 25 | ±5% | 0.33 | High-Q |
| 23 | CL03C390JA3ANN □ | | 39pF | 25 | ±5% | 0.33 | |
| 24 | CL03C470JA3ANN □ | | 47pF | 25 | ±5% | 0.33 | |
| 25 | CL03C101JA3ANN □ | | 100pF | 25 | ±5% | 0.33 | |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (Super Small Size Capacitors -X7R)

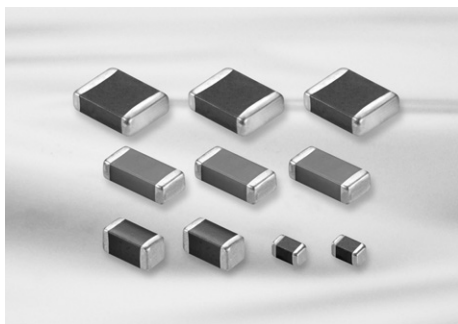
| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|---|------------------|------------------|-------------|---------------------------|--------------------------|------------------------|
| 1 | CL02B101KP2NNN □ | 0.40×0.20 | 100pF | 10 | ±10% | 0.22 |
| 2 | CL02B151KP2NNN □ | | 150pF | 10 | ±10% | 0.22 |
| 3 | CL02B221KP2NNN □ | | 220pF | 10 | ±10% | 0.22 |
| 4 | CL02B331KP2NNN □ | | 330pF | 10 | ±10% | 0.22 |
| 5 | CL02B471KP2NNN □ | | 470pF | 10 | ±10% | 0.22 |
| 6 | CL02B681KP2NNN □ | | 680pF | 10 | ±10% | 0.22 |
| 7 | CL02B102KP2NNN □ | | 1nF | 10 | ±10% | 0.22 |
| 1 | CL03B331KO3NNN □ | 0.60×0.30 | 330pF | 16 | ±10% | 0.33 |
| 2 | CL03B102KO3NNN □ | | 1nF | 16 | ±10% | 0.33 |
| 3 | CL03B472KQ3NNN □ | | 4.7nF | 6.3 | ±10% | 0.33 |
| 4 | CL03B103KP3NNN □ | | 10nF | 10 | ±10% | 0.33 |

Product Lineup (Super Small Size Capacitors -X5R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|------------------|-------------|---------------------------|--------------------------|------------------------|
| 1 | CL02A151KQ2NNN □ | 0.40×0.20 | 150pF | 6.3 | ±10% | 0.22 |
| 2 | CL02A221KQ2NNN □ | | 220pF | 6.3 | ±10% | 0.22 |
| 3 | CL02A331KQ2NNN □ | | 330pF | 6.3 | ±10% | 0.22 |
| 4 | CL02A471KQ2NNN □ | | 470pF | 6.3 | ±10% | 0.22 |
| 5 | CL02A681KQ2NNN □ | | 680pF | 6.3 | ±10% | 0.22 |
| 6 | CL02A102KQ2NNN □ | | 1nF | 6.3 | ±10% | 0.22 |
| 7 | CL02A152KQ2NNN □ | | 1.5nF | 6.3 | ±10% | 0.22 |
| 8 | CL02A222KQ2NNN □ | | 2.2nF | 6.3 | ±10% | 0.22 |
| 9 | CL02A332KQ2NNN □ | | 3.2nF | 6.3 | ±10% | 0.22 |
| 10 | CL02A472KQ2NNN □ | | 4.7nF | 6.3 | ±10% | 0.22 |
| 11 | CL02A682KQ2NNN □ | | 6.8nF | 6.3 | ±10% | 0.22 |
| 12 | CL02A103KQ2NNN □ | | 10nF | 6.3 | ±10% | 0.22 |
| 13 | CL02A104KQ2NNN □ | | 100nF | 6.3 | ±10% | 0.22 |
| 1 | CL03A103KP3NNN □ | 0.60×0.30 | 10nF | 10 | ±10% | 0.33 |
| 2 | CL03A223KQ3NNN □ | | 22nF | 6.3 | ±10% | 0.33 |
| 3 | CL03A473KQ3NNN □ | | 47nF | 6.3 | ±10% | 0.33 |
| 4 | CL03A104MA3NNN □ | | 100nF | 25 | ±20% | 0.33 |
| 5 | CL03A104KO3NNN □ | | 100nF | 16 | ±10% | 0.33 |
| 6 | CL03A104KP3NNN □ | | 100nF | 10 | ±10% | 0.33 |
| 7 | CL03A104KQ3NNN □ | | 100nF | 6.3 | ±10% | 0.33 |
| 8 | CL03A224KQ3NNN □ | | 220nF | 6.3 | ±10% | 0.33 |
| 9 | CL03A224KP3NNN □ | | 220nF | 10 | ±10% | 0.33 |
| 10 | CL03A105MQ3CSN □ | | 1μF | 6.3 | ±20% | 0.35 |
| 11 | CL03A105MP3NSN □ | | 1μF | 10 | ±20% | 0.35 |
| 12 | CL03A225MR3CRN □ | | 2.2μF | 4 | ±20% | 0.39 |
| 13 | CL03A225MQ3CRN □ | | 2.2μF | 6.3 | ±20% | 0.39 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Medium-High Voltage Capacitors



Feature

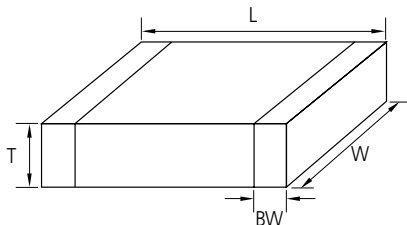
- Highly reliable performance
- Operating at high voltage level
- Wide voltage level: from 100V to 3000V
- High withstanding voltage
- Tape & reel surface mount assembly

Application

- Switching Power Circuit(SMPS)
- Lighting Ballast, LCD back lighting inverter
- DC-DC converter input filter, snubber circuit
- Phone, Fax, Modem
- Network(IEEE802.3)

※ For using special purpose like Military, Medical, Aviation, Automobile device should be following a special specification.

Structure and Dimensions



| Code | EIA Code | Dimension(mm) | | | | |
|------|----------|---------------|-----------|-----------|----------------|--------------|
| | | L | W | T | Thickness Code | BW |
| 10 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.80±0.10 | 8 | 0.3±0.2 |
| 21 | 0805 | 2.00±0.10 | 1.25±0.10 | 1.25±0.10 | F | 0.5+0.2/-0.3 |
| | | 2.00±0.10 | 1.25±0.10 | 0.85±0.10 | C | |
| | | 2.00±0.10 | 1.25±0.10 | 0.65±0.10 | A | |
| 31 | 1206 | 3.20±0.20 | 1.60±0.20 | 1.60±0.20 | H | 0.5±0.3 |
| | | 3.20±0.15 | 1.60±0.15 | 1.25±0.15 | F | |
| | | 3.20±0.15 | 1.60±0.15 | 0.85±0.15 | C | |
| 32 | 1210 | 3.20±0.30 | 2.50±0.20 | 2.50±0.20 | J | 0.6±0.3 |
| | | 3.20±0.30 | 2.50±0.20 | 1.60±0.20 | H | |
| | | 3.20±0.30 | 2.50±0.20 | 1.25±0.20 | F | |
| 42 | 1808 | 4.50±0.40 | 2.00±0.20 | 2.00±0.20 | I | 0.8±0.3 |
| | | 4.50±0.40 | 2.00±0.20 | 1.60±0.20 | H | |
| | | 4.50±0.40 | 2.00±0.20 | 1.25±0.20 | F | |
| 43 | 1812 | 4.50±0.40 | 3.20±0.30 | 2.50±0.20 | J | 0.8±0.3 |
| | | 4.50±0.40 | 3.20±0.30 | 1.60±0.20 | H | |
| | | 4.50±0.40 | 3.20±0.30 | 1.25±0.20 | F | |
| 55 | 2220 | 5.70±0.40 | 5.00±0.40 | 2.50±0.20 | J | 1.0±0.3 |
| | | 5.70±0.40 | 5.00±0.40 | 1.60±0.20 | H | |

* Note : This catalog has only typical specifications because there is no space for detailed specifications. Please approve our product specifications or transact the approval sheet for product specifications before ordering.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Medium-High Voltage Capacitors Table (C0G)

| Vr | Size(mm) | Capacitance | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|------------|-------------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|
| | | (pF) | | | | | | (nF) | | | | | | | | | | | | | | | | | | | |
| | | 330 | 390 | 470 | 560 | 680 | 820 | 1 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 | 10 | 12 | 15 | 18 | 22 | 27 | 33 | 47 |
| 100V | 0603(1608) | ■ | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0805(2012) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1206(3216) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| 200V | 0603(1608) | ■ | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0805(2012) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1206(3216) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| 250V | 0603(1608) | ■ | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0805(2012) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1206(3216) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| 500V | 1206(3216) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| 630V | 0805(2012) | ■ | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1206(3216) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | ■ | | | | | | ■ | | | | | | | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | ■ | | | | | | | | | | | | | | | | | | | |

Medium-High Voltage Capacitors Table (C0G)

| Vr | Size(mm) | Capacitance | | | | | | | | | | | | | | | | | | | | | | | |
|-----|------------|-------------|----|----|----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|
| | | (pF) | | | | | | | | | | (nF) | | | | | | | | | | | | | |
| | | 47 | 56 | 68 | 82 | 100 | 120 | 150 | 180 | 220 | 270 | 330 | 390 | 470 | 560 | 680 | 820 | 1 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 |
| 1KV | 1206(3216) | █ | | | | | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | | | | | | | | | | | █ | | | | | | | | | | | | | |
| | 1812(4532) | | | | | | | | | | | █ | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | | | | | █ | | | | | | | | | | | | | |
| 2KV | 1206(3216) | █ | | | | | | | | | | | | | | | | | | | | | | | |
| | 1210(3225) | █ | | | | | | | | | | | | | | | | | | | | | | | |
| | 1808(4520) | █ | | | | | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | █ | | | | | | | | | | █ | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | | | | | █ | | | | | | | | | | | | | |
| 3KV | 1808(4520) | █ | | | | | | | | | | | | | | | | | | | | | | | |
| | 1812(4532) | | | | | | | | | | | █ | | | | | | | | | | | | | |
| | 2220(5750) | | | | | | | | | | | █ | | | | | | | | | | | | | |

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors**
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



Medium-High Voltage Capacitors Table (X7R)

| Vr(V) | Size(mm) | Capacitance (nF) | | | | | | | | | | | | | | | | |
|-------|------------|------------------|------|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|
| | | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| 100V | 0603(1608) | 4.7 | 10 | | | | | | | | | | | | | | | |
| | 0805(2012) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1206(3216) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1210(3225) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1812(4532) | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | |
| | 2220(5750) | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | | | | | | | |
| 200V | 0805(2012) | 4.7 | 10 | 15 | | | | | | | | | | | | | | |
| | 1206(3216) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1210(3225) | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | |
| | 1812(4532) | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | |
| | 2220(5750) | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | | | | | | | |
| 250V | 0805(2012) | 4.7 | 10 | 15 | | | | | | | | | | | | | | |
| | 1206(3216) | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | |
| | 1210(3225) | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | |
| | 1812(4532) | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | | |
| | 2220(5750) | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | | | | | | | |
| 350V | 1206(3216) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| 500V | 1206(3216) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1210(3225) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1812(4532) | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | |
| | 2220(5750) | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | | |
| 630V | 1206(3216) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1210(3225) | 4.7 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 |
| | 1812(4532) | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | |
| | 2220(5750) | 100 | 150 | 220 | 330 | 470 | 680 | 1000 | 1500 | 2200 | 4700 | | | | | | | |

Medium-High Voltage Capacitors Table (X7R)

| Vr(V) | Size(mm) | Capacitance (nF) | | | | | | | | | | | | | | | |
|-------|------------|------------------|-----|-----|-----|-----|-----|----|----|----|----|----|----|-----|-----|-----|-----|
| | | 1 | 1.5 | 2.2 | 3.3 | 4.7 | 6.8 | 10 | 15 | 22 | 33 | 47 | 68 | 100 | 150 | 220 | 330 |
| 1K | 1206(3216) | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| | 1210(3225) | | | | ■ | ■ | ■ | ■ | | | | | | | | | |
| | 1812(4532) | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | |
| | 2220(5750) | | | | | | | | | | | ■ | ■ | | | | |
| 2KV | 1206(3216) | ■ | ■ | ■ | | | | | | | | | | | | | |
| | 1210(3225) | ■ | | | | | | | | | | | | | | | |
| | 1808(4520) | ■ | ■ | ■ | | | | | | | | | | | | | |
| | 1812(4532) | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| | 2220(5750) | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| 3KV | 1808(4520) | ■ | | | | | | | | | | | | | | | |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Product Lineup (Medium-High Voltage Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|-------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL10C100JC8NNN □ | 1.60×0.80 | 10pF | 100 | ±5% | 0.90 |
| 2 | CL10C150JC8NNN □ | | 15pF | 100 | ±5% | 0.90 |
| 3 | CL10C330JC8NNN □ | | 33pF | 100 | ±5% | 0.90 |
| 4 | CL10C390JC8NNN □ | | 39pF | 100 | ±5% | 0.90 |
| 5 | CL10C470JC8NNN □ | | 47pF | 100 | ±5% | 0.90 |
| 6 | CL10C560JC8NNN □ | | 56pF | 100 | ±5% | 0.90 |
| 7 | CL10C101JC8NNN □ | | 100pF | 100 | ±5% | 0.90 |
| 8 | CL10C121JC8NNN □ | | 120pF | 100 | ±5% | 0.90 |
| 9 | CL10C151JC8NNN □ | | 150pF | 100 | ±5% | 0.90 |
| 10 | CL10C331JC8NNN □ | | 330pF | 100 | ±5% | 0.90 |
| 11 | CL10C331JD8NNN □ | | 330pF | 200 | ±5% | 0.90 |
| 12 | CL10C331JE8NNN □ | | 330pF | 250 | ±5% | 0.90 |
| 13 | CL10C391JD8NNN □ | | 390pF | 200 | ±5% | 0.90 |
| 14 | CL10C391JE8NNN □ | | 390pF | 250 | ±5% | 0.90 |
| 15 | CL10C471JC8NNN □ | | 470pF | 100 | ±5% | 0.90 |
| 16 | CL10C471JD8NNN □ | | 470pF | 200 | ±5% | 0.90 |
| 17 | CL10C471JE8NNN □ | | 470pF | 250 | ±5% | 0.90 |
| 18 | CL10C561JD8NNN □ | | 560pF | 200 | ±5% | 0.90 |
| 19 | CL10C561JE8NNN □ | | 560pF | 250 | ±5% | 0.90 |
| 20 | CL10C681JC8NNN □ | | 680pF | 100 | ±5% | 0.90 |
| 21 | CL10C681JD8NNN □ | | 680pF | 200 | ±5% | 0.90 |
| 22 | CL10C681JE8NNN □ | | 680pF | 250 | ±5% | 0.90 |
| 23 | CL10C821JC8NNN □ | | 820pF | 100 | ±5% | 0.90 |
| 24 | CL10C102JC8NNN □ | | 1nF | 100 | ±5% | 0.90 |
| 25 | CL10C122JC8NNN □ | | 1.2nF | 100 | ±5% | 0.90 |
| 1 | CL21C100JCANNN □ | 2.00×1.25 | 10pF | 100 | ±5% | 0.75 |
| 2 | CL21C120JCANNN □ | | 12pF | 100 | ±5% | 0.75 |
| 3 | CL21C150JCANNNC □ | | 15pF | 100 | ±5% | 0.75 |
| 4 | L21C150JDCNNN □ | | 15pF | 200 | ±5% | 0.95 |
| 5 | CL21C180JCANNN □ | | 18pF | 100 | ±5% | 0.75 |
| 6 | CL21C180JDCNNN □ | | 18pF | 200 | ±5% | 0.95 |
| 7 | CL21C220JCANNN □ | | 22pF | 100 | ±5% | 0.75 |
| 8 | CL21C270JCANNN □ | | 27pF | 100 | ±5% | 0.75 |
| 9 | CL21C270JHFNNN □ | | 27pF | 630 | ±5% | 1.35 |
| 10 | CL21C330JCANNN □ | | 33pF | 100 | ±5% | 0.75 |
| 11 | CL21C330JDCNNN □ | | 33pF | 200 | ±5% | 0.95 |
| 12 | CL21C330JHFNNN □ | | 33pF | 630 | ±5% | 1.35 |
| 13 | CL21C390JDCNNN □ | | 39pF | 200 | ±5% | 0.95 |
| 14 | CL21C470JCANNN □ | | 47pF | 100 | ±5% | 0.75 |
| 15 | CL21C470JDCNNN □ | | 47pF | 200 | ±5% | 0.95 |
| 16 | CL21C470JHFNNN □ | | 47pF | 630 | ±5% | 1.35 |
| 17 | CL21C560JCCNNN □ | | 56pF | 100 | ±5% | 0.95 |
| 18 | CL21C560JDCNNN □ | | 56pF | 200 | ±5% | 0.95 |
| 19 | CL21C680JCANNN □ | | 68pF | 100 | ±5% | 0.75 |
| 20 | CL21C680JDCNNN □ | | 68pF | 200 | ±5% | 0.95 |
| 21 | CL21C680JHFNNN □ | | 68pF | 630 | ±5% | 1.35 |
| 22 | CL21C820JCCNNN □ | | 82pF | 100 | ±5% | 0.95 |
| 23 | CL21C101JCANNN □ | | 100pF | 100 | ±5% | 0.75 |
| 24 | CL21C101JDCNNN □ | | 100pF | 200 | ±5% | 0.95 |
| 25 | CL21C101JECNNN □ | | 100pF | 250 | ±5% | 0.95 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (Medium-High Voltage Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 26 | CL21C121JDCNNN □ | 2.00×1.25 | 120pF | 200 | ±5% | 0.95 |
| 27 | CL21C151JCANNN □ | | 150pF | 100 | ±5% | 0.75 |
| 28 | CL21C151JHFNNN □ | | 150pF | 630 | ±5% | 1.35 |
| 29 | CL21C221JCANNN □ | | 220pF | 100 | ±5% | 0.75 |
| 30 | CL21C221JDCNNN □ | | 220pF | 200 | ±5% | 0.95 |
| 31 | CL21C331JCANNN □ | | 330pF | 100 | ±5% | 0.75 |
| 32 | CL21C471JCCNNN □ | | 470pF | 100 | ±5% | 0.95 |
| 33 | CL21C561JCCNNN □ | | 560pF | 100 | ±5% | 0.95 |
| 34 | CL21C561JHFNNN □ | | 560pF | 630 | ±5% | 1.35 |
| 35 | CL21C681JCCNNN □ | | 680pF | 100 | ±5% | 0.95 |
| 36 | CL21C102JCFNNN □ | | 1nF | 100 | ±5% | 1.35 |
| 37 | CL21C102JDFNNN □ | | 1nF | 200 | ±5% | 1.35 |
| 38 | CL21C272JDFNNN □ | | 2.7nF | 200 | ±5% | 1.35 |
| 39 | CL21C272JEFNNN □ | | 2.7nF | 250 | ±5% | 1.35 |
| 40 | CL21C472JCFNNN □ | | 4.7nF | 100 | ±5% | 1.35 |
| 1 | CL31C150JGFNNN □ | | 3.20×1.60 | 15pF | 500 | ±5% |
| 2 | CL31C180JGFNNN □ | 18pF | | 500 | ±5% | 1.40 |
| 3 | CL31C220JGFNNN □ | 22pF | | 500 | ±5% | 1.40 |
| 4 | CL31C220JHNNN □ | 22pF | | 2000 | ±5% | 1.80 |
| 5 | CL31C270JGFNNN □ | 27pF | | 500 | ±5% | 1.40 |
| 6 | CL31C330JGFNNN □ | 33pF | | 500 | ±5% | 1.40 |
| 7 | CL31C390JGFNNN □ | 39pF | | 500 | ±5% | 1.40 |
| 8 | CL31C470JGFNNN □ | 47pF | | 500 | ±5% | 1.40 |
| 9 | CL31C470JHFNNN □ | 47pF | | 630 | ±5% | 1.40 |
| 10 | CL31C470JHNNN □ | 47pF | | 2000 | ±5% | 1.80 |
| 11 | CL31C560JGFNNN □ | 56pF | | 500 | ±5% | 1.40 |
| 12 | CL31C680JCCNNN □ | 68pF | | 100 | ±5% | 1.00 |
| 13 | CL31C680JGFNNN □ | 68pF | | 500 | ±5% | 1.40 |
| 14 | CL31C680JHFNNN □ | 68pF | | 630 | ±5% | 1.40 |
| 15 | CL31C680JIFNNN □ | 68pF | | 1000 | ±5% | 1.40 |
| 16 | CL31C820JGFNCN □ | 82pF | | 500 | ±5% | 1.40 |
| 17 | CL31C101JGFNNN □ | 100pF | | 500 | ±5% | 1.40 |
| 18 | CL31C101JHFNNN □ | 100pF | | 630 | ±5% | 1.40 |
| 19 | CL31C101JIFNNN □ | 100pF | | 1000 | ±5% | 1.40 |
| 20 | CL31C101JHNNN □ | 100pF | | 2000 | ±5% | 1.80 |
| 21 | CL31C121JGFNNN □ | 120pF | | 500 | ±5% | 1.40 |
| 22 | CL31C151JGFNNN □ | 150pF | | 500 | ±5% | 1.40 |
| 23 | CL31C181JGFNNN □ | 180pF | | 500 | ±5% | 1.40 |
| 24 | CL31C221JGFNNN □ | 220pF | | 500 | ±5% | 1.40 |
| 25 | CL31C271JGFNNN □ | 270pF | | 500 | ±5% | 1.40 |
| 26 | CL31C271JCCNNN □ | 270pF | | 100 | ±5% | 1.00 |
| 27 | CL31C331JGFNNN □ | 330pF | | 500 | ±5% | 1.40 |
| 28 | CL31C331JHNNN □ | 330pF | | 1000 | ±5% | 1.80 |
| 29 | CL31C391JCCNNN □ | 390pF | | 100 | ±5% | 1.00 |
| 30 | CL31C471JGFNNN □ | 470pF | | 500 | ±5% | 1.40 |
| 31 | CL31C471JHFNNN □ | 470pF | | 630 | ±5% | 1.40 |
| 32 | CL31C471JIFNNN □ | 470pF | | 1000 | ±5% | 1.40 |
| 33 | CL31C561JCCNNN □ | 560pF | | 100 | ±5% | 1.00 |
| 34 | CL31C561JGFNNN □ | 560pF | | 500 | ±5% | 1.40 |
| 35 | CL31C681JGFNNN □ | 680pF | | 500 | ±5% | 1.80 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Product Lineup (Medium-High Voltage Capacitors-C0G)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|------|
| 36 | CL31C102JCCNNN □ | 3.20×1.60 | 1nF | 100 | ±5% | 1.00 | |
| 37 | CL31C102JGHNNN □ | | 1nF | 500 | ±5% | 1.80 | |
| 38 | CL31C152JCCNNN □ | | 1.5nF | 100 | ±5% | 1.00 | |
| 39 | CL31C222JCCNNN □ | | 2.2nF | 100 | ±5% | 1.00 | |
| 40 | CL31C332JGHNNN □ | | 3.3nF | 500 | ±5% | 1.80 | |
| 41 | CL31C332JHHNNN □ | | 3.3nF | 630 | ±5% | 1.80 | |
| 42 | CL31C392JCHNNN □ | | 3.9nF | 100 | ±5% | 1.80 | |
| 43 | CL31C822JDHNNN □ | | 8.2nF | 200 | ±5% | 1.80 | |
| 44 | CL31C822JEHNNN □ | | 8.2nF | 250 | ±5% | 1.80 | |
| 45 | CL31C183JCHNNN □ | | 18nF | 100 | ±5% | 1.80 | |
| 1 | CL32C101JJFNNN □ | | 3.20×2.50 | 100pF | 2000 | ±5% | 1.45 |
| 2 | CL32C471JJJNNN □ | | | 470pF | 2000 | ±5% | 2.70 |
| 3 | CL32C821JIJNNN □ | 820pF | | 1000 | ±5% | 2.70 | |
| 4 | CL32C103JGJNNN □ | 10nF | | 500 | ±5% | 2.70 | |
| 5 | CL32C103JHJNNN □ | 10nF | | 630 | ±5% | 2.70 | |
| 6 | CL32C273JDJNNN □ | 27nF | | 200 | ±5% | 2.70 | |
| 7 | CL32C273JEJNNN □ | 27nF | | 250 | ±5% | 2.70 | |
| 8 | CL32C563JCJNNN □ | 56nF | | 100 | ±5% | 2.70 | |
| 1 | CL42C100JKFNNN □ | 4.50×2.00 | 10pF | 3000 | ±5% | 1.45 | |
| 2 | CL42C151JKINNN □ | | 150pF | 3000 | ±5% | 2.20 | |
| 3 | CL42C221JJHNNN □ | | 220pF | 2000 | ±5% | 1.80 | |
| 1 | CL43C391JKJNNN □ | 4.50×3.20 | 390pF | 3000 | ±5% | 2.70 | |
| 2 | CL43C102JIHNNN □ | | 1nF | 1000 | ±5% | 1.80 | |
| 3 | CL43C122JIINNN □ | | 1.2nF | 1000 | ±5% | 2.20 | |
| 4 | CL43C182JIJNNN □ | | 1.8nF | 1000 | ±5% | 2.70 | |
| 5 | CL43C182JJJNNN □ | | 1.8nF | 2000 | ±5% | 2.70 | |
| 6 | CL43C223JGJNNN □ | | 22nF | 500 | ±5% | 2.70 | |
| 7 | CL43C223JHJNNN □ | | 22nF | 630 | ±5% | 2.70 | |
| 8 | CL43C473JDJNNN □ | | 47nF | 200 | ±5% | 2.70 | |
| 9 | CL43C473JEJNNN □ | | 47nF | 250 | ±5% | 2.70 | |
| 10 | CL43C563JCJNNN □ | | 56nF | 100 | ±5% | 2.70 | |
| 1 | CL55C102JJJNNN □ | 5.70×5.00 | 1nF | 2000 | ±5% | 2.70 | |
| 2 | CL55C102JKJNNN □ | | 1nF | 3000 | ±5% | 2.70 | |
| 3 | CL55C362JIJNNN □ | | 3.6nF | 1000 | ±5% | 2.70 | |
| 4 | CL55C223JGJNNN □ | | 22nF | 500 | ±5% | 2.70 | |
| 5 | CL55C223JHJNNN □ | | 22nF | 630 | ±5% | 2.70 | |
| 6 | CL55C473JDJNNN □ | | 47nF | 200 | ±5% | 2.70 | |
| 7 | CL55C473JEJNNN □ | | 47nF | 250 | ±5% | 2.70 | |
| 8 | CL55C683JCJNNN □ | | 68nF | 100 | ±5% | 2.70 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (Medium-High Voltage Capacitors-X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL10B102KC8NNN □ | 1.60×0.80 | 1nF | 100 | ±10% | 0.90 |
| 2 | CL10B472KC8NNN □ | | 4.7nF | 100 | ±10% | 0.90 |
| 3 | CL10B103KC8NNN □ | | 10nF | 100 | ±10% | 0.90 |
| 1 | CL21B221KDCNNN □ | 2.00×1.25 | 220pF | 200 | ±10% | 0.95 |
| 2 | CL21B221KCANNN □ | | 220pF | 100 | ±10% | 0.75 |
| 3 | CL21B331KDCNNN □ | | 330pF | 200 | ±10% | 0.95 |
| 4 | CL21B471KCANNN □ | | 470pF | 100 | ±10% | 0.75 |
| 5 | CL21B102KDCNNN □ | | 1nF | 200 | ±10% | 0.95 |
| 6 | CL21B102KCANNN □ | | 1nF | 100 | ±10% | 0.75 |
| 7 | CL21B222KDCNNN □ | | 2.2nF | 200 | ±10% | 0.95 |
| 8 | CL21B222KCANNN □ | | 2.2nF | 100 | ±10% | 0.75 |
| 9 | CL21B332KCANNN □ | | 3.3nF | 100 | ±10% | 0.75 |
| 10 | CL21B472KDCNNN □ | | 4.7nF | 200 | ±10% | 0.95 |
| 11 | CL21B472KCANNN □ | | 4.7nF | 100 | ±10% | 0.75 |
| 12 | CL21B682KCANNN □ | | 6.8nF | 100 | ±10% | 0.75 |
| 13 | CL21B103KDCNNN □ | | 10nF | 200 | ±10% | 0.95 |
| 14 | CL21B103KCANNN □ | | 10nF | 100 | ±10% | 0.75 |
| 15 | CL21B153KEFNNN □ | | 15nF | 250 | ±10% | 1.35 |
| 16 | CL21B153KDFNNN □ | | 15nF | 200 | ±10% | 1.35 |
| 17 | CL21B153KCCNNN □ | | 15nF | 100 | ±10% | 0.95 |
| 18 | CL21B223KCFNNN □ | | 22nF | 100 | ±10% | 1.35 |
| 19 | CL21B473KCFNNN □ | | 47nF | 100 | ±10% | 1.35 |
| 20 | CL21B683KCFNNN □ | | 68nF | 100 | ±10% | 1.35 |
| 21 | CL21B104KCFNNN □ | | 100nF | 100 | ±10% | 1.35 |
| 22 | CL21B154KCFNNN □ | | 150nF | 100 | ±10% | 1.35 |
| 23 | CL21B224KCFNNN □ | | 220nF | 100 | ±10% | 1.35 |
| 1 | CL31B221KGFNNN □ | 3.20×1.60 | 220pF | 500 | ±10% | 1.40 |
| 2 | CL31B471KGFNNN □ | | 470pF | 500 | ±10% | 1.40 |
| 3 | CL31B471KDCNNN □ | | 470pF | 200 | ±10% | 1.00 |
| 4 | CL31B102KJHNNN □ | | 1nF | 2000 | ±10% | 1.80 |
| 5 | CL31B102KIFNNN □ | | 1nF | 1000 | ±10% | 1.40 |
| 6 | CL31B102KGFNNN □ | | 1nF | 500 | ±10% | 1.40 |
| 7 | CL31B102KHFNFN □ | | 1nF | 630 | ±10% | 1.40 |
| 8 | CL31B152KGFNNN □ | | 1.5nF | 500 | ±10% | 1.40 |
| 9 | CL31B152KJHNNN □ | | 1.5nF | 2000 | ±10% | 1.80 |
| 10 | CL31B222KIFNNN □ | | 2.2nF | 1000 | ±10% | 1.40 |
| 11 | CL31B222KDCNNN □ | | 2.2nF | 200 | ±10% | 1.00 |
| 12 | CL31B222KGFNNN □ | | 2.2nF | 500 | ±10% | 1.40 |
| 13 | CL31B222KJHNNN □ | | 2.2nF | 2000 | ±10% | 1.80 |
| 14 | CL31B332KGFNNN □ | | 3.3nF | 500 | ±10% | 1.40 |
| 15 | CL31B332KIFNNN □ | | 3.3nF | 1000 | ±10% | 1.40 |
| 16 | CL31B472KGFNNN □ | | 4.7nF | 500 | ±10% | 1.40 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



Product Lineup (Medium-High Voltage Capacitors-X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|------|
| 17 | CL31B472KDCNNN □ | 3.20×1.60 | 4.7nF | 200 | ±10% | 1.00 | |
| 18 | CL31B682KGFNNN □ | | 6.8nF | 500 | ±10% | 1.40 | |
| 19 | CL31B103KHFNNN □ | | 10nF | 630 | ±10% | 1.40 | |
| 20 | CL31B103KGFNNN □ | | 10nF | 500 | ±10% | 1.40 | |
| 21 | CL31B103KFCSNN □ | | 10nF | 350 | ±10% | 1.00 | |
| 22 | CL31B153KDCNNN □ | | 15nF | 200 | ±10% | 1.00 | |
| 23 | CL31B153KFCSNN □ | | 15nF | 350 | ±10% | 1.00 | |
| 24 | CL31B153KCCNNN □ | | 15nF | 100 | ±10% | 1.00 | |
| 25 | CL31B153KGFNNN □ | | 15nF | 500 | ±10% | 1.40 | |
| 26 | CL31B153KHFNNN □ | | 15nF | 630 | ±10% | 1.40 | |
| 27 | CL31B223KDCNNN □ | | 22nF | 200 | ±10% | 1.00 | |
| 28 | CL31B223KCCNNN □ | | 22nF | 100 | ±10% | 1.00 | |
| 29 | CL31B223KFCSNN □ | | 22nF | 350 | ±10% | 1.00 | |
| 30 | CL31B223KGHNNN □ | | 22nF | 500 | ±10% | 1.80 | |
| 31 | CL31B223KHHNNN □ | | 22nF | 630 | ±10% | 1.80 | |
| 32 | CL31B333KDFNNN □ | | 33nF | 200 | ±10% | 1.40 | |
| 33 | CL31B333KFESNN □ | | 33nF | 350 | ±10% | 1.25 | |
| 34 | CL31B333KCCNNN □ | | 33nF | 100 | ±10% | 1.00 | |
| 35 | CL31B333KGHNNN □ | | 33nF | 500 | ±10% | 1.80 | |
| 36 | CL31B333KHHNNN □ | | 33nF | 630 | ±10% | 1.80 | |
| 37 | CL31B473KDFNNN □ | | 47nF | 200 | ±10% | 1.40 | |
| 38 | CL31B473KFHSNN □ | | 47nF | 350 | ±10% | 1.80 | |
| 39 | CL31B473KCCNNN □ | | 47nF | 100 | ±10% | 1.00 | |
| 40 | CL31B473KEHNNN □ | | 47nF | 250 | ±10% | 1.80 | |
| 41 | CL31B683KEHNNN □ | | 68nF | 250 | ±10% | 1.80 | |
| 42 | CL31B104KDHNNN □ | | 100nF | 200 | ±10% | 1.80 | |
| 43 | CL31B104KCFNNN □ | | 100nF | 100 | ±10% | 1.40 | |
| 44 | CL31B104KEHNNN □ | | 100nF | 250 | ±10% | 1.80 | |
| 45 | CL31B154KCHNNN □ | | 150nF | 100 | ±10% | 1.80 | |
| 46 | CL31B105KCHNNN □ | | 1μF | 100 | ±10% | 1.80 | |
| 47 | CL31B155KCHNNN □ | | 1.5μF | 100 | ±10% | 1.80 | |
| 48 | CL31B225KCHNNN □ | | 2.2μF | 100 | ±10% | 1.80 | |
| 1 | CL32B102KJFNNN □ | | 3.20×2.50 | 1nF | 2000 | ±10% | 1.45 |
| 2 | CL32B472KHFNNN □ | | | 4.7nF | 630 | ±10% | 1.45 |
| 3 | CL32B472KIFNNN □ | | | 4.7nF | 1000 | ±10% | 1.45 |
| 4 | CL32B682KIFNNN □ | | | 6.8nF | 1000 | ±10% | 1.45 |
| 5 | CL32B103KCFNNN □ | | | 10nF | 100 | ±10% | 1.45 |
| 6 | CL32B153KGFNNN □ | | | 15nF | 500 | ±10% | 1.45 |
| 7 | CL32B223KGFNNN □ | 22nF | | 500 | ±10% | 1.45 | |
| 8 | CL32B333KHHNNN □ | 33nF | | 630 | ±10% | 1.80 | |
| 9 | CL32B333KGHNNN □ | 33nF | | 500 | ±10% | 1.80 | |
| 10 | CL32B473KHHNNN □ | 47nF | | 630 | ±10% | 1.80 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

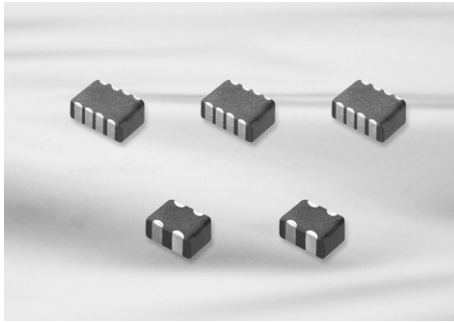
Product Lineup (Medium-High Voltage Capacitors-X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|-------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 11 | CL32B473KDHNNN □ | 3.20×2.50 | 47nF | 200 | ±10% | 1.80 |
| 12 | CL32B473KGNHNN □ | | 47nF | 500 | ±10% | 1.80 |
| 13 | CL32B683KDINNN □ | | 68nF | 200 | ±10% | 2.20 |
| 14 | CL32B104KE JNNN □ | | 100nF | 250 | ±10% | 2.70 |
| 15 | CL32B104KDINNN □ | | 100nF | 200 | ±10% | 2.20 |
| 16 | CL32B154KCFNNN □ | | 150nF | 100 | ±10% | 1.45 |
| 17 | CL32B154KDJNNN □ | | 150nF | 200 | ±10% | 2.70 |
| 18 | CL32B154KEJNNN □ | | 150nF | 250 | ±10% | 2.70 |
| 19 | CL32B224KCHNNN □ | | 220nF | 100 | ±10% | 1.80 |
| 20 | CL32B224KDJNNN □ | | 220nF | 200 | ±10% | 2.70 |
| 21 | CL32B224KEJNNN □ | | 220nF | 250 | ±10% | 2.70 |
| 22 | CL32B334KCHNNN □ | | 330nF | 100 | ±10% | 1.80 |
| 23 | CL32B474KCINNN □ | | 470nF | 100 | ±10% | 2.20 |
| 24 | CL32B105KJNNN □ | | 1μF | 100 | ±10% | 2.70 |
| 25 | CL32B155KCHNNN □ | | 1.5μF | 100 | ±10% | 1.80 |
| 26 | CL32B225KJNNN □ | | 2.2μF | 100 | ±10% | 2.70 |
| 1 | CL43B102KJFNNN □ | 4.50×3.20 | 1nF | 2000 | ±10% | 1.45 |
| 2 | CL43B152KJFNNN □ | | 1.5nF | 2000 | ±10% | 1.45 |
| 3 | CL43B222KJFNNN □ | | 2.2nF | 1000 | ±10% | 1.45 |
| 4 | CL43B222KJFNNN □ | | 2.2nF | 2000 | ±10% | 1.45 |
| 5 | CL43B332KJFNNN □ | | 3.3nF | 2000 | ±10% | 1.45 |
| 6 | CL43B103KJFNNN □ | | 10nF | 1000 | ±10% | 1.45 |
| 7 | CL43B333KIJNNN □ | | 33nF | 1000 | ±10% | 2.70 |
| 8 | CL43B473KGFNNN □ | | 47nF | 500 | ±10% | 1.45 |
| 9 | CL43B473KHFNNN □ | | 47nF | 630 | ±10% | 1.45 |
| 10 | CL43B473KIJNNN □ | | 47nF | 1000 | ±10% | 2.70 |
| 11 | CL43B104KGINNN □ | | 100nF | 500 | ±10% | 2.20 |
| 12 | CL43B104KDFNNN □ | | 100nF | 200 | ±10% | 1.45 |
| 13 | CL43B104KHINNN □ | | 100nF | 630 | ±10% | 2.20 |
| 14 | CL43B224KCFNNN □ | | 220nF | 100 | ±10% | 1.45 |
| 15 | CL43B334KCFNNN □ | | 330nF | 100 | ±10% | 1.45 |
| 16 | CL43B474KEJNNN □ | | 470nF | 250 | ±10% | 2.70 |
| 17 | CL43B474KCHNNN □ | | 470nF | 100 | ±10% | 1.80 |
| 18 | CL43B474KDJNNN □ | | 470nF | 200 | ±10% | 2.70 |
| 19 | CL43B105KJNNN □ | | 1μF | 100 | ±10% | 2.70 |
| 1 | CL55B103KJHNNN □ | 5.70×5.00 | 10nF | 2000 | ±10% | 1.80 |
| 2 | CL55B473KIINNN □ | | 47nF | 1000 | ±10% | 2.20 |
| 3 | CL55B224KGJNNN □ | | 220nF | 500 | ±10% | 2.70 |
| 4 | CL55B224KHJNNN □ | | 220nF | 630 | ±10% | 2.70 |
| 5 | CL55B105KCHNNN □ | | 1μF | 100 | ±10% | 1.80 |
| 6 | CL55B105KDJNNN □ | | 1μF | 200 | ±10% | 2.70 |
| 7 | CL55B105KEJNNN □ | | 1μF | 250 | ±10% | 2.70 |
| 8 | CL55B475KJNNN □ | | 4.7μF | 100 | ±10% | 2.70 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

- Part Numbering System
- General Capacitors
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- Super Small Size Capacitors
- Medium-High Voltage Capacitors
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- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting

Array Type Capacitors



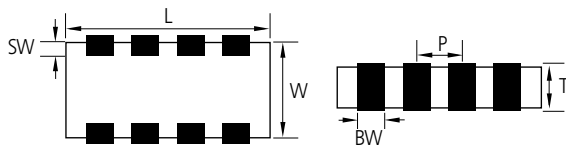
Feature

- Reduction in required space (more than 50%)
- Reduction in cost and time for replacement of PCB
- Reduction in amount of solder joints
- Easier PCB design
- Reduced waste from tape and reel packaging process
- It protect EMI bypassing digital signal line nose

Application

- A bypass for digital and analog signal line noise generated by telecommunication equipment and other common electronic circuits
- ※ For using special purpose like Military, Medical, Aviation, Automobile device should be following a special specification.

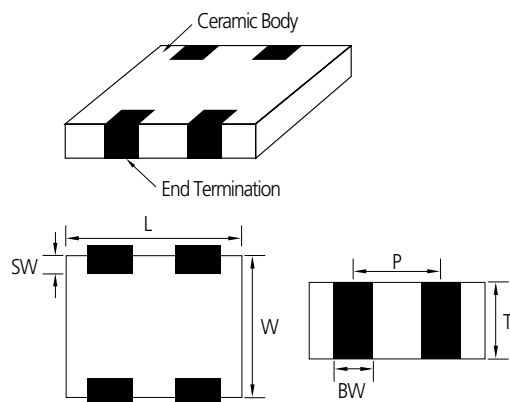
Structure and Dimensions



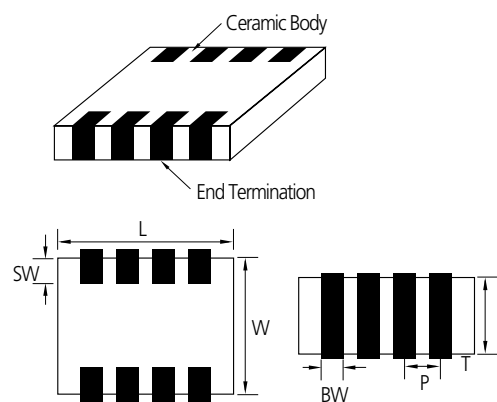
| Code | Size (mm) | EIA Code | Dimension(mm) | | | | | |
|------|-----------|----------|-----------------|-----------------|--|-----------------|-----------------|-----------------|
| | | | L | W | T | BW | SW | P |
| A | 0906 | 0302 | 0.90 ± 0.05 | 0.60 ± 0.05 | 0.45 ± 0.05 | 0.25 ± 0.05 | 0.15 ± 0.1 | 0.45 ± 0.05 |
| A | 1410 | 0504 | 1.37 ± 0.15 | 1.0 ± 0.15 | 0.35 ± 0.05 0.50 ± 0.05 0.60 ± 0.06 0.80 ± 0.08 | 0.36 ± 0.1 | 0.2 ± 0.1 | 0.64 ± 0.1 |
| A | 2012 | 0805 | 2.0 ± 0.15 | 1.25 ± 0.15 | 0.85 ± 0.1 | 0.5 ± 0.2 | 0.25 ± 0.15 | 1.0 ± 0.1 |
| B | 2012 | 0805 | 2.0 ± 0.15 | 1.25 ± 0.15 | 0.85 ± 0.1 | 0.25 ± 0.1 | 0.25 ± 0.15 | 0.5 ± 0.1 |
| B | 3216 | 1206 | 3.2 ± 0.15 | 1.6 ± 0.15 | 0.85 ± 0.15 | 0.4 ± 0.2 | 0.3 ± 0.15 | 0.8 ± 0.2 |

Structure and Control Code

▪ A : ARRAY(2-element)



▪ B : ARRAY(4-element)



Array Type Capacitors Table (C0G, X5R, X7R, Y5V)

| TC | Size(mm) | Type | Vr(V) | Tmax (mm) | Capacitance (pF) | | | | | |
|-----|------------|-----------|-------|-----------|------------------|----|----|----|-----|-----|
| | | | | | 10 | 22 | 27 | 47 | 100 | 470 |
| C0G | 0504(1410) | 2-element | 25 | 0.88 | | | | | | |
| | 1206(3216) | 4-element | 50 | 1.00 | | | | | | |

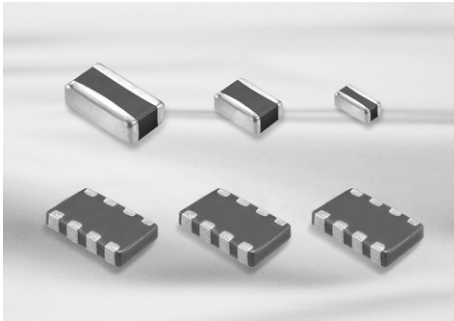
| TC | Size(mm) | Type | Vr(V) | Tmax (mm) | Capacitance (nF) | | | | | | | | | | | | | | | |
|-----|------------|------------|-----------|-----------|------------------|-----|-----|----|----|----|-----|-----|-----|------|------|--|--|--|--|--|
| | | | | | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 | 220 | 470 | 1000 | 2200 | | | | | |
| X5R | 0302(0906) | 2-element | 4 | 0.50 | | | | | | | | | | | | | | | | |
| | | | 6.3 | | | | | | | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | | | | | | | |
| | 0504(1410) | 2-element | 6.3 | 0.88 | | | | | | | | | | | | | | | | |
| | | | | 0.66 | | | | | | | | | | | | | | | | |
| | | | | 0.55 | | | | | | | | | | | | | | | | |
| | | | | 0.40 | | | | | | | | | | | | | | | | |
| | | | 10 | 0.88 | | | | | | | | | | | | | | | | |
| | | | | 0.66 | | | | | | | | | | | | | | | | |
| | | | | 0.55 | | | | | | | | | | | | | | | | |
| | | | | 0.40 | | | | | | | | | | | | | | | | |
| | | | 16 | 0.88 | | | | | | | | | | | | | | | | |
| | | | | 0.66 | | | | | | | | | | | | | | | | |
| | | | | 0.55 | | | | | | | | | | | | | | | | |
| | | | | 0.40 | | | | | | | | | | | | | | | | |
| | 25 | 0.88 | | | | | | | | | | | | | | | | | | |
| | | 0.66 | | | | | | | | | | | | | | | | | | |
| | | 0.55 | | | | | | | | | | | | | | | | | | |
| | 0805(2012) | 2-element | 6.3 | 0.95 | | | | | | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | | | | | | | |
| | | | 16 | | | | | | | | | | | | | | | | | |
| | X7R | 0805(2012) | 4-element | 10 | 0.95 | | | | | | | | | | | | | | | |
| | | | | 16 | | | | | | | | | | | | | | | | |
| | | 1206(3216) | 4-element | 16 | 1.00 | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | | | | | | |
| Y5V | 1206(3216) | 4-element | 25 | 1.00 | | | | | | | | | | | | | | | | |
| | | | 50 | | | | | | | | | | | | | | | | | |

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors**
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting

Product Lineup (Array Type Capacitors)

| | Part Number | Element Type | Size L × W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|--------------|-----------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL14C270KA6NAN □ | 2-Array | 1.40 × 1.00 | 27 pF | 25 | ±10% | 0.66 |
| 1 | CL31C100JBCNBN □ | 4-Array | 3.20 × 1.60 | 10 pF | 50 | ±5% | 1.00 |
| 2 | CL31C150JBCNBN □ | | | 15 pF | 50 | ±5% | 1.00 |
| 3 | CL31C220JBCNBN □ | | | 22 pF | 50 | ±5% | 1.00 |
| 4 | CL31C270JBCNBN □ | | | 27 pF | 50 | ±5% | 1.00 |
| 5 | CL31C330KBCNBN □ | | | 33 pF | 50 | ±10% | 1.00 |
| 6 | CL31C390KBCNBN □ | | | 39 pF | 50 | ±10% | 1.00 |
| 7 | CL31C680JBCNBN □ | | | 68 pF | 50 | ±5% | 1.00 |
| 8 | CL31C820JBCNBN □ | | | 82 pF | 50 | ±5% | 1.00 |
| 9 | CL31C101JBCNBN □ | | | 100 pF | 50 | ±5% | 1.00 |
| 10 | CL31C151KBCNBN □ | | | 150 pF | 50 | ±10% | 1.00 |
| 11 | CL31C181JBCNBN □ | | | 180 pF | 50 | ±5% | 1.00 |
| 12 | CL31C331JBCNBN □ | | | 330 pF | 50 | ±5% | 1.00 |
| 13 | CL31C471JBCNBN □ | | | 470 pF | 50 | ±5% | 1.00 |
| 1 | CL21B471KBCNBN □ | 4-Array | 2.00 × 1.25 | 470 pF | 50 | ±10% | 0.95 |
| 2 | CL21B104KOCNBN □ | | | 100 nF | 16 | ±10% | 0.95 |
| 3 | CL21B104MPCNBN □ | | | 100 nF | 10 | ±20% | 0.95 |
| 1 | CL31B102MBCNBN □ | 4-Array | 3.20 × 1.60 | 1 nF | 50 | ±20% | 1.00 |
| 2 | CL31B103MBCNBN □ | | | 10 nF | 50 | ±20% | 1.00 |
| 3 | CL31B153KBCNBN □ | | | 15 nF | 50 | ±10% | 1.00 |
| 4 | CL31B473KACNBN □ | | | 47 nF | 25 | ±10% | 1.00 |
| 5 | CL31B104KACNBN □ | | | 100 nF | 25 | ±10% | 1.00 |
| 6 | CL31B104KOCNBN □ | | | 100 nF | 16 | ±10% | 1.00 |
| 1 | CL09A104KP4SAN □ | 2-Array | 0.90 × 0.60 | 100 nF | 10 | ±10% | 0.50 |
| 2 | CL09A104KQ4SAN □ | | | 100 nF | 6.3 | ±10% | 0.50 |
| 3 | CL09A105MQ4NAN □ | | | 1 μF | 6.3 | ±20% | 0.50 |
| 4 | CL09A105MR4NAN □ | | | 1 μF | 4 | ±20% | 0.50 |
| 1 | CL14A104KA6NAN □ | 2-Array | 1.40 × 1.00 | 100 nF | 25 | ±10% | 0.66 |
| 2 | CL14A104KO6NAN □ | | | 100 nF | 16 | ±10% | 0.66 |
| 3 | CL14A104KP6NAN □ | | | 100 nF | 10 | ±10% | 0.66 |
| 4 | CL14A105MA5NAN □ | | | 1 μF | 25 | ±20% | 0.55 |
| 5 | CL14A105KP8NAN □ | | | 1 μF | 10 | ±10% | 0.88 |
| 6 | CL14A105MO3NAN □ | | | 1 μF | 16 | ±20% | 0.40 |
| 7 | CL14A105MO8NAN □ | | | 1 μF | 16 | ±20% | 0.88 |
| 8 | CL14A105MO5NAN □ | | | 1 μF | 16 | ±20% | 0.55 |
| 9 | CL14A105MP3NAN □ | | | 1 μF | 10 | ±20% | 0.40 |
| 10 | CL14A105MP5NAN □ | | | 1 μF | 10 | ±20% | 0.55 |
| 11 | CL14A225KP8NAN □ | | | 2.2 μF | 10 | ±10% | 0.88 |
| 12 | CL14A225KQ8NAN □ | | | 2.2 μF | 6.3 | ±10% | 0.88 |
| 1 | CL21A105KOCNAN □ | 2-Array | 2.00 × 1.25 | 1 μF | 16 | ±10% | 0.95 |
| 2 | CL21A105MPCNAN □ | | | 1 μF | 10 | ±20% | 0.95 |
| 1 | CL31F473ZBCNBN □ | 4-Array | 3.20 × 1.60 | 47 nF | 50 | +80/-20% | 1.00 |
| 2 | CL31F104ZACNBN □ | | | 100 nF | 25 | +80/-20% | 1.00 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.



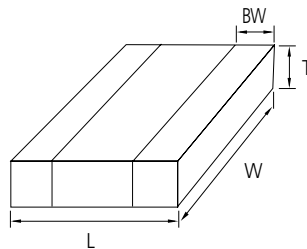
Feature

- Low ESL, good for noise reduction for high frequency
- Highly reliable tolerance and high speed automatic chip placement on PCBs
- Highly reliable performance
- Highly resistant termination metal
- Tape & reel for surface mount assembly

Application

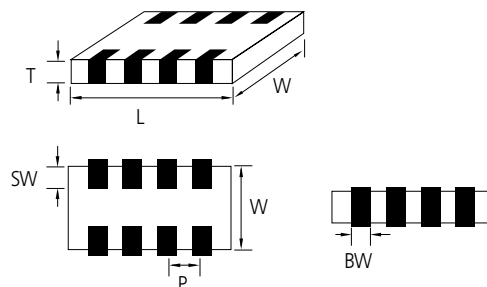
- High Speed Microprocessor
- High Frequency Digital Equipment
- ※ For using special purpose like Military, Medical, Aviation, Automobile device should be following a special specification.

LICC(Low Inductance Ceramic Capacitors)



| Code | Size (mm) | EIA Code | Dimension(mm) | | | |
|------|-----------|----------|-----------------|----------------|----------------------|-----------------|
| | | | L | W | T | BW |
| L5 | 0510 | 0204 | 0.52 ± 0.05 | 1.0 ± 0.05 | 0.3 ± 0.05 | 0.18 ± 0.08 |
| 01 | 0816 | 0306 | 0.8 ± 0.15 | 1.6 ± 0.2 | $0.5 + 0.05 / - 0.1$ | $0.25 + 0.15$ |

SLIC(Super Low Inductance Capacitors)



| Code | Size (mm) | EIA Code | Dimension(mm) | | | | | |
|------|-----------|----------|---------------|----------------|----------------------|---------------------|--------------------|---------------|
| | | | L | W | T | BW | SW | P |
| 10 | 1608 | 0603 | 1.6 ± 0.1 | 0.8 ± 0.1 | $0.5 / + 0.05 - 0.1$ | 0.25 ± 0.1 | 0.15 ± 0.1 | 0.4 ± 0.1 |
| 21 | 2012 | 0805 | 2.0 ± 0.1 | 1.25 ± 0.1 | $0.5 / + 0.05 - 0.1$ | $0.25 + 0.15 - 0.1$ | $0.2 + 0.15 - 0.1$ | 0.5 ± 0.1 |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Low ESL Capacitors Table (LICC)

| TC | Size(mm) | Tmax(mm) | Vr(V) | Capacitance (uF) | | | | | | | | | | |
|---------------------|------------|----------|-------|------------------|-------|-------|-----|------|------|-----|-----|-----|----|--|
| | | | | 0.01 | 0.022 | 0.047 | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | |
| X6S /X7S /X7T | 0204(0510) | 0.35 | 2.5 | | | | | | | | X7T | | | |
| | | | 4 | | | | X7S | | X6S | | | | | |
| | | | 6.3 | | | | X7S | | | | | | | |
| | 0306(0816) | 0.55 | 4 | | | | | | | X7S | | | | |

| TC | Size(mm) | Tmax(mm) | Vr(V) | Capacitance (uF) | | | | | | | | | | |
|-------------|------------|----------|-------|------------------|-------|-------|-----|------|------|-----|-----|-----|----|--|
| | | | | 0.01 | 0.022 | 0.047 | 0.1 | 0.22 | 0.47 | 1 | 2.2 | 4.7 | 10 | |
| X7R /X5R | 0306(0816) | 0.55 | 6.3 | | | X7R | | | | X5R | | | | |
| | | | 10 | | | X7R | | | | | | | | |
| | | | 16 | | | X7R | | | | | | | | |
| | | | 25 | | | X7R | | | | | | | | |
| | | | 50 | | | X7R | | | | | | | | |

Low ESL Capacitors Table (SLIC)

| TC | Size(mm) | Tmax(mm) | Vr(V) | Capacitance (uF) | | | | | | | | | |
|---------------------|------------|----------|-------|------------------|------|------|-----|-----|-----|----|----|--|--|
| | | | | 0.1 | 0.47 | 0.68 | 1 | 2.2 | 4.7 | 10 | 22 | | |
| X7R /X7S /X7T | 0603(1608) | 0.55 | 2.5 | | | | | | | | | | |
| | | | 4 | | | | X7S | | | | | | |
| | 0805(2012) | 0.55 | 4 | | | | X7R | | X7S | | | | |
| | | | 6.3 | | | | X7R | | | | | | |
| | | | 16 | | | | X7R | | | | | | |

Product Lineup (Low ESL Capacitors-X7R, X6S, X7S, X7T)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|---|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL21B104M05NJK □ | 2.00×1.25 | 100nF | 16 | ±20% | 0.55 |
| 2 | CL21B684M05NJK □ | | 680nF | 16 | ±20% | 0.55 |
| 3 | CL21B684MQ5NJK □ | | 680nF | 6.3 | ±20% | 0.55 |
| 1 | CLL5X224MR3NLN □ | 0.50×1.00 | 220nF | 4 | ±20% | 0.35 |
| 2 | CLL5X474MR3NLN □ | | 470nF | 4 | ±20% | 0.35 |
| 3 | CLL5X105MR3NLN □ | | 1μF | 4 | ±20% | 0.35 |
| 1 | CLL5Y104MQ3NLN □ | 0.50×1.00 | 100nF | 6.3 | ±20% | 0.35 |
| 1 | CL01Y105MR5NLN □ | 0.80×1.60 | 1μF | 4 | ±20% | 0.55 |
| 2 | CL01Y225MR5NLN □ | | 2.2μF | 4 | ±20% | 0.55 |
| 1 | CL10Y474MR5NJK □ | 1.60×0.80 | 470nF | 4 | ±20% | 0.55 |
| 2 | CL10Y105MR5NJK □ | | 1μF | 4 | ±20% | 0.55 |
| 3 | CL10Y225MR5NJK □ | | 2.2μF | 4 | ±20% | 0.55 |
| 1 | CL21Y105MR5NJK □ | 2.00×1.25 | 1μF | 4 | ±20% | 0.55 |
| 2 | CL21Y225MR5NJK □ | | 2.2μF | 4 | ±20% | 0.55 |
| 1 | CLL5Z105MS3NLN □ | 0.50×1.00 | 1μF | 2.5 | ±20% | 0.35 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

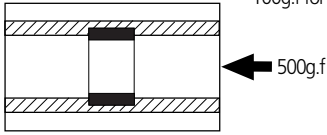
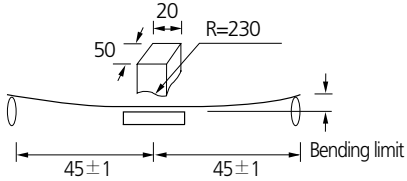

Packaging Specification

Application Manual for Surface Mounting

Reliability Test Condition

| No | Item | Performance | Test Condition | | | | |
|---|-----------------------------------|---|--|-----------------------------------|--------------------------|--------------|--|
| 1 | Appearance | No abnormal exterior appearance | Visual Inspection through Microscope($\times 10$) | | | | |
| 2 | Insulation Resistance | 10,000M Ω min. or 500M $\Omega \cdot \mu\text{F}$ min. (or *100M $\Omega \cdot \mu\text{F}$) product whichever is smaller (Rated voltage $\leq 16\text{V}$: 10,000M Ω min. or 100M $\Omega \cdot \mu\text{F}$ min. product whichever is smaller) | Apply the rated voltage for 60~120 sec. Rated voltage $> 500\text{V}$: Insulation Resistance shall be measured with $500 \pm 50\text{Vdc}$ | | | | |
| 3 | Withstanding Voltage | No dielectric breakdown or mechanical breakdown | Apply the specified voltage* for 1~5 sec. Charge/Discharge current limit: 50mA max. *CLASS I (Rated Voltage $< 100\text{V}$): 300% of the rated Voltage CLASS II (Rated Voltage $< 100\text{V}$): 250% of the rated Voltage In the case of $V_r \geq 100\text{V}$ products, following condition should be applied. $100\text{V} \leq \text{Rated Voltage} < 500\text{V}$: 200% of the rated Voltage $500\text{V} \leq \text{Rated Voltage} < 1000\text{V}$: 150% of the rated Voltage Rated Voltage $\geq 1000\text{V}$: 120% of the rated Voltage | | | | |
| 4 | Capacitance | CLASS I Within the specified tolerance | Capacitance | Frequency | Voltage | | |
| | | | $\leq 1,000\text{pF}$ | 1MHz $\pm 10\%$ | | 0.5 ~ 5 Vrms | |
| | | $> 1,000\text{pF}$ | 1KHz $\pm 10\%$ | 0.5 $\pm 0.1\text{Vrms}$ | | | |
| | | CLASS II Within the specified tolerance | Capacitance | | Frequency | Voltage | |
| $\leq 10\mu\text{F}$ | 1KHz $\pm 10\%$ | $1.0 \pm 0.2\text{Vrms}$ | | | | | |
| $> 10\mu\text{F}$ | 120Hz $\pm 20\%$ | $0.5 \pm 0.1\text{Vrms}$ | | | | | |
| * | 1KHz $\pm 10\%$ | $0.5 \pm 0.1\text{Vrms}$ | | | | | |
| Q | CLASS I | Capacitance $\geq 30\text{pF}$: $Q \geq 1,000$ $< 30\text{pF}$: $Q \geq 400 + 20 \times C$ (C : Capacitance) | Capacitance | Frequency | Voltage | | |
| | | | $\leq 1,000\text{pF}$ | 1MHz $\pm 10\%$ | 0.5 ~ 5 Vrms | | |
| $> 1,000\text{pF}$ | 1KHz $\pm 10\%$ | 0.5 $\pm 0.1\text{Vrms}$ | | | | | |
| 5 | Tan δ | | CLASS II | Capacitance | Frequency | Voltage | |
| | | $\leq 10\mu\text{F}$ | | 1KHz $\pm 10\%$ | $1.0 \pm 0.2\text{Vrms}$ | | |
| | | $> 10\mu\text{F}$ | | 120Hz $\pm 20\%$ | $0.5 \pm 0.1\text{Vrms}$ | | |
| | | * | | 1KHz $\pm 10\%$ | $0.5 \pm 0.1\text{Vrms}$ | | |
| | | 1. Characteristic: A(X5R) | | Rated Voltage | Spec | | |
| | | 50V / 35V | | 0.025 max / 0.05 max* | | | |
| | | 25V | | 0.025 max / 0.05 max* | | | |
| | | 16V | | 0.035 max / 0.05 max* / 0.10 max* | | | |
| | | $\leq 10\text{V}$ | | 0.05 max / 0.10 max* | | | |
| | | 2. Characteristic: B(X7R), X(X6S), Y(X7S) | | Rated Voltage | Spec | | |
| $50\text{V} \geq / 35\text{V} / 25\text{V}$ | 0.025 max / 0.05 max* / 0.10 max* | | | | | | |
| 16V | 0.035 max / 0.10 max* | | | | | | |
| $\leq 10\text{V}$ | 0.05 max / 0.10 max* | | | | | | |
| 3. Characteristic: F(Y5V) | | Rated Voltage | Spec | | | | |
| $50\text{V} / 35\text{V} / 25\text{V}$ | 0.05 max / 0.07 max* / 0.09 max* | | | | | | |
| 16V | 0.07 max / 0.09 max* / 0.125 max* | | | | | | |
| 10V | 0.125 max / 0.16 max* | | | | | | |
| $\leq 6.3\text{V}$ | 0.16 max | | | | | | |

You can check the specification at the web site or contact sales people for each product with mark*

| No | Item | Performance | Test Condition | | | | | | | | | | | | | | | | |
|---|--|--|--|--------------------------|--------------------|--------------|--|-----------|--|-----------|--------------|-------------|----------------------------|---|--------|---|--------------------------|---|--------|
| 6 | Temperature Characteristics of Capacitance | <table border="1"> <tr> <th>Characteristic</th> <th>Temp.Coefficient(PPM/°C)</th> </tr> <tr> <td>C</td> <td>0 ± 30</td> </tr> </table> | Characteristic | Temp.Coefficient(PPM/°C) | C | 0 ± 30 | <p>Capacitance shall be measured by the steps shown in the following table.</p> <table border="1"> <tr> <th>Step</th> <th>Temperature(°C)</th> </tr> <tr> <td>1</td> <td>25 ± 2</td> </tr> <tr> <td>2</td> <td>Min. Operating Temp. ± 2</td> </tr> <tr> <td>3</td> <td>25 ± 2</td> </tr> <tr> <td>4</td> <td>Max. Operating Temp. ± 2</td> </tr> <tr> <td>5</td> <td>25 ± 2</td> </tr> </table> <p>(1) CLASS I Temperature Coefficient shall be calculated from the formula as below Temp. Coefficient = $\frac{C2 - C1}{C1 \times \Delta T} \times 10^6$ [ppm/°C] C1: Capacitance at step 3 C2: Capacitance at 125°C ΔT: 100°C (=125°C-25°C)</p> <p>(2) CLASS II Capacitance Change shall be calculated from the formula as below $\Delta C = \frac{C2 - C1}{C1} \times 100$ (%) C1: Capacitance at step 3 C2: Capacitance at step 2 or 4</p> | Step | Temperature(°C) | 1 | 25 ± 2 | 2 | Min. Operating Temp. ± 2 | 3 | 25 ± 2 | 4 | Max. Operating Temp. ± 2 | 5 | 25 ± 2 |
| | | Characteristic | Temp.Coefficient(PPM/°C) | | | | | | | | | | | | | | | | |
| C | 0 ± 30 | | | | | | | | | | | | | | | | | | |
| Step | Temperature(°C) | | | | | | | | | | | | | | | | | | |
| 1 | 25 ± 2 | | | | | | | | | | | | | | | | | | |
| 2 | Min. Operating Temp. ± 2 | | | | | | | | | | | | | | | | | | |
| 3 | 25 ± 2 | | | | | | | | | | | | | | | | | | |
| 4 | Max. Operating Temp. ± 2 | | | | | | | | | | | | | | | | | | |
| 5 | 25 ± 2 | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr> <th>Characteristic</th> <th>Capacitance Change(%) with No bias</th> </tr> <tr> <td>A(X5R) / B(X7R)</td> <td>± 15%</td> </tr> <tr> <td>X(X6S), Y(X7S)</td> <td>± 22%</td> </tr> <tr> <td>Z(X7T)</td> <td>+22%~-33%</td> </tr> <tr> <td>F(Y5V)</td> <td>+22%~-82%</td> </tr> </table> | Characteristic | Capacitance Change(%) with No bias | A(X5R) / B(X7R) | ± 15% | X(X6S), Y(X7S) | ± 22% | Z(X7T) | +22%~-33% | F(Y5V) | +22%~-82% | | | | | | | | | |
| Characteristic | Capacitance Change(%) with No bias | | | | | | | | | | | | | | | | | | |
| A(X5R) / B(X7R) | ± 15% | | | | | | | | | | | | | | | | | | |
| X(X6S), Y(X7S) | ± 22% | | | | | | | | | | | | | | | | | | |
| Z(X7T) | +22%~-33% | | | | | | | | | | | | | | | | | | |
| F(Y5V) | +22%~-82% | | | | | | | | | | | | | | | | | | |
| 7 | Adhesive Strength of Termination | No indication of peeling shall occur on the terminal electrode | <p>Apply 500g.f* pressure for 10 ± 1 sec. *200g.f for 0201 *100g.f for 01005</p>  | | | | | | | | | | | | | | | | |
| 8 | Appearance | No indication of peeling shall occur | <ul style="list-style-type: none"> Bending Limit: 1mm Test Speed: 1.0mm/sec. Keep the test board at the limit point in 5 sec. Then Measure Capacitance  | | | | | | | | | | | | | | | | |
| | Capacitance | <table border="1"> <tr> <th>Characteristic</th> <th>Capacitance Change</th> </tr> <tr> <td>CLASS I</td> <td>± 5% or ± 0.5 pF whichever is larger</td> </tr> <tr> <td rowspan="2">CLASS II</td> <td>A(X5R), B(X7R), X(X6S), Y(X7S), Z(X7T)</td> <td>± 12.5%</td> </tr> <tr> <td>F(Y5V)</td> <td>± 30%</td> </tr> </table> | | Characteristic | Capacitance Change | CLASS I | ± 5% or ± 0.5 pF whichever is larger | CLASS II | A(X5R), B(X7R), X(X6S), Y(X7S), Z(X7T) | ± 12.5% | F(Y5V) | ± 30% | | | | | | | |
| Characteristic | Capacitance Change | | | | | | | | | | | | | | | | | | |
| CLASS I | ± 5% or ± 0.5 pF whichever is larger | | | | | | | | | | | | | | | | | | |
| CLASS II | A(X5R), B(X7R), X(X6S), Y(X7S), Z(X7T) | ± 12.5% | | | | | | | | | | | | | | | | | |
| | F(Y5V) | ± 30% | | | | | | | | | | | | | | | | | |
| 9 | Solderability | <p>More than 75% of the terminal surface is to be soldered newly, so metal part does not come out or dissolve</p>  | <table border="1"> <tr> <td>Solder</td> <td>Sn-3Ag-0.5Cu</td> </tr> <tr> <td>Solder Temp.</td> <td>245 ± 5°C</td> </tr> <tr> <td>Flux</td> <td>RMA Type</td> </tr> <tr> <td>Dip time</td> <td>3 ± 0.3 sec.</td> </tr> <tr> <td>Pre-heating</td> <td>at 80~120°C for 10~30 sec.</td> </tr> </table> | Solder | Sn-3Ag-0.5Cu | Solder Temp. | 245 ± 5°C | Flux | RMA Type | Dip time | 3 ± 0.3 sec. | Pre-heating | at 80~120°C for 10~30 sec. | | | | | | |
| Solder | Sn-3Ag-0.5Cu | | | | | | | | | | | | | | | | | | |
| Solder Temp. | 245 ± 5°C | | | | | | | | | | | | | | | | | | |
| Flux | RMA Type | | | | | | | | | | | | | | | | | | |
| Dip time | 3 ± 0.3 sec. | | | | | | | | | | | | | | | | | | |
| Pre-heating | at 80~120°C for 10~30 sec. | | | | | | | | | | | | | | | | | | |
| 10 | Appearance | No mechanical damage shall occur | <p>Solder temperature: 270 ± 5°C DIP TIME: 10 ± 1 sec. Each termination shall be fully immersed and preheated as below:</p> <table border="1"> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Time (sec.)</th> </tr> <tr> <td>1</td> <td>80~100</td> <td>60</td> </tr> <tr> <td>2</td> <td>150~180</td> <td>60</td> </tr> </table> <p>Leave the capacitor in ambient condition for specified time* before measurement *24 ± 2 hours(CLASS I) 24 ± 2 hours(CLASS II)</p> | Step | Temperature(°C) | Time (sec.) | 1 | 80~100 | 60 | 2 | 150~180 | 60 | | | | | | | |
| | Step | Temperature(°C) | | Time (sec.) | | | | | | | | | | | | | | | |
| | 1 | 80~100 | | 60 | | | | | | | | | | | | | | | |
| | 2 | 150~180 | | 60 | | | | | | | | | | | | | | | |
| | Capacitance | <table border="1"> <tr> <th>Characteristic</th> <th>Capacitance Change</th> </tr> <tr> <td>CLASS I</td> <td>± 2.5% or ± 0.25 pF whichever is larger</td> </tr> <tr> <td rowspan="2">CLASS II</td> <td>A(X5R), B(X7R), X(X6S), Y(X7S), Z(X7T)</td> <td>± 7.5%</td> </tr> <tr> <td>F(Y5V)</td> <td>± 20%</td> </tr> </table> | | Characteristic | Capacitance Change | CLASS I | ± 2.5% or ± 0.25 pF whichever is larger | CLASS II | A(X5R), B(X7R), X(X6S), Y(X7S), Z(X7T) | ± 7.5% | F(Y5V) | ± 20% | | | | | | | |
| | Characteristic | Capacitance Change | | | | | | | | | | | | | | | | | |
| CLASS I | ± 2.5% or ± 0.25 pF whichever is larger | | | | | | | | | | | | | | | | | | |
| CLASS II | A(X5R), B(X7R), X(X6S), Y(X7S), Z(X7T) | ± 7.5% | | | | | | | | | | | | | | | | | |
| | F(Y5V) | ± 20% | | | | | | | | | | | | | | | | | |
| Q (CLASS I) | Within the specified initial value | | | | | | | | | | | | | | | | | | |
| Tanδ (CLASS II) | Within the specified initial value | | | | | | | | | | | | | | | | | | |
| Insulation resistance | Within the specified initial value | | | | | | | | | | | | | | | | | | |
| Withstanding voltage | Within the specified initial value | | | | | | | | | | | | | | | | | | |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



| No | Item | Performance | Test Condition | | | |
|-------------------------|--|-------------|---|---|--|--------------|
| 11 | Vibration Test | Appearance | No mechanical damage shall occur | <p>The capacitor shall be subjected to a harmonic motion having a total amplitude of 1.5mm changing frequency from 10Hz to 55Hz and back to 10Hz in about 1 min.</p> <p>Repeat this for 2hours each in 3 mutually perpendicular directions.</p> | | |
| | | Capacitance | Characteristic | | Capacitance Change | |
| | | | CLASS I | | $\pm 2.5\%$ or ± 0.25 pF whichever is larger | |
| | | | CLASS II | | A(X5R), B(X7R) | $\pm 5\%$ |
| | | | | | X(X6S), Y(X7S) Z(X7T) | $\pm 10\%$ |
| | | F(Y5V) | | | $\pm 20\%$ | |
| | | Q (CLASS I) | Within the specified initial value | | | |
| Tan δ (CLASS II) | Within the specified initial value | | | | | |
| Insulation resistance | Within the specified initial value | | | | | |
| 12 | Moisture Resistance | Appearance | No mechanical damage shall occur | <p>Applied Voltage: rated voltage Temperature: 40 ± 2 °C Humidity: 90~95% RH Duration Time: 500+12/0 Hr. Charge/Discharge Current: 50mA max.</p> <p>Perform the initial measurement according to Note1. Perform the final measurement according to Note2.</p> <p>This test is only applied to $V_r \leq 500V$ products. You can check the specification at the web site or contact sales people for each product with mark*</p> | | |
| | | Capacitance | Characteristic | | Capacitance Change | |
| | | | CLASS I | | $\pm 7.5\%$ or ± 0.75 pF whichever is larger | |
| | | | CLASS II | | A(X5R), B(X7R), X(X6S), Y(X7S) Z(X7T) | $\pm 12.5\%$ |
| | | | | | F(Y5V) | $\pm 30\%$ |
| | | Q (CLASS I) | Capacitance ≥ 30 pF : $Q \geq 200$ < 30 pF : $Q \geq 100 + 10/3 \times C$ (C: Capacitance) | | | |
| Tan δ (CLASS II) | <p>1.Capacitance: A(X5R) 0.05 max / 0.075 max* (35V / 50V) 0.05 max / 0.075 max* / 0.125 max* (16V / 25V) 0.075 max / 0.125 max* ($\leq 10V$)</p> <p>2.Capacitance: B(X7R), X(X6S) 0.05 max / 0.125 max* (16V / 25V / 35V / 50V \geq) 0.075 max / 0.125 max* ($\leq 10V$)</p> <p>3.Capacitance: F(Y5V) 0.09 max (50V) 0.09 max / 0.125 max* (25V / 35V) 0.09 max / 0.125 max* / 0.16 max* (16V) 0.16 max / 0.195 max* (10V) 0.195 max (4V / 6.3V)</p> | | | | | |
| Insulation resistance | 500M Ω min. or 25M Ω · μ F min. product whichever is smaller / 12.5M Ω · μ F or over* | | | | | |
| 13 | High Temperature Resistance | Appearance | No mechanical damage shall occur | <p>Temperature : max. operating temperature</p> <p>Duration Time: 1000+48/0 Hr. Charge/Discharge Current: 50mA max.</p> <p>$V_r \leq 200V$: 200% of the rated Voltage $250V \leq V_r \leq 500V$: 150% of the rated Voltage $V_r = 630V$: 120% of the rated Voltage $1000V \leq V_r \leq 3000V$: 100% of the rated Voltage * : 150% or 100% of the rated Voltage</p> <p>Perform the initial measurement according to Note1 for class II Perform the final measurement according to Note2.</p> <p>You can check the specification at the web site or contact sales people for each product with mark*</p> | | |
| | | Capacitance | Characteristic | | Capacitance Change | |
| | | | CLASS I | | $\pm 3\%$ or ± 0.3 pF whichever is larger | |
| | | | CLASS II | | A(X5R), B(X7R), X(X6S), Y(X7S) Z(X7T) | $\pm 12.5\%$ |
| | | | | | F(Y5V) | $\pm 30\%$ |
| | | Q (CLASS I) | Capacitance ≥ 30 pF : $Q \geq 350$ $10 \leq$ Capacitance < 30 pF : $Q \geq 275 + 2.5 \times C$ Capacitance < 10 pF : $Q \geq 200 + 10 \times C$ (C: Capacitance) | | | |
| Tan δ (CLASS II) | <p>1.Capacitance: A(X5R) 0.05 max / 0.075 max* (35V / 50V) 0.05 max / 0.075 max* / 0.125 max* (16V / 25V) 0.075 max / 0.125 max* ($\leq 10V$)</p> <p>2.Capacitance: B(X7R), X(X6S) 0.05 max / 0.125 max* (16V / 25V / 35V / 50V \geq) 0.075 max / 0.125 max* ($\leq 10V$)</p> <p>3.Capacitance: F(Y5V) 0.09 max (50V) 0.09 max / 0.125 max* (25V / 35V) 0.09 max / 0.125 max* / 0.16 max* (16V) 0.16 max / 0.195 max* (10V) 0.195 max (4V / 6.3V)</p> | | | | | |
| Insulation resistance | 1,000M Ω min. or 50M Ω · μ F min. product whichever is smaller / 25M Ω · μ F or over* | | | | | |

| No | Item | Performance | Test Condition | | | | | | | | | | | | | | | |
|-------------------------|------------------------------------|-------------|---|--------------------------|--|------------|---|----------------------------------|----|---|----|-----|---|----------------------------------|----|---|----|-----|
| 14 | Temperature Cycle | Appearance | No mechanical damage shall occur | | | | | | | | | | | | | | | |
| | | Capacitance | Characteristic | Capacitance Change | | | | | | | | | | | | | | |
| | | | CLASS I | | $\pm 2.5\%$ or $\pm 0.25\text{pF}$ whichever is larger | | | | | | | | | | | | | |
| | | | CLASS II | A(X5R), B(X7R) | $\pm 7.5\%$ | | | | | | | | | | | | | |
| | | | | X(X6S), Y(X7S) Z(X7T) | $\pm 15\%$ | | | | | | | | | | | | | |
| | | F(Y5V) | | $\pm 20\%$ | | | | | | | | | | | | | | |
| | | Q (CLASS I) | Within the specified initial value | | | | | | | | | | | | | | | |
| Tan δ (CLASS II) | Within the specified initial value | | | | | | | | | | | | | | | | | |
| Insulation resistance | Within the specified initial value | | | | | | | | | | | | | | | | | |
| | | | Capacitor shall be subjected to 5 cycles. Condition for 1 cycle: | | | | | | | | | | | | | | | |
| | | | <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Time(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>min. operating temperature +0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>max. operating temperature +0/-3</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>2~3</td> </tr> </tbody> </table> | Step | Temperature(°C) | Time(min.) | 1 | min. operating temperature +0/-3 | 30 | 2 | 25 | 2~3 | 3 | max. operating temperature +0/-3 | 30 | 4 | 25 | 2~3 |
| Step | Temperature(°C) | Time(min.) | | | | | | | | | | | | | | | | |
| 1 | min. operating temperature +0/-3 | 30 | | | | | | | | | | | | | | | | |
| 2 | 25 | 2~3 | | | | | | | | | | | | | | | | |
| 3 | max. operating temperature +0/-3 | 30 | | | | | | | | | | | | | | | | |
| 4 | 25 | 2~3 | | | | | | | | | | | | | | | | |
| | | | Leave the capacitor in ambient condition for specified time* before measurement *24 \pm 2 hours(CLASS I) 24 \pm 2 hours(CLASS II) | | | | | | | | | | | | | | | |

| No | Recommended Soldering Method | | | | | | |
|-------------|---|------------------|-------------------------------|----------------------|-------------------------|--------|---|
| 15 | Recommended Soldering Method By Size & Capacitance | Size inch(mm) | Temperature Characteristic | Capacitance | Condition | | |
| | | | | | Flow | Reflow | |
| | | 01005(0402) | - | - | - | - | ○ |
| | | 0201 (0603) | | | | | |
| | | 0402 (1005) | | | | | |
| | | 0603(1608) | Class I | - | - | ○ | ○ |
| | | | Class II | $C < 1\mu\text{F}$ | - | ○ | ○ |
| | | | | | $C \geq 1\mu\text{F}$ | - | ○ |
| | | 0805 (2012) | Class I | - | - | ○ | ○ |
| | | | Class II | $C < 4.7\mu\text{F}$ | - | ○ | ○ |
| | | | | | $C \geq 4.7\mu\text{F}$ | - | ○ |
| | | 1206 (3216) | Array | - | - | - | ○ |
| | | | Class I | - | - | ○ | ○ |
| | | | | Class II | $C < 10\mu\text{F}$ | - | ○ |
| | | | | | $C \geq 10\mu\text{F}$ | - | ○ |
| | Array | - | - | - | ○ | | |
| 1210 (3225) | - | - | - | - | ○ | | |
| 1808 (4520) | | | | | ○ | | |
| 1812 (4532) | | | | | ○ | | |
| 2220 (5750) | | | | | ○ | | |
| | | | | | ○ | | |

Note1. Initial Measurement For Class II

Perform the heat treatment at 150°C+0/-10°C for 1 hour. Then Leave the capacitor in ambient condition for 24 \pm 2 hours before measurement. Then perform the measurement.

Note2. Latter Measurement

1. CLASS I

Leave the capacitor in ambient condition for 24 \pm 2 hours before measurement. Then perform the measurement.

2. CLASS II

Perform the heat treatment at 150°C+0/-10°C for 1 hour. Then Leave the capacitor in ambient condition for 24 \pm 2 hours before measurement. Then perform the measurement.

Note3. All Size in Reliability Test Condition Section is "inch"

Note4. Camera Strobe Circuit Capacitors Should be Following a Special Reliability Test Condition.

Please check with our sales representatives or product engineers.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

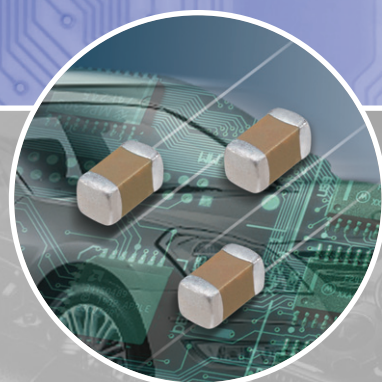
Application Manual for Surface Mounting

S A M S U N G E L E C T R O - M E C H A N I C S





Premium Capacitors for Automotive Applications



**SAMSUNG
ELECTRO-MECHANICS**

SAMSUNG

Premium Capacitors for Automotive Applications

Part Numbering System (Automotive Capacitors)

| | CL | 10 | B | 104 | K | B | 8 | 5 | P | N | C |
|---|-----------|-----------|----------|------------|----------|----------|----------|----------|----------|-----------|-----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1. SERIES CODE _____ CL=Multi layer Ceramic Capacitors | | | | | | | | | | | |
| 2. SIZE CODE — inch (mm) _____ 05=1005(0402) 10=1608(0603) 21=2012(0805) 31=3216(1206) 32=3225(1210) | | | | | | | | | | | |
| * 3. DIELECTRIC CODE _____ C=C0G (Class I) B=X7R (Class II) | | | | | | | | | | | |
| 4. CAPACITANCE CODE _____ Capacitance expressed in pF. 2 significant digits plus number of zeros. example) 106=10 × 10 ⁶ =10000000pF For Values < 10pF, Letter R denotes decimal point example) 1R5=1.5pF | | | | | | | | | | | |
| ** 5. TOLERANCE CODE _____ C=±0.25pF D=±0.5pF F=±1pF, ±1%* G=±2% J=±5% K=±10% M=±20% *For Values ≤10pF, F=±1pF, Values>10pF, F=±1% ※This code has only typical specifications. Please refer to individual specifications. | | | | | | | | | | | |
| 6. RATED VOLTAGE CODE _____ P=10V O=16V A=25V B=50V C=100V | | | | | | | | | | | |
| *** 7. THICKNESS CODE _____ 5 = 0.50mm 6= 0.60mm 8 = 0.80mm C = 0.85mm P = 1.15mm F = 1.25mm H = 1.60mm J = 2.50mm ※This code has only typical specifications. Please refer to individual specifications. | | | | | | | | | | | |
| 8. DESIGN CODE _____ 1=Ni/Cu/Ni Barrier/Sn 100%/Standard 4=Ni/Cu+Soft termination/Ni Barrier/Sn 100%/Standard 5=Ni/Cu+Soft termination/Ni Barrier/Sn 100%/Open Mode ※This code has only typical specifications. Please refer to individual specifications. | | | | | | | | | | | |
| 9. PRODUCT CODE _____ P=Automotive product meet AEC-Q-200. ※If orders are placed without returned specification, please allow us to judge that specification is accepted by your side. | | | | | | | | | | | |
| 10. GRADE CODE _____ N=Standard | | | | | | | | | | | |
| 11. PACKAGING CODE _____ B = Bulk O = Cardboard Tape, 10" Reel E = Embossed Type, 7" Reel P = Bulk Case D = Cardboard Tape, 13" Reel(10,000ea) F = Embossed Type, 13" Reel C = Cardboard Tape, 7" Reel L = Cardboard Tape, 13" Reel(15,000ea) S = Embossed Type, 10" Reel | | | | | | | | | | | |

This catalog has only typical specifications because there is no space for detailed specifications.
Please approve our product specifications or transact the approval sheet for product specifications before ordering.

★
Class I

| Symbol | EIA Code | Operation Temperature Range(°C) | Temperature Coefficient Range(ppm/°C) |
|--------|----------|---------------------------------|---------------------------------------|
| C | COG | -55 ~ +125 | 0 ±30 |

Class II

| Symbol | EIA Code | Operation Temperature Range(°C) | Capacitance Change (ΔC %) |
|--------|----------|---------------------------------|---------------------------|
| B | X7R | -55 ~ +125 | 0 ±15 |

★★
Capacitance Tolerance

| Code | Capacitance Tolerance | TC | Capacitance Step | Rated Capacitance |
|------|-----------------------|-----|------------------|-------------------|
| C | ± 0.25 pF | COG | Under 5 pF | E-12 series ★ |
| D | ± 0.5 pF | COG | 6.0 to 9.0 pF | E-12 series ★ |
| J | ± 5% | COG | Over 10 pF | E-12 series |
| K | ± 10% | X7R | Under 0.01 μF | E-3 series |
| | | | Over 0.01 μF | E-6 series |
| M | ± 20% | X7R | Under 0.01 μF | E-3 series |
| | | | Over 0.01 μF | E-6 series |

★E-24 series is also available

| Series | Capacitance Step | | | | | | | | | | | |
|--------|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 1.0 | | | | 2.2 | | | | 4.7 | | | |
| E-3 | 1.0 | | | | 2.2 | | | | 4.7 | | | |
| E-6 | 1.0 | | 1.5 | | 2.2 | | 3.3 | | 4.7 | | 6.8 | |
| E-12 | 1.0 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |
| E-24 | 1.0 | 1.1 | 1.2 | 1.3 | 2.2 | 2.4 | 2.7 | 3.0 | 4.7 | 5.1 | 5.6 | 6.2 |
| | 1.5 | 1.6 | 1.8 | 2.0 | 3.3 | 3.6 | 3.9 | 4.3 | 6.8 | 7.5 | 8.2 | 9.1 |

★★★

| Size | Code | Thickness(mm) | Spec(mm) ★ |
|------------|------|---------------|------------|
| 0402(1005) | 5 | 0.50 | ±0.05 |
| 0603(1608) | 8 | 0.80 | ±0.10 |
| 0805(2012) | 6 | 0.60 | ±0.10 |
| | C | 0.85 | ±0.10 |
| | F | 1.25 | ±0.10 |
| 1206(3216) | C | 0.85 | ±0.15 |
| | P | 1.15 | ±0.10 |
| | H | 1.60 | ±0.20 |

★The tolerance will be changed by Customer' standards and our new products. (High Capacitance)
Please check with our sales representatives or product engineers before ordering.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

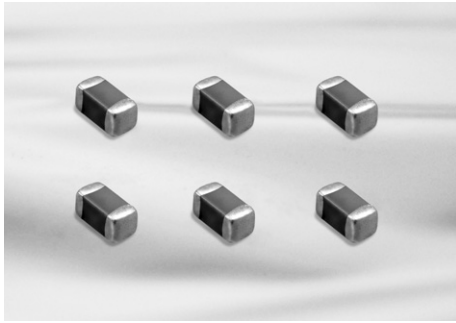
Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



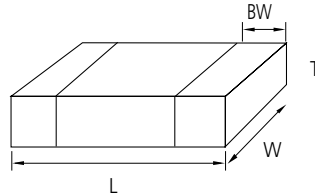
Feature

- Automotive products are manufactured in state of the art facilities recommended for registration to ISO/TS 16949:2002.
- Automotive products meet AEC-Q-200 requirements.
- Automotive products are RoHS compliant.
- Samsung terminations are suitable for all flow and reflow soldering systems. (10/21/31 size type only)
- Automotive products meet JEDEC-020-D requirements.
- COG dielectric components contain BME and copper terminations with a Ni/Sn plated overcoat.
- X7R dielectric components have BME and soft terminations with a Ni/Sn plated overcoat.

Application

- Automotive Electronic Equipment
(Powertrain, Safety, Body & Chassis, Convenience, Infotainment)

Structure and Dimensions



| Code | EIA Code | Dimension(mm) | | | |
|------|----------|---------------|-----------|-------------|--------------|
| | | L | W | T | BW |
| 05 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.50(±0.05) | 0.25±0.10 |
| 10 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.80(±0.10) | 0.3±0.2 |
| 21 | 0805 | 2.00±0.10 | 1.25±0.10 | 0.60(±0.10) | 0.5+0.2/-0.3 |
| | | | | 0.85(±0.10) | |
| | | | | 1.25(±0.10) | |
| 31 | 1206 | 3.20±0.20 | 1.60±0.20 | 0.85(±0.15) | 0.5±0.3 |
| | | | | 1.15(±0.10) | |
| | | | | 1.60(±0.20) | |

Automotive Capacitors Table (COG, X7R)

| TC | Size(mm) | Thickness (mm) | Vr | Capacitance (pF) | | | Capacitance (nF) | | | | | | | |
|-----|------------|----------------------|-----|------------------|-----|-----|------------------|-----|-----|----|----|----|-----|--|
| | | | | 100 | 220 | 470 | 1 | 2.2 | 4.7 | 10 | 22 | 47 | 100 | |
| COG | 0402(1005) | 0.50 | 50 | █ | | | | | | | | | | |
| | | | 100 | █ | | | | | | | | | | |
| | 0603(1608) | 0.80 | 50 | █ | █ | | | | | | | | | |
| | | | 100 | █ | █ | | | | | | | | | |
| | 0805(2012) | 0.60 0.85 1.25 | 50 | █ | █ | █ | | | | | | | | |
| | | | 100 | █ | █ | █ | | | | | | | | |

| TC | Size(mm) | Thickness (mm) | Vr | Capacitance (nF) | | | | | | Capacitance (μF) | | | | | |
|-----|------------|----------------|------|------------------|----|----|-----|-----|-----|------------------|-----|-----|----|--|--|
| | | | | 10 | 22 | 47 | 100 | 220 | 470 | 1 | 2.2 | 4.7 | 10 | | |
| X7R | 0402(1005) | 0.50 | 10 | █ | █ | █ | █ | | | | | | | | |
| | | | 16 | █ | █ | █ | █ | | | | | | | | |
| | | | 25 | █ | █ | █ | █ | | | | | | | | |
| | | | 50 | █ | █ | █ | █ | | | | | | | | |
| | 0603(1608) | 0.80 | 10 | █ | █ | █ | █ | █ | | | | | | | |
| | | | 16 | █ | █ | █ | █ | █ | | | | | | | |
| | | | 25 | █ | █ | █ | █ | █ | | | | | | | |
| | | | 50 | █ | █ | █ | █ | | | | | | | | |
| | | | 100 | █ | █ | █ | █ | | | | | | | | |
| | 0805(2012) | 1.25 | 10 | 10 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 16 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 25 | █ | █ | █ | █ | █ | | | | | | |
| | | 0.85 | 50 | 10 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 16 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 25 | █ | █ | █ | █ | █ | | | | | | |
| | | 0.60 | 100 | 10 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 16 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 25 | █ | █ | █ | █ | █ | | | | | | |
| | | 1206(3216) | 1.60 | 10 | 10 | █ | █ | █ | █ | █ | | | | | |
| | | | | | 16 | █ | █ | █ | █ | █ | | | | | |
| | | | | | 25 | █ | █ | █ | █ | █ | | | | | |
| | 0.85 | | 50 | 10 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 16 | █ | █ | █ | █ | █ | | | | | | |
| | | | | 25 | █ | █ | █ | █ | █ | | | | | | |

- Part Numbering System
- General Capacitors
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Product Lineup (Automotive Capacitors_COG)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05C010CB51PN □ | 1.00×0.50 | 1.0pF | 50 | ±0.25pF | 0.55 |
| 2 | CL05C010CC51PN □ | | 1.0pF | 100 | ±0.25pF | 0.55 |
| 3 | CL05C1R5CB51PN □ | | 1.5pF | 50 | ±0.25pF | 0.55 |
| 4 | CL05C1R5CC51PN □ | | 1.5pF | 100 | ±0.25pF | 0.55 |
| 5 | CL05C2R2CB51PN □ | | 2.2pF | 50 | ±0.25pF | 0.55 |
| 6 | CL05C2R2CC51PN □ | | 2.2pF | 100 | ±0.25pF | 0.55 |
| 7 | CL05C3R3CB51PN □ | | 3.3pF | 50 | ±0.25pF | 0.55 |
| 8 | CL05C3R3CC51PN □ | | 3.3pF | 100 | ±0.25pF | 0.55 |
| 9 | CL05C4R7CB51PN □ | | 4.7pF | 50 | ±0.25pF | 0.55 |
| 10 | CL05C4R7CC51PN □ | | 4.7pF | 100 | ±0.25pF | 0.55 |
| 11 | CL05C6R8DB51PN □ | | 6.8pF | 50 | ±0.5pF | 0.55 |
| 12 | CL05C6R8DC51PN □ | | 6.8pF | 100 | ±0.5pF | 0.55 |
| 13 | CL05C100JB51PN □ | | 10pF | 50 | ±5% | 0.55 |
| 14 | CL05C100JC51PN □ | | 10pF | 100 | ±5% | 0.55 |
| 15 | CL05C120JB51PN □ | | 12pF | 50 | ±5% | 0.55 |
| 16 | CL05C120JC51PN □ | | 12pF | 100 | ±5% | 0.55 |
| 17 | CL05C150JB51PN □ | | 15pF | 50 | ±5% | 0.55 |
| 18 | CL05C150JC51PN □ | | 15pF | 100 | ±5% | 0.55 |
| 19 | CL05C180JB51PN □ | | 18pF | 50 | ±5% | 0.55 |
| 20 | CL05C180JC51PN □ | | 18pF | 100 | ±5% | 0.55 |
| 21 | CL05C220JB51PN □ | | 22pF | 50 | ±5% | 0.55 |
| 22 | CL05C220JC51PN □ | | 22pF | 100 | ±5% | 0.55 |
| 23 | CL05C270JB51PN □ | | 27pF | 50 | ±5% | 0.55 |
| 24 | CL05C270JC51PN □ | | 27pF | 100 | ±5% | 0.55 |
| 25 | CL05C330JB51PN □ | | 33pF | 50 | ±5% | 0.55 |
| 26 | CL05C330JC51PN □ | | 33pF | 100 | ±5% | 0.55 |
| 27 | CL05C390JB51PN □ | | 39pF | 50 | ±5% | 0.55 |
| 28 | CL05C390JC51PN □ | | 39pF | 100 | ±5% | 0.55 |
| 29 | CL05C470JB51PN □ | | 47pF | 50 | ±5% | 0.55 |
| 30 | CL05C470JC51PN □ | | 47pF | 100 | ±5% | 0.55 |
| 31 | CL05C560JB51PN □ | | 56pF | 50 | ±5% | 0.55 |
| 32 | CL05C560JC51PN □ | | 56pF | 100 | ±5% | 0.55 |
| 33 | CL05C680JB51PN □ | | 68pF | 50 | ±5% | 0.55 |
| 34 | CL05C680JC51PN □ | | 68pF | 100 | ±5% | 0.55 |
| 35 | CL05C820JB51PN □ | | 82pF | 50 | ±5% | 0.55 |
| 36 | CL05C820JC51PN □ | | 82pF | 100 | ±5% | 0.55 |
| 37 | CL05C101JB51PN □ | | 100pF | 50 | ±5% | 0.55 |
| 38 | CL05C101JC51PN □ | | 100pF | 100 | ±5% | 0.55 |
| 39 | CL05C121JB51PN □ | | 120pF | 50 | ±5% | 0.55 |
| 40 | CL05C151JB51PN □ | | 150pF | 50 | ±5% | 0.55 |
| 41 | CL05C221JB51PN □ | | 220pF | 50 | ±5% | 0.55 |
| 1 | CL10C010CB81PN □ | 1.60×0.80 | 1.0pF | 50 | ±0.25pF | 0.9 |
| 2 | CL10C010CC81PN □ | | 1.0pF | 100 | ±0.25pF | 0.9 |
| 3 | CL10C1R5CB81PN □ | | 1.5pF | 50 | ±0.25pF | 0.9 |
| 4 | CL10C1R5CC81PN □ | | 1.5pF | 100 | ±0.25pF | 0.9 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (Automotive Capacitors_COG)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 5 | CL10C2R2CB81PN □ | 1.60×0.80 | 2.2pF | 50 | ±0.25pF | 0.9 |
| 6 | CL10C2R2CC81PN □ | | 2.2pF | 100 | ±0.25pF | 0.9 |
| 7 | CL10C3R3CB81PN □ | | 3.3pF | 50 | ±0.25pF | 0.9 |
| 8 | CL10C3R3CC81PN □ | | 3.3pF | 100 | ±0.25pF | 0.9 |
| 9 | CL10C4R7CB81PN □ | | 4.7pF | 50 | ±0.25pF | 0.9 |
| 10 | CL10C4R7CC81PN □ | | 4.7pF | 100 | ±0.25pF | 0.9 |
| 11 | CL10C6R8DB81PN □ | | 6.8pF | 50 | ±0.5pF | 0.9 |
| 12 | CL10C6R8DC81PN □ | | 6.8pF | 100 | ±0.5pF | 0.9 |
| 13 | CL10C100JB81PN □ | | 10pF | 50 | ±5% | 0.9 |
| 14 | CL10C100JC81PN □ | | 10pF | 100 | ±5% | 0.9 |
| 15 | CL10C120JB81PN □ | | 12pF | 50 | ±5% | 0.9 |
| 16 | CL10C120JC81PN □ | | 12pF | 100 | ±5% | 0.9 |
| 17 | CL10C150JB81PN □ | | 15pF | 50 | ±5% | 0.9 |
| 18 | CL10C150JC81PN □ | | 15pF | 100 | ±5% | 0.9 |
| 19 | CL10C180JB81PN □ | | 18pF | 50 | ±5% | 0.9 |
| 20 | CL10C180JC81PN □ | | 18pF | 100 | ±5% | 0.9 |
| 21 | CL10C220JB81PN □ | | 22pF | 50 | ±5% | 0.9 |
| 22 | CL10C220JC81PN □ | | 22pF | 100 | ±5% | 0.9 |
| 23 | CL10C270JB81PN □ | | 27pF | 50 | ±5% | 0.9 |
| 24 | CL10C270JC81PN □ | | 27pF | 100 | ±5% | 0.9 |
| 25 | CL10C330JB81PN □ | | 33pF | 50 | ±5% | 0.9 |
| 26 | CL10C330JC81PN □ | | 33pF | 100 | ±5% | 0.9 |
| 27 | CL10C390JB81PN □ | | 39pF | 50 | ±5% | 0.9 |
| 28 | CL10C390JC81PN □ | | 39pF | 100 | ±5% | 0.9 |
| 29 | CL10C470JB81PN □ | | 47pF | 50 | ±5% | 0.9 |
| 30 | CL10C470JC81PN □ | | 47pF | 100 | ±5% | 0.9 |
| 31 | CL10C560JB81PN □ | | 56pF | 50 | ±5% | 0.9 |
| 32 | CL10C560JC81PN □ | | 56pF | 100 | ±5% | 0.9 |
| 33 | CL10C680JB81PN □ | | 68pF | 50 | ±5% | 0.9 |
| 34 | CL10C680JC81PN □ | | 68pF | 100 | ±5% | 0.9 |
| 35 | CL10C820JB81PN □ | | 82pF | 50 | ±5% | 0.9 |
| 36 | CL10C820JC81PN □ | | 82pF | 100 | ±5% | 0.9 |
| 37 | CL10C101JB81PN □ | | 100pF | 50 | ±5% | 0.9 |
| 38 | CL10C101JC81PN □ | | 100pF | 100 | ±5% | 0.9 |
| 39 | CL10C121JB81PN □ | | 120pF | 50 | ±5% | 0.9 |
| 40 | CL10C151JB81PN □ | | 150pF | 50 | ±5% | 0.9 |
| 41 | CL10C221JB81PN □ | | 220pF | 50 | ±5% | 0.9 |
| 42 | CL10C271JB81PN □ | | 270pF | 50 | ±5% | 0.9 |
| 43 | CL10C331JB81PN □ | | 330pF | 50 | ±5% | 0.9 |
| 44 | CL10C391JB81PN □ | | 390pF | 50 | ±5% | 0.9 |
| 45 | CL10C471JB81PN □ | | 470pF | 50 | ±5% | 0.9 |
| 46 | CL10C561JB81PN □ | | 560pF | 50 | ±5% | 0.9 |
| 47 | CL10C681JB81PN □ | | 680pF | 50 | ±5% | 0.9 |
| 48 | CL10C821JB81PN □ | | 820pF | 50 | ±5% | 0.9 |
| 49 | CL10C102JB81PN □ | | 1nF | 50 | ±5% | 0.9 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

- Part Numbering System
- General Capacitors
- High Capacitance Capacitors
- Super Small Size Capacitors
- Medium-High Voltage Capacitors
- Array Type Capacitors
- Low ESL Capacitors
- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



Product Lineup (Automotive Capacitors_COG)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL21C100JB61PN □ | 2.00×1.25 | 10pF | 50 | ±5% | 0.7 |
| 2 | CL21C100JC61PN □ | | 10pF | 100 | ±5% | 0.7 |
| 3 | CL21C120JB61PN □ | | 12pF | 50 | ±5% | 0.7 |
| 4 | CL21C120JC61PN □ | | 12pF | 100 | ±5% | 0.7 |
| 5 | CL21C150JB61PN □ | | 15pF | 50 | ±5% | 0.7 |
| 6 | CL21C150JC61PN □ | | 15pF | 100 | ±5% | 0.7 |
| 7 | CL21C180JB61PN □ | | 18pF | 50 | ±5% | 0.7 |
| 8 | CL21C180JC61PN □ | | 18pF | 100 | ±5% | 0.7 |
| 9 | CL21C220JB61PN □ | | 22pF | 50 | ±5% | 0.7 |
| 10 | CL21C220JC61PN □ | | 22pF | 100 | ±5% | 0.7 |
| 11 | CL21C270JC61PN □ | | 27pF | 100 | ±5% | 0.7 |
| 12 | CL21C330JB61PN □ | | 33pF | 50 | ±5% | 0.7 |
| 13 | CL21C330JC61PN □ | | 33pF | 100 | ±5% | 0.7 |
| 14 | CL21C390JB61PN □ | | 39pF | 50 | ±5% | 0.7 |
| 15 | CL21C390JC61PN □ | | 39pF | 100 | ±5% | 0.7 |
| 16 | CL21C470JB61PN □ | | 47pF | 50 | ±5% | 0.7 |
| 17 | CL21C470JC61PN □ | | 47pF | 100 | ±5% | 0.7 |
| 18 | CL21C560JB61PN □ | | 56pF | 50 | ±5% | 0.7 |
| 19 | CL21C560JC61PN □ | | 56pF | 100 | ±5% | 0.7 |
| 20 | CL21C680JB61PN □ | | 68pF | 50 | ±5% | 0.7 |
| 21 | CL21C680JC61PN □ | | 68pF | 100 | ±5% | 0.7 |
| 22 | CL21C820JB61PN □ | | 82pF | 50 | ±5% | 0.7 |
| 23 | CL21C820JC61PN □ | | 82pF | 100 | ±5% | 0.7 |
| 24 | CL21C101JB61PN □ | | 100pF | 50 | ±5% | 0.7 |
| 25 | CL21C101JC61PN □ | | 100pF | 100 | ±5% | 0.7 |
| 26 | CL21C121JB61PN □ | | 120pF | 50 | ±5% | 0.7 |
| 27 | CL21C121JC61PN □ | | 120pF | 100 | ±5% | 0.7 |
| 28 | CL21C151JB61PN □ | | 150pF | 50 | ±5% | 0.7 |
| 29 | CL21C151JC61PN □ | | 150pF | 100 | ±5% | 0.7 |
| 30 | CL21C221JB61PN □ | | 220pF | 50 | ±5% | 0.7 |
| 31 | CL21C221JC61PN □ | | 220pF | 100 | ±5% | 0.7 |
| 32 | CL21C271JB61PN □ | | 270pF | 50 | ±5% | 0.7 |
| 33 | CL21C271JC61PN □ | | 270pF | 100 | ±5% | 0.7 |
| 34 | CL21C331JB61PN □ | | 330pF | 50 | ±5% | 0.7 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (Automotive Capacitors_COG)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 35 | CL21C331JC61PN □ | 2.00×1.25 | 330pF | 100 | ±5% | 0.7 |
| 36 | CL21C471JBC1PN □ | | 470pF | 50 | ±5% | 0.95 |
| 37 | CL21C471JCC1PN □ | | 470pF | 100 | ±5% | 0.95 |
| 38 | CL21C561JBC1PN □ | | 560pF | 50 | ±5% | 0.95 |
| 39 | CL21C561JCC1PN □ | | 560pF | 100 | ±5% | 0.95 |
| 40 | CL21C681JBC1PN □ | | 680pF | 50 | ±5% | 0.95 |
| 41 | CL21C681JCC1PN □ | | 680pF | 100 | ±5% | 0.95 |
| 42 | CL21C821JBC1PN □ | | 820pF | 50 | ±5% | 0.95 |
| 43 | CL21C821JCC1PN □ | | 820pF | 100 | ±5% | 0.95 |
| 44 | CL21C102JBC1PN □ | | 1nF | 50 | ±5% | 0.95 |
| 45 | CL21C102JCC1PN □ | | 1nF | 100 | ±5% | 0.95 |
| 46 | CL21C102JCF1PN □ | | 1nF | 100 | ±5% | 1.35 |
| 47 | CL21C122JBC1PN □ | | 1.2nF | 50 | ±5% | 0.95 |
| 48 | CL21C152JBC1PN □ | | 1.5nF | 50 | ±5% | 0.95 |
| 49 | CL21C182JBC1PN □ | | 1.8nF | 50 | ±5% | 0.95 |
| 50 | CL21C222JBC1PN □ | | 2.2nF | 50 | ±5% | 0.95 |
| 51 | CL21C272JBC1PN □ | | 2.7nF | 50 | ±5% | 0.95 |
| 52 | CL21C332JBC1PN □ | | 3.3nF | 50 | ±5% | 0.95 |
| 53 | CL21C392JBC1PN □ | | 3.9nF | 50 | ±5% | 0.95 |
| 54 | CL21C472JBC1PN □ | | 4.7nF | 50 | ±5% | 0.95 |
| 55 | CL21C562JBC1PN □ | | 5.6nF | 50 | ±5% | 0.95 |
| 56 | CL21C102JBF1PN □ | | 1nF | 50 | ±5% | 1.35 |
| 57 | CL21C122JBF1PN □ | | 1.2nF | 50 | ±5% | 1.35 |
| 58 | CL21C152JBF1PN □ | | 1.5nF | 50 | ±5% | 1.35 |
| 59 | CL21C182JBF1PN □ | | 1.8nF | 50 | ±5% | 1.35 |
| 60 | CL21C222JBF1PN □ | | 2.2nF | 50 | ±5% | 1.35 |
| 61 | CL21C272JBF1PN □ | | 2.7nF | 50 | ±5% | 1.35 |
| 62 | CL21C332JBF1PN □ | | 3.3nF | 50 | ±5% | 1.35 |
| 63 | CL21C392JBF1PN □ | | 3.9nF | 50 | ±5% | 1.35 |
| 64 | CL21C472JBF1PN □ | | 4.7nF | 50 | ±5% | 1.35 |
| 65 | CL21C562JBF1PN □ | | 5.6nF | 50 | ±5% | 1.35 |
| 66 | CL21C682JBF1PN □ | | 6.8nF | 50 | ±5% | 1.35 |
| 67 | CL21C822JBF1PN □ | | 8.2nF | 50 | ±5% | 1.35 |
| 68 | CL21C103JBF1PN □ | | 10nF | 50 | ±5% | 1.35 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Product Lineup (Automotive Capacitors_X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|
| 1 | CL05B223KB54PN □ | 1.00×0.50 | 22nF | 50 | ±10% | 0.55 |
| 2 | CL05B104KO54PN □ | | 100nF | 16 | ±10% | 0.55 |
| 1 | CL10B221KC85PN □ | 1.60×0.80 | 220pF | 100 | ±10% | 0.90 |
| 2 | CL10B471KC85PN □ | | 470pF | 100 | ±10% | 0.90 |
| 3 | CL10B102KB85PN □ | | 1.0nF | 50 | ±10% | 0.90 |
| 4 | CL10B102KC85PN □ | | 1.0nF | 100 | ±10% | 0.90 |
| 5 | CL10B222KB85PN □ | | 2.2nF | 50 | ±10% | 0.90 |
| 6 | CL10B222KC85PN □ | | 2.2nF | 100 | ±10% | 0.90 |
| 7 | CL10B472KB85PN □ | | 4.7nF | 50 | ±10% | 0.90 |
| 8 | CL10B472KC85PN □ | | 4.7nF | 100 | ±10% | 0.90 |
| 9 | CL10B103KA85PN □ | | 10nF | 25 | ±10% | 0.90 |
| 10 | CL10B103KB85PN □ | | 10nF | 50 | ±10% | 0.90 |
| 11 | CL10B103KC85PN □ | | 10nF | 100 | ±10% | 0.90 |
| 12 | CL10B153KA85PN □ | | 15nF | 25 | ±10% | 0.90 |
| 13 | CL10B153KB85PN □ | | 15nF | 50 | ±10% | 0.90 |
| 14 | CL10B223KA85PN □ | | 22nF | 25 | ±10% | 0.90 |
| 15 | CL10B223KB85PN □ | | 22nF | 50 | ±10% | 0.90 |
| 16 | CL10B333KA85PN □ | | 33nF | 25 | ±10% | 0.90 |
| 17 | CL10B333KB85PN □ | | 33nF | 50 | ±10% | 0.90 |
| 18 | CL10B473KO85PN □ | | 47nF | 16 | ±10% | 0.90 |
| 19 | CL10B473KA85PN □ | | 47nF | 25 | ±10% | 0.90 |
| 20 | CL10B473KB85PN □ | | 47nF | 50 | ±10% | 0.90 |
| 21 | CL10B683KO85PN □ | | 68nF | 16 | ±10% | 0.90 |
| 22 | CL10B683KA85PN □ | | 68nF | 25 | ±10% | 0.90 |
| 23 | CL10B683KB85PN □ | | 68nF | 50 | ±10% | 0.90 |
| 24 | CL10B104KO85PN □ | | 100nF | 16 | ±10% | 0.90 |
| 25 | CL10B104KA85PN □ | | 100nF | 25 | ±10% | 0.90 |
| 26 | CL10B104KB85PN □ | | 100nF | 50 | ±10% | 0.90 |
| 27 | CL10B154KO84PN □ | | 150nF | 16 | ±10% | 0.90 |
| 28 | CL10B154KA84PN □ | | 150nF | 25 | ±10% | 0.90 |
| 29 | CL10B224KO84PN □ | | 220nF | 16 | ±10% | 0.90 |
| 30 | CL10B224KA84PN □ | | 220nF | 25 | ±10% | 0.90 |
| 31 | CL10B334KO84PN □ | | 330nF | 16 | ±10% | 0.90 |
| 32 | CL10B334KA84PN □ | | 330nF | 25 | ±10% | 0.90 |
| 33 | CL10B474KO84PN □ | | 470nF | 16 | ±10% | 0.90 |
| 34 | CL10B474KA84PN □ | | 470nF | 25 | ±10% | 0.90 |
| 35 | CL10B105KO84PN □ | | 1μF | 16 | ±10% | 0.90 |
| 1 | CL21B102KB65PN □ | 2.00×1.25 | 1.0nF | 50 | ±10% | 0.70 |
| 2 | CL21B102KC65PN □ | | 1.0nF | 100 | ±10% | 0.70 |
| 3 | CL21B222KB65PN □ | | 2.2nF | 50 | ±10% | 0.70 |
| 4 | CL21B222KC65PN □ | | 2.2nF | 100 | ±10% | 0.70 |
| 5 | CL21B472KB65PN □ | | 4.7nF | 50 | ±10% | 0.70 |
| 6 | CL21B472KC65PN □ | | 4.7nF | 100 | ±10% | 0.70 |
| 7 | CL21B103KB65PN □ | | 10nF | 50 | ±10% | 0.70 |
| 8 | CL21B103KC65PN □ | | 10nF | 100 | ±10% | 0.70 |
| 9 | CL21B153KB65PN □ | | 15nF | 50 | ±10% | 0.70 |
| 10 | CL21B153KC65PN □ | | 15nF | 100 | ±10% | 0.70 |
| 11 | CL21B223KB65PN □ | | 22nF | 50 | ±10% | 0.70 |
| 12 | CL21B223KC65PN □ | | 22nF | 100 | ±10% | 0.70 |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Product Lineup (Automotive Capacitors_X7R)

| | Part Number | Size L×W (mm) | Capacitance | Rated Voltage (Vdc) | Capacitance Tolerance | Thickness Max. (mm) | |
|----|------------------|---------------|-------------|---------------------|-----------------------|---------------------|------|
| 13 | CL21B333KBC5PN □ | 2.00×1.25 | 33nF | 50 | ±10% | 0.95 | |
| 14 | CL21B333KCC5PN □ | | 33nF | 100 | ±10% | 0.95 | |
| 15 | CL21B473KAC5PN □ | | 47nF | 25 | ±10% | 0.95 | |
| 16 | CL21B473KBC5PN □ | | 47nF | 50 | ±10% | 0.95 | |
| 17 | CL21B473KCC5PN □ | | 47nF | 100 | ±10% | 0.95 | |
| 18 | CL21B683KAC5PN □ | | 68nF | 25 | ±10% | 0.95 | |
| 19 | CL21B683KBC5PN □ | | 68nF | 50 | ±10% | 0.95 | |
| 20 | CL21B683KCC5PN □ | | 68nF | 100 | ±10% | 0.95 | |
| 21 | CL21B104KOC5PN □ | | 100nF | 16 | ±10% | 0.95 | |
| 22 | CL21B104KAC5PN □ | | 100nF | 25 | ±10% | 0.95 | |
| 23 | CL21B104KBC5PN □ | | 100nF | 50 | ±10% | 0.95 | |
| 24 | CL21B104KBF5PN □ | | 100nF | 50 | ±10% | 1.35 | |
| 25 | CL21B104KCC5PN □ | | 100nF | 100 | ±10% | 0.95 | |
| 26 | CL21B104KCF5PN □ | | 100nF | 100 | ±10% | 1.35 | |
| 27 | CL21B154KOF4PN □ | | 150nF | 16 | ±10% | 1.35 | |
| 28 | CL21B154KAF4PN □ | | 150nF | 25 | ±10% | 1.35 | |
| 29 | CL21B154KBF4PN □ | | 150nF | 50 | ±10% | 1.35 | |
| 30 | CL21B224KOF4PN □ | | 220nF | 16 | ±10% | 1.35 | |
| 31 | CL21B224KAF4PN □ | | 220nF | 25 | ±10% | 1.35 | |
| 32 | CL21B224KBF4PN □ | | 220nF | 50 | ±10% | 1.35 | |
| 33 | CL21B334KOF4PN □ | | 330nF | 16 | ±10% | 1.35 | |
| 34 | CL21B334KAF4PN □ | | 330nF | 25 | ±10% | 1.35 | |
| 35 | CL21B334KBF4PN □ | | 330nF | 50 | ±10% | 1.35 | |
| 36 | CL21B474KOF4PN □ | | 470nF | 16 | ±10% | 1.35 | |
| 37 | CL21B474KAF4PN □ | | 470nF | 25 | ±10% | 1.35 | |
| 38 | CL21B474KBF4PN □ | | 470nF | 50 | ±10% | 1.35 | |
| 39 | CL21B684KOF4PN □ | | 680nF | 16 | ±10% | 1.35 | |
| 40 | CL21B684KAF4PN □ | | 680nF | 25 | ±10% | 1.35 | |
| 41 | CL21B105KOF4PN □ | | 1μF | 16 | ±10% | 1.35 | |
| 42 | CL21B105KAF4PN □ | | 1μF | 25 | ±10% | 1.35 | |
| 43 | CL21B225KOF4PN □ | | 2.2μF | 16 | ±10% | 1.35 | |
| 1 | CL31B104KBC5PN □ | | 3.20×1.60 | 100nF | 50 | ±10% | 1.00 |
| 2 | CL31B154KBP5PN □ | | | 150nF | 50 | ±10% | 1.25 |
| 3 | CL31B224KAC5PN □ | | | 220nF | 25 | ±10% | 1.00 |
| 4 | CL31B224KBP5PN □ | | | 220nF | 50 | ±10% | 1.25 |
| 5 | CL31B334KAC5PN □ | | | 330nF | 25 | ±10% | 1.00 |
| 6 | CL31B334KBH5PN □ | | | 330nF | 50 | ±10% | 1.80 |
| 7 | CL31B474KAC5PN □ | | | 470nF | 25 | ±10% | 1.00 |
| 8 | CL31B474KBH5PN □ | | | 470nF | 50 | ±10% | 1.80 |
| 9 | CL31B684KAP5PN □ | | | 680nF | 25 | ±10% | 1.25 |
| 10 | CL31B684KBH5PN □ | | | 680nF | 50 | ±10% | 1.80 |
| 11 | CL31B105KOP5PN □ | | | 1μF | 16 | ±10% | 1.25 |
| 12 | CL31B105KAP5PN □ | | | 1μF | 25 | ±10% | 1.25 |
| 13 | CL31B105KBH5PN □ | 1μF | | 50 | ±10% | 1.80 | |
| 14 | CL31B155KOH4PN □ | 1.5μF | | 16 | ±10% | 1.80 | |
| 15 | CL31B155KAH4PN □ | 1.5μF | | 25 | ±10% | 1.80 | |
| 16 | CL31B155KBH4PN □ | 1.5μF | | 50 | ±10% | 1.80 | |
| 17 | CL31B225KOH4PN □ | 2.2μF | | 16 | ±10% | 1.80 | |
| 18 | CL31B225KAH4PN □ | 2.2μF | | 25 | ±10% | 1.80 | |
| 19 | CL31B225KBH4PN □ | 2.2μF | | 50 | ±10% | 1.80 | |

※ □ mark means packaging code. If you want to learn the code or quantity in detail, please see p80.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



Reliability Test Condition (Automotive Capacitors)

| No | Item | Performance | Test Condition | |
|----|-------------------------------------|--|---------------------------------|--|
| 1 | Pre-and Post-Stress Electrical Test | - | | |
| 2 | High Temperature Exposure | Appearance | No abnormal exterior appearance | |
| | | Capacitance Change | CLASS I | Within $\pm 2.5\%$ or $0.25\mu\text{F}$, (Whichever is larger) |
| | | | CLASS II | Within $\pm 10\%$ |
| | | Q | CLASS I | Capacitance $\geq 30\mu\text{F}$: $Q \geq 1,000$ $< 30\mu\text{F}$: $Q \geq 400 + 20 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | Rated Voltage $\geq 25\text{V}$: 0.03 max $\geq 16\text{V}$: 0.05 max $\geq 10\text{V}$: 0.075 max |
| IR | | More than $10,000 \text{M}\Omega$ or $500 \text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | |
| 3 | Temperature Cycling | Appearance | No abnormal exterior appearance | |
| | | Capacitance Change | CLASS I | Within $\pm 2.5\%$ or $0.25\mu\text{F}$, (Whichever is larger) |
| | | | CLASS II | Within $\pm 10\%$ |
| | | Q | CLASS I | Capacitance $\geq 30\mu\text{F}$: $Q \geq 1,000$ $< 30\mu\text{F}$: $Q \geq 400 + 20 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | Rated Voltage $\geq 25\text{V}$: 0.03 max $\geq 16\text{V}$: 0.05 max $\geq 10\text{V}$: 0.075 max |
| IR | | More than $10,000 \text{M}\Omega$ or $500 \text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | |
| 4 | Destructive Physical Analysis | No defects or abnormalities | Per EIA 469 | |
| 5 | Moisture Resistance | Appearance | No abnormal exterior appearance | |
| | | Capacitance Change | CLASS I | Within $\pm 2.5\%$ or $0.25\mu\text{F}$, (Whichever is larger) |
| | | | CLASS II | Within $\pm 12.5\%$ |
| | | Q | CLASS I | Capacitance $\geq 30\mu\text{F}$: $Q \geq 350$ $10 \leq \text{Capacitance} < 30\mu\text{F}$: $Q \geq 275 + (5/2) \times C$ Capacitance $< 10\mu\text{F}$: $Q \geq 200 + 10 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | Rated Voltage $\geq 25\text{V}$: 0.03 max $\geq 16\text{V}$: 0.05 max $\geq 10\text{V}$: 0.075 max |
| IR | | More than $10,000 \text{M}\Omega$ or $500 \text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | |

1000Cycles
Measurement at 24 ± 2 hrs after test conclusion

| Step | Temperature(°C) | Time(min.) |
|------|------------------------------|------------|
| 1 | Min. operating Temp. ± 2 | 15 ± 3 |
| 2 | 25 ± 2 | 1 |
| 3 | Max. operating Temp. ± 2 | 15 ± 3 |
| 4 | 25 ± 2 | 1 |

The graph shows a temperature cycle over 24 hours. The y-axis is temperature in °C (0 to 80), and the x-axis is time in hours (0 to 24). The cycle consists of four trapezoidal pulses. Each pulse starts at 25°C, ramps up to 65°C, holds at 65°C for 2 hours, and ramps back down to 25°C. The humidity is 90-100% RH during the heating and cooling phases, and 80-100% RH during the 2-hour hold at 65°C. The pulses occur at approximately 4-6h, 8-10h, 12-14h, and 16-18h.

| No | Item | Performance | Test Condition | | | | | | |
|-----------|---------------------------------|--|--|--|----------|------|--------|-------|-----------|
| 6 | Biased Humidity | Appearance | No abnormal exterior appearance | | | | | | |
| | | Capacitance Change | CLASS I | Within $\pm 2.5\%$ or $0.25\mu\text{F}$, (Whichever is larger) | | | | | |
| | | | CLASS II | Within $\pm 12.5\%$ | | | | | |
| | | Q | CLASS I | Capacitance $\geq 30\mu\text{F}$: $Q \geq 200$ $< 30\mu\text{F}$: $Q \geq 100 + (10/3) \times C$ (C : Capacitance) | | | | | |
| | | Tan δ | CLASS II | Rated Voltage $\geq 25\text{V}$: 0.035 max $\geq 16\text{V}$: 0.05 max $\geq 10\text{V}$: 0.075 max | | | | | |
| IR | | More than $500\mu\Omega$ or $25\mu\Omega \times \mu\text{F}$ (Whichever is Smaller) | | | | | | | |
| | | | 1000hrs $85^\circ\text{C}/85\%\text{RH}$, Rated Voltage and $1.3\sim 1.5\text{V}$, (add $100\text{k}\Omega$ resistor) Measurement at 24 ± 2 hrs after test conclusion The charge/discharge current is less than 50mA . | | | | | | |
| 7 | High Temperature Operating Life | Appearance | No abnormal exterior appearance | | | | | | |
| | | Capacitance Change | CLASS I | Within $\pm 3.0\%$ or $0.3\mu\text{F}$, (Whichever is larger) | | | | | |
| | | | CLASS II | Within $\pm 12.5\%$ | | | | | |
| | | Q | CLASS I | Capacitance $\geq 30\mu\text{F}$: $Q \geq 350$ $\geq 10\mu\text{F}$: $Q \geq 275 + (5/2) \times C$ $< 10\mu\text{F}$: $Q \geq 200 + 10 \times C$ (C : Capacitance) | | | | | |
| | | Tan δ | CLASS II | Rated Voltage $\geq 25\text{V}$: 0.035 max $\geq 16\text{V}$: 0.05 max $\geq 10\text{V}$: 0.075 max | | | | | |
| IR | | More than $1,000\mu\Omega$ or $50\mu\Omega \times \mu\text{F}$ (Whichever is smaller) | | | | | | | |
| | | | 1000hrs @ $\text{TA} = 125^\circ\text{C}$, 200% Rated Voltage, Measurement at 24 ± 2 hrs after test conclusion The charge/discharge current is less than 50mA . | | | | | | |
| 8 | External Visual | No abnormal exterior appearance | Microscope (x10) | | | | | | |
| 9 | Physical Dimensions | Within the specified dimensions | Using the calipers | | | | | | |
| 10 | Mechanical Shock | Appearance | No abnormal exterior appearance | | | | | | |
| | | Capacitance Change | CLASS I | Within $\pm 2.5\%$ or $0.25\mu\text{F}$, (Whichever is larger) | | | | | |
| | | | CLASS II | Within $\pm 10\%$ | | | | | |
| | | Q | CLASS I | Capacitance $\geq 30\mu\text{F}$: $Q \geq 1,000$ $< 30\mu\text{F}$: $Q \geq 400 + 20 \times C$ (C : Capacitance) | | | | | |
| | | Tan δ | CLASS II | Rated Voltage $\geq 25\text{V}$: 0.025 max $\geq 16\text{V}$: 0.035 max $\geq 10\text{V}$: 0.05 max | | | | | |
| IR | | More than $10,000\mu\Omega$ or $500\mu\Omega \times \mu\text{F}$ (Whichever is smaller) | | | | | | | |
| | | | Three shocks in each direction should be applied along 3 mutually perpendicular axes of the test specimen (18 shocks) | | | | | | |
| | | | <table border="1"> <thead> <tr> <th>Peakvalue</th> <th>Duration</th> <th>Wave</th> </tr> </thead> <tbody> <tr> <td>1,500G</td> <td>0.5ms</td> <td>Half sine</td> </tr> </tbody> </table> | Peakvalue | Duration | Wave | 1,500G | 0.5ms | Half sine |
| Peakvalue | Duration | Wave | | | | | | | |
| 1,500G | 0.5ms | Half sine | | | | | | | |

- Part Numbering System
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- Super Small Size Capacitors
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- Reliability Test Condition
- Premium Capacitors for Automotive Applications
- Packaging Specification
- Application Manual for Surface Mounting



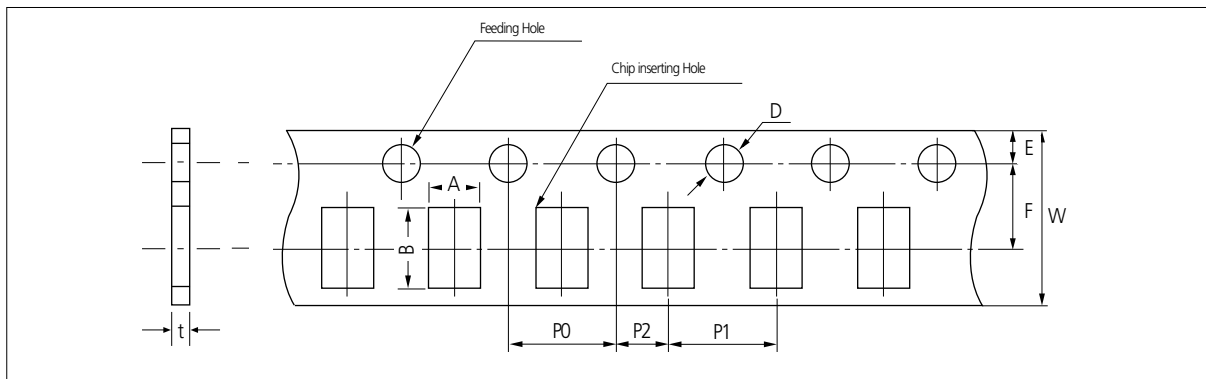
| No | Item | | Performance | Test Condition | |
|----|---------------------------|--|---------------------------------|--|--|
| 11 | Vibration | Appearance | No abnormal exterior appearance | 5g's for 20min., 12cycles each of 3 orientations, Use 8" x5" PCB 0.031" Thick 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10~2000 Hz. | |
| | | Capacitance Change | CLASS I | | Within $\pm 2.5\%$ or 0.25pF, (Whichever is larger) |
| | | | CLASS II | | Within $\pm 10\%$ |
| | | Q | CLASS I | | Capacitance $\geq 30\text{pF}$: $Q \geq 1,000$ < 30pF : $Q \geq 400 + 20 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | | Rated Voltage $\geq 25\text{V}$: 0.025 max $\geq 16\text{V}$: 0.035 max $\geq 10\text{V}$: 0.05max |
| IR | | More than 10,000 $\text{M}\Omega$ or 500 $\text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | | |
| 12 | Resistance to Solder Heat | Appearance | No abnormal exterior appearance | Solder pot : $260 \pm 5^\circ\text{C}$, $10 \pm 1\text{sec}$. | |
| | | Capacitance Change | CLASS I | | Within $\pm 2.5\%$ or 0.25pF, (Whichever is larger) |
| | | | CLASS II | | Within $\pm 10\%$ |
| | | Q | CLASS I | | Capacitance $\geq 30\text{pF}$: $Q \geq 1,000$ < 30pF : $Q \geq 400 + 20 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | | Rated Voltage $\geq 25\text{V}$: 0.025 max $\geq 16\text{V}$: 0.035 max $\geq 10\text{V}$: 0.05max |
| IR | | More than 10,000 $\text{M}\Omega$ or 500 $\text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | | |
| 13 | Thermal Shock | Appearance | No abnormal exterior appearance | -55 $^\circ\text{C}$ /+125 $^\circ\text{C}$ Note: Number of cycles required - 300, Maximum transfer time-20 sec, Dwell time-15min. Air-Air | |
| | | Capacitance Change | CLASS I | | Within $\pm 2.5\%$ or 0.25pF, (Whichever is larger) |
| | | | CLASS II | | Within $\pm 10\%$ |
| | | Q | CLASS I | | Capacitance $\geq 30\text{pF}$: $Q \geq 1,000$ < 30pF : $Q \geq 400 + 20 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | | Rated Voltage $\geq 25\text{V}$: 0.025 max $\geq 16\text{V}$: 0.035 max $\geq 10\text{V}$: 0.05max |
| IR | | More than 10,000 $\text{M}\Omega$ or 500 $\text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | | |
| 14 | ESD | Appearance | No abnormal exterior appearance | AEC-Q200-002 | |
| | | Capacitance Change | CLASS I | | Within $\pm 2.5\%$ or 0.25pF, (Whichever is larger) |
| | | | CLASS II | | Within $\pm 10\%$ |
| | | Q | CLASS I | | Capacitance $\geq 30\text{pF}$: $Q \geq 1,000$ < 30pF : $Q \geq 400 + 20 \times C$ (C : Capacitance) |
| | | Tan δ | CLASS II | | Rated Voltage $\geq 25\text{V}$: 0.025 max $\geq 16\text{V}$: 0.035 max $\geq 10\text{V}$: 0.05max |
| IR | | More than 10,000 $\text{M}\Omega$ or 500 $\text{M}\Omega \times \mu\text{F}$ (Whichever is smaller) | | | |

| No | Item | Performance | Test Condition | | | | | | | | | | | | | | | | | | |
|---|--|---|---|---|-----------------|-----------|------|---------|----------|-------------|--------------------------|----------|-------------|---------------|----------|---------|--------------------------|---------------|---------|--------------|---------------|
| 15 | Solderability | 95% of the terminations is to be soldered evenly and continuously | a) Preheat at 155 °C for 4 hours, Immerse in solder for 5s at 235 ± 5 °C b) Steam aging for 8 hours, Immerse in solder for 5s at 235 ± 5 °C c) Steam aging for 8 hours, Immerse in solder for 120s at 260 ± 5 °C solder : a solution ethanol and rosin | | | | | | | | | | | | | | | | | | |
| 16 | Electrical Characterization | Capacitance | Within specified tolerance | | | | | | | | | | | | | | | | | | |
| | | Q | CLASS I Capacitance ≥ 30pF : Q ≥ 1,000 < 30pF : Q ≥ 400 + 20 × C (C: Capacitance) | | | | | | | | | | | | | | | | | | |
| | | Tanδ | CLASS II Rated Voltage ≥ 25V : 0.025 max ≥ 16V : 0.035 max ≥ 10V : 0.05max | | | | | | | | | | | | | | | | | | |
| | | IR@25 °C | CLASS I | More than 100,000 μΩ or 1,000 μΩ × μF (Whichever is smaller) | | | | | | | | | | | | | | | | | |
| | | | CLASS II | More than 10,000 μΩ or 500 μΩ × μF (Whichever is smaller) | | | | | | | | | | | | | | | | | |
| | | IR@125 °C | CLASS I | More than 10,000 μΩ or 100 μΩ × μF (Whichever is smaller) | | | | | | | | | | | | | | | | | |
| CLASS II | More than 1,000 μΩ or 10 μΩ × μF (Whichever is smaller) | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | No dielectric breakdown or mechanical breakdown | | | | | | | | | | | | | | | | | | | | |
| The Capacitance /D.F. should be measured at 25 °C, | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Class</th> <th>Capacitance</th> <th>Frequency</th> <th>Vrms</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Class I</td> <td>1000pF ↓</td> <td>1 kHz ± 10%</td> <td>0.5~5Vrms</td> </tr> <tr> <td>1000pF ↑</td> <td>1 kHz ± 10%</td> <td>1.0 ± 0.2Vrms</td> </tr> <tr> <td rowspan="2">Class II</td> <td>10 μF ↓</td> <td>1 kHz ± 10%</td> <td>1.0 ± 0.2Vrms</td> </tr> <tr> <td>10 μF ↑</td> <td>120 Hz ± 20%</td> <td>0.5 ± 0.1Vrms</td> </tr> </tbody> </table> | | | | Class | Capacitance | Frequency | Vrms | Class I | 1000pF ↓ | 1 kHz ± 10% | 0.5~5Vrms | 1000pF ↑ | 1 kHz ± 10% | 1.0 ± 0.2Vrms | Class II | 10 μF ↓ | 1 kHz ± 10% | 1.0 ± 0.2Vrms | 10 μF ↑ | 120 Hz ± 20% | 0.5 ± 0.1Vrms |
| Class | Capacitance | Frequency | Vrms | | | | | | | | | | | | | | | | | | |
| Class I | 1000pF ↓ | 1 kHz ± 10% | 0.5~5Vrms | | | | | | | | | | | | | | | | | | |
| | 1000pF ↑ | 1 kHz ± 10% | 1.0 ± 0.2Vrms | | | | | | | | | | | | | | | | | | |
| Class II | 10 μF ↓ | 1 kHz ± 10% | 1.0 ± 0.2Vrms | | | | | | | | | | | | | | | | | | |
| | 10 μF ↑ | 120 Hz ± 20% | 0.5 ± 0.1Vrms | | | | | | | | | | | | | | | | | | |
| I.R. should be measured with a DC voltage not exceeding Rated Voltage @25 °C, @125 °C for 60~120 sec. | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength : 250% of the rated voltage for 1~5 seconds The charge/discharge current is less than 50mA. | | | | | | | | | | | | | | | | | | | | | |
| 17 | Board Flex | Appearance | No abnormal exterior appearance | | | | | | | | | | | | | | | | | | |
| | | Capacitance Change | CLASS I Within ± 5.0% or 0.5pF, (Whichever is larger) | | | | | | | | | | | | | | | | | | |
| | | | CLASS II Within ± 10% | | | | | | | | | | | | | | | | | | |
| Bending to the limit for 5 seconds Limit : Class I - 3mm Class II - 2mm | | | | | | | | | | | | | | | | | | | | | |
| 18 | Terminal Strength(SMD) | Appearance | No abnormal exterior appearance | | | | | | | | | | | | | | | | | | |
| | | Capacitance Change | CLASS I Within ± 2.5% or 0.25pF, (Whichever is larger) | | | | | | | | | | | | | | | | | | |
| | | | CLASS II Within ± 10% | | | | | | | | | | | | | | | | | | |
| 18N, for 60 ± 1 sec. * 0603(1608) -10N, 0402(1005) -2N | | | | | | | | | | | | | | | | | | | | | |
| 19 | Beam Load | Destruction value should be exceed Chip Length ≤ 2.5mm a) Chip Thickness > 0.5mm : 20N b) Chip Thickness ≤ 0.5mm : 8N Chip Length ≥ 3.2mm a) Chip Thickness ≥ 1.25mm : 54.5N b) Chip Thickness < 1.25mm : 15N | Beam speed Chip Length ≤ 2.5mm, 0.5 ± 0.05 mm/sec Chip Length ≥ 3.2mm, 2.5 ± 0.25 mm/sec | | | | | | | | | | | | | | | | | | |
| 20 | Capacitance Temperature Characteristics | Capacitance Change | CLASS I 0 ± 30 ppm/°C | | | | | | | | | | | | | | | | | | |
| | | | CLASS II Within ± 15% | | | | | | | | | | | | | | | | | | |
| | | Temperature Coefficient | CLASS I 0 ± 30 ppm/°C | | | | | | | | | | | | | | | | | | |
| | | | CLASS I Within ± 0.2% or 0.05pF, (Whichever is larger) | | | | | | | | | | | | | | | | | | |
| | | Capacitance Drift | CLASS I | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature(°C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25 ± 2</td> <td>1</td> </tr> <tr> <td>2</td> <td>Min. Operating Temp. ± 2</td> <td>15 ± 3</td> </tr> <tr> <td>3</td> <td>25 ± 2</td> <td>1</td> </tr> <tr> <td>4</td> <td>Max. Operating Temp. ± 2</td> <td>15 ± 3</td> </tr> <tr> <td>5</td> <td>25 ± 2</td> <td>1</td> </tr> </tbody> </table> | | | | Step | Temperature(°C) | Time(min) | 1 | 25 ± 2 | 1 | 2 | Min. Operating Temp. ± 2 | 15 ± 3 | 3 | 25 ± 2 | 1 | 4 | Max. Operating Temp. ± 2 | 15 ± 3 | 5 | 25 ± 2 | 1 |
| Step | Temperature(°C) | Time(min) | | | | | | | | | | | | | | | | | | | |
| 1 | 25 ± 2 | 1 | | | | | | | | | | | | | | | | | | | |
| 2 | Min. Operating Temp. ± 2 | 15 ± 3 | | | | | | | | | | | | | | | | | | | |
| 3 | 25 ± 2 | 1 | | | | | | | | | | | | | | | | | | | |
| 4 | Max. Operating Temp. ± 2 | 15 ± 3 | | | | | | | | | | | | | | | | | | | |
| 5 | 25 ± 2 | 1 | | | | | | | | | | | | | | | | | | | |

* If you want more detailed information, Please Visit Samsung Electro-mechanics website(www.sem1cr.com)

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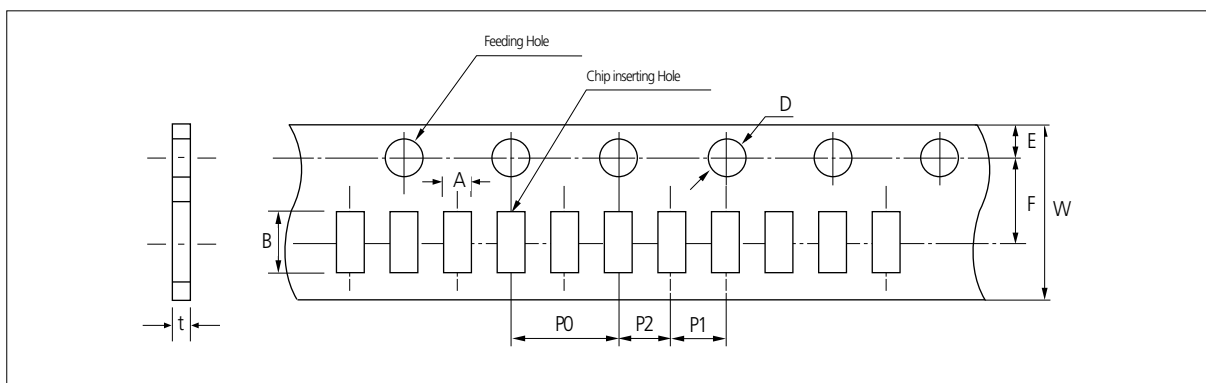
Cardboard Paper Tape(4mm)



Unit: inch(mm)

| Symbol | | A | B | W | F | E | P1 | P2 | P0 | D | t |
|-----------|----------------------------|------------------|------------------|------------------|-------------------|-------------------|------------------|-------------------|------------------|------------------------------|--------------|
| Type | | | | | | | | | | | |
| Dimension | 0504 (1410) | 1.3 ± 0.2 | 1.7 ± 0.2 | 8.0 ± 0.3 | 3.5 ± 0.05 | 1.75 ± 0.1 | 4.0 ± 0.1 | 2.0 ± 0.05 | 4.0 ± 0.1 | $\varnothing 1.5$ $+0/-0$ | 1.1 Below |
| | 0603 0306 (1608) (0816) | 1.1 ± 0.2 | 1.9 ± 0.2 | | | | | | | | |
| | 0805 0508 (2012) (1220) | 1.6 ± 0.2 | 2.4 ± 0.2 | | | | | | | | |
| | 1206 0612 (3216) (1632) | 2.0 ± 0.2 | 3.6 ± 0.2 | | | | | | | | |

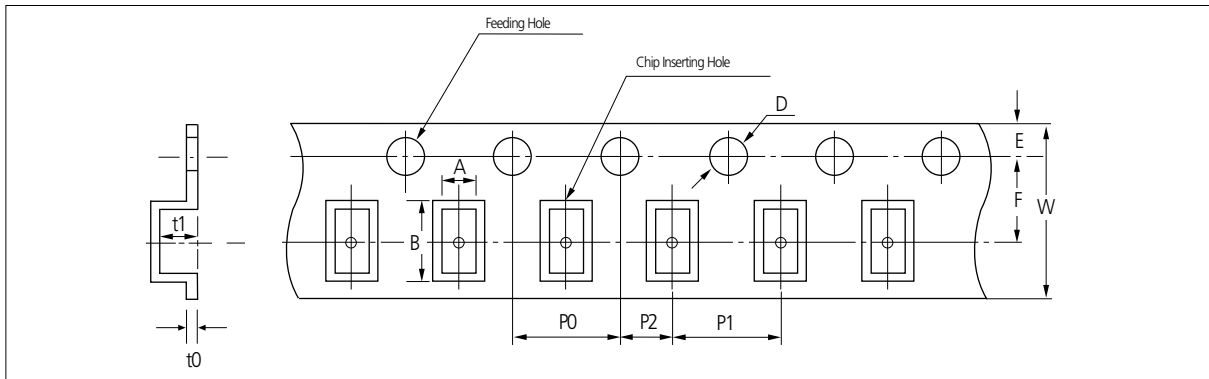
Cardboard Paper Tape(2mm)



Unit: inch(mm)

| Symbol | | A | B | W | F | E | P1 | P2 | P0 | D | t |
|-----------|-----------------|----------------------------|----------------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|--|--------------------|
| Type | | | | | | | | | | | |
| Dimension | 01005 (0402) | 0.24 ± 0.02 | 0.44 ± 0.02 | 8.0 ± 0.3 | 3.5 ± 0.05 | 1.75 ± 0.1 | 2.0 ± 0.05 | 2.0 ± 0.05 | 4.0 ± 0.1 | $\varnothing 1.5$ $+0.1$ -0.03 | 0.23 ± 0.02 |
| | 0201 (0603) | 0.38 ± 0.03 | 0.68 ± 0.03 | | | | | | | | 0.37 ± 0.03 |
| | 0402 (1005) | 0.62 ± 0.04 | 1.12 ± 0.04 | | | | | | | | 0.37 ± 0.05 |
| | | | | | | | | | | | 0.60 ± 0.05 |
| | 0204 (0510) | 0.62 $+0.05$ -0.10 | 1.12 $+0.05$ -0.10 | | | | | | | | 0.37 ± 0.03 |

Embossed Plastic Tape



Unit: inch(mm)

| Symbol Type | A | B | W | F | E | P1 | P2 | P0 | D | t1 | t0 |
|-----------------|----------------|-------------------------|------------------------|--------------|--------------|--------------|--------------|--------------|------------------------|---------------|--------------|
| 01005 (0402) | 0.25 ±0.02 | 0.45 ±0.02 | 4.0 ±0.05 | 1.8 ±0.02 | 0.9 ±0.05 | 1.0 ±0.02 | 1.0 ±0.02 | 2.0 ±0.04 | ∅0.8 ±0.04 | 0.24 ±0.02 | 0.5 max |
| Dimension | 0603 (1608) | 1.05 ±0.15 | 1.9 ±0.15 | 8.0 ±0.3 | 3.5 ±0.05 | 4.0 ±0.1 | 2.0 ±0.05 | 4.0 ±0.1 | ∅1.5 +0.1/ -0.03 | 2.9 max | 0.6 Below |
| | 0805 (2012) | 1.45 ±0.2 | 2.3 ±0.2 | | | | | | | | |
| | 1206 (3216) | 1.9 ±0.2 | 3.5 ±0.2 | | | | | | | | |
| | 1210 (3225) | 2.8 ±0.2 | 3.6 ±0.2 | | | | | | | | |
| | 1808 (4520) | 2.3 ±0.2 | 4.9 ±0.2 | | | | | | | | |
| | 1812 (4532) | 3.6 ±0.2 | 4.9 ±0.2 | | | | | | | | |
| | 2220 (5750) | 5.5 ±0.2 | 6.2 ±0.2 | | | | | | | | |
| | 0204 (5010) | 0.62 +0.05 /-0.10 | 1.12 +0.05 -0.10 | | | | | | | | |
| | 0306 (0816) | 1.1 ±0.2 | 1.9 ±0.2 | | | | | | | | |
| | 0508 (1220) | 1.45 ±0.2 | 2.3 ±0.2 | | | | | | | | |
| 0612 (1632) | 2.0 ±0.2 | 3.6 ±0.2 | 0.8 ±0.3 | 3.5 ±0.05 | 4.0 ±0.1 | 2.5 max | | | | | |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

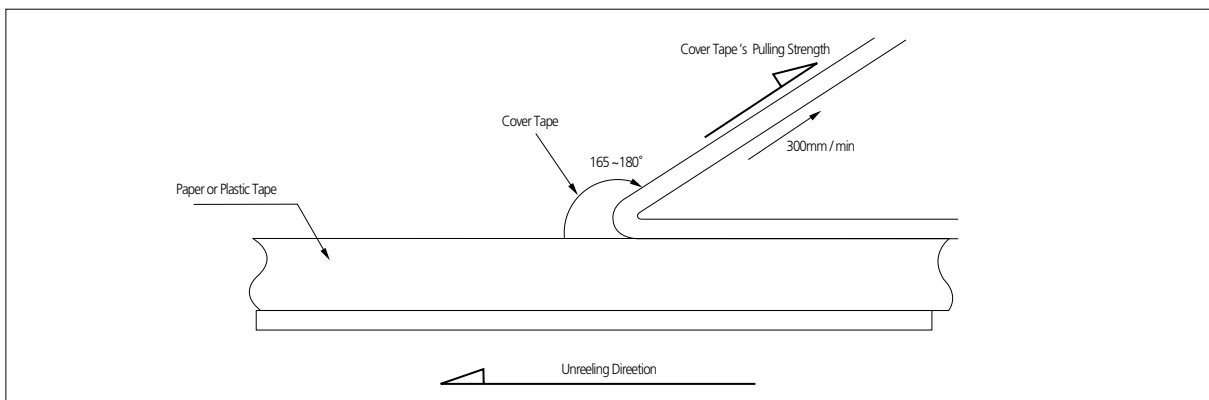
Premium Capacitors for Automotive Applications

Packaging Specification

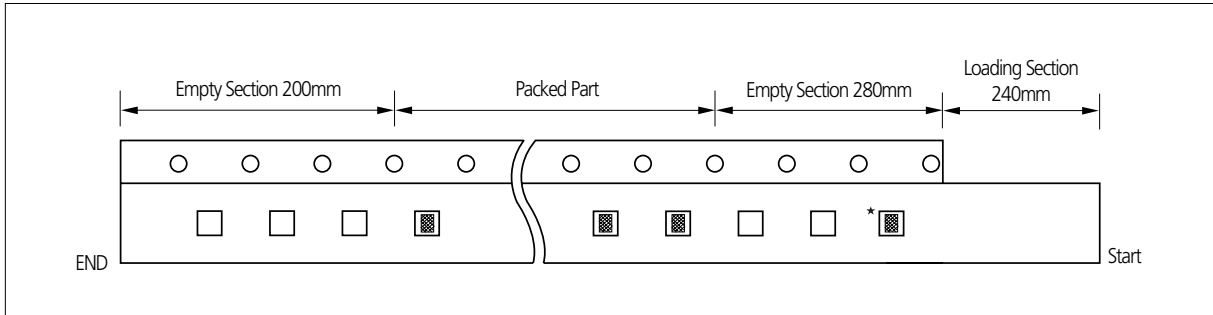
Application Manual for Surface Mounting

Peeling off of Cover Tape

- 5 g.f ≤ Peel off force ≤ 70 g.f



Taping Size



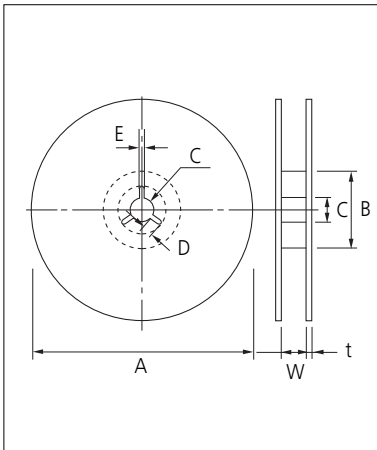
- The chip is only use for identifying the label and packaged products.
Please don't use the chip.

Unit: kpcs

| Size | T code | Quantity & Packing Code | | | | | | | | |
|-------------|------------|-------------------------|---------------|----------------|----------------|----------------|---------------|---------------|----------------|----------------|
| | | Paper Type | | | | | Plastic Type | | | |
| | | C (7"reel) | H (7"reel) | O (10"reel) | D (13"reel) | L (13"reel) | E (7"reel) | G (7"reel) | F (13"reel) | S (10"reel) |
| 01005(0402) | 2 | 20 | - | - | - | - | 50 | - | - | - |
| 0201(0603) | 3 | 10 | 15 | 30 | 50 | - | - | - | - | |
| 0402(1005) | 3 | 10 | 15 | 30 | 50 | - | - | - | - | |
| | 5 | 10 | - | 30 | 50 | 40 | - | - | - | |
| 0504(1410) | 8 | 4 | - | 10 | 10 | 15 | - | - | - | |
| 0603(1608) | 5 | 4 | - | 10 | 10 | - | - | - | - | |
| | 8 | 4 | - | 10 | 10 | 15 | 3 | - | - | |
| 0604(1610) | D | - | - | - | - | - | 3 | - | 10 | 6 |
| 0805(2012) | A, C | 4 | - | 10 | 10 | 15 | - | - | - | - |
| | E, F, Q | - | - | - | - | - | 2 | 3 | 10 | 6 |
| 1206(3216) | C | 4 | - | 10 | 10 | 15 | - | - | - | - |
| | E, F, P | - | - | - | - | - | 2 | 3 | 10 | 6 |
| | H | - | - | - | - | - | 2 | - | 8 | 4 |
| 1210(3225) | 9, D, C, O | - | - | - | - | - | 2 | - | 10 | - |
| | E, F, M | - | - | - | - | - | 2 | - | 10 | - |
| | H, T | - | - | - | - | - | 2 | - | 8 | 4 |
| | I, U | - | - | - | - | - | 2 | - | 4 | - |
| | J, V | - | - | - | - | - | 1 | - | 4 | - |
| | S | - | - | - | - | - | 2 | - | 8 | - |
| 1808(4520) | F | - | - | - | - | - | 2 | - | - | - |
| 1812(4532) | F, H, I | - | - | - | - | - | 1 | - | 4 | - |
| | L, J | - | - | - | - | - | - | - | 2 | - |
| 2220(5750) | H, I, J | - | - | - | - | - | - | - | 2 | - |

* Note : This catalog has only typical specifications because there is no space for detailed specifications.
Please approve our product specifications or transact the approval sheet for product specifications before ordering.

Reel Dimensions



Unit: mm

| Symbol | Tape Width | A | B | C | D |
|----------|------------|--------------------------|-------------------------|-------------------------|------------|
| 7" Reel | 8mm | $\varnothing 180+0/-3$ | $\varnothing 60\pm 1.0$ | $\varnothing 13\pm 0.3$ | 4 ± 0.2 |
| | 12mm | $\varnothing 180+0/-3$ | $\varnothing 60+1/-0$ | $\varnothing 13\pm 0.3$ | 4 ± 0.2 |
| 10" Reel | 8mm | $\varnothing 258+0/-3$ | $\varnothing 80+1/-0$ | $\varnothing 13\pm 0.3$ | 4 ± 0.2 |
| | 12mm | $\varnothing 258+0/-3$ | $\varnothing 80+1/-0$ | $\varnothing 13\pm 0.3$ | 4 ± 0.2 |
| 13" Reel | 8mm | $\varnothing 330\pm 2.0$ | $\varnothing 80\pm 1.0$ | $\varnothing 13\pm 0.3$ | 4 ± 0.2 |
| | 12mm | $\varnothing 330\pm 2.0$ | $\varnothing 80\pm 1.0$ | $\varnothing 13\pm 0.3$ | 4 ± 0.2 |

| Symbol | Tape Width | E | W | t |
|----------|------------|--------------|-------------|--------------|
| 7" Reel | 8mm | 2.0 ± 0.5 | 9 ± 0.5 | 1.2 ± 0.2 |
| | 12mm | 2.0 ± 0.5 | 13 ± 0.5 | 1.2 ± 0.2 |
| 10" Reel | 8mm | 2.0 ± 0.5 | 9 ± 0.5 | 1.8 ± 0.2 |
| | 12mm | 2.0 ± 0.5 | 13 ± 0.5 | 1.8 ± 0.2 |
| 13" Reel | 8mm | 2.0 ± 0.5 | 9 ± 0.5 | 2.2 ± 0.2 |
| | 12mm | 2.0 ± 0.5 | 13 ± 0.5 | 2.2 ± 0.2 |

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

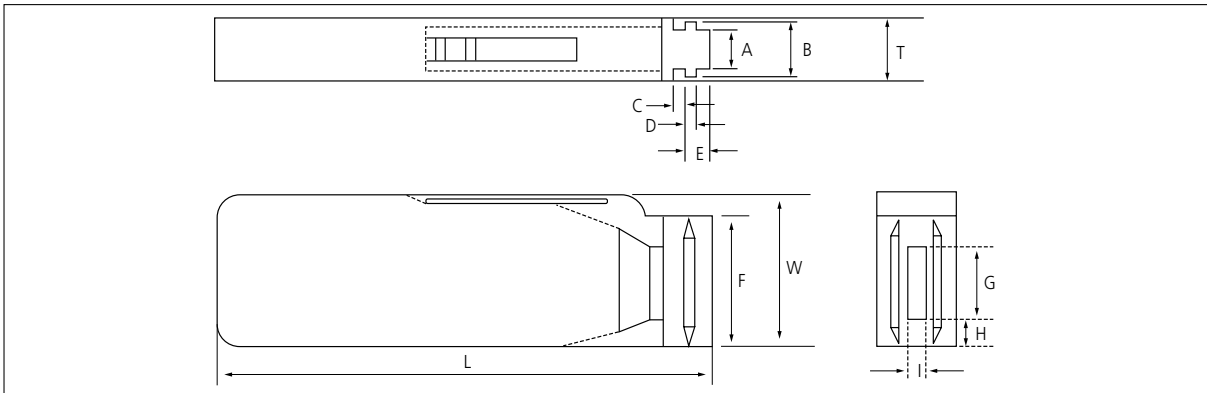
Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting

Bulk Case Packaging

- Bulk case packaging can reduce the stock space and transportation costs.
- The bulk feeding system can increase the productivity.
- It can eliminate the components loss.



Unit: mm

| Symbol | A | B | T | C | D | E |
|-----------|--------------|--------------|-------------|--------------|------------|--------------|
| Dimension | 6.8 ± 0.1 | 8.8 ± 0.1 | 12 ± 0.1 | $1.5+0.1/-0$ | $2+0/-0.1$ | $3.0+0.2/-0$ |

| Symbol | F | W | G | H | L | I |
|-----------|---------------|-------------|--------------|-------------|--------------|-------------|
| Dimension | $31.5+0.2/-0$ | $36+0/-0.2$ | 19 ± 0.35 | 7 ± 0.35 | 110 ± 0.7 | 5 ± 0.35 |

• QUANTITY

Unit: inch(mm) and pcs

| Size | 0402(1005) | 0603(1608) | 0805(2012) | |
|----------|------------|------------------|-----------------|----------------|
| | | | T \leq 0.85mm | T \geq 1.0mm |
| Quantity | 50,000 | 10,000 or 15,000 | 10,000 | 5,000 |

Application Manual for Surface Mounting

1. Storage of products

1-1. Storage Environment

Tape packing materials are designed to withstand long-term storage, but they will degrade more rapidly in the presence of high temperature or high humidity. Therefore, the products must be stored in an ambient 5~40°C with a relative humidity of 20~70%. Allowable storage period is within 6 months from the outgoing date of delivery.

1-2. Corrosive Gases

Since sulfur and chlorine may degrade the solderability of the end termination, it is important to store the capacitors in an environment free of these gases.

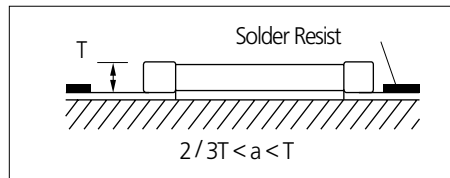
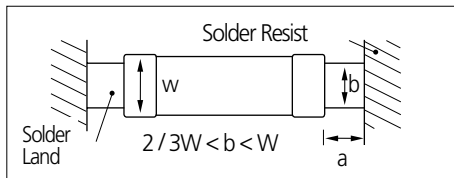
1-3. Temperature Fluctuations

Since dew condensation may occur by the differences in temperature when the products are taken out of storage, it is important to maintain a temperature-controlled environment.

2. Design of Solder Land Pattern

When designing printed circuit boards, the shape and size of the solder lands must allow for the proper amount of solder on the capacitor. The amount of solder at the end terminations has a direct effect on the probability that the chip will crack. The greater amount of solder, the larger amount of stress on the chip, and the more likely that it will break. Use the following illustrations as guidelines for proper Solder land design.

Recommendation of solder Land Shape and Size



3. Adhesives

MLCCs generally require the use of an adhesive to position the chips to the circuit board prior to soldering.

3-1. Requirements for Adhesives

They must have enough adhesion so that the chips will not fall off or move during the handling of the circuit board.

They must maintain their adhesive strength when exposed to soldering temperatures.

They should not spread or run when applied to the circuit board.

They should have a long pot life.

They should harden quickly.

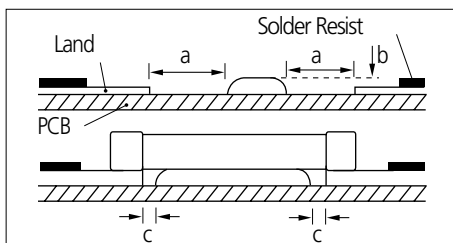
They should not corrode the circuit board or chip material.

They should be a good insulator.

They should be non-toxic, and not produce harmful gases, nor be harmful when touched.

3-2. Application Method

It is important to use the proper amount of adhesive. Too little will cause poor adhesion to the circuit board, and too much may strain the conductor pattern, thereby causing defective soldering. The following illustrations show the proper quantity of adhesive.



| Unit: mm | | |
|----------|----------|----------|
| Type | 21 | 31 |
| a | 0.2min | 0.2min |
| b | 70~100μm | 70~100μm |
| c | >0 | >0 |

3-3. Adhesive hardening Characteristics

To prevent oxidation of the terminations, the adhesive must harden at 160°C or less, within 2 minutes or less.

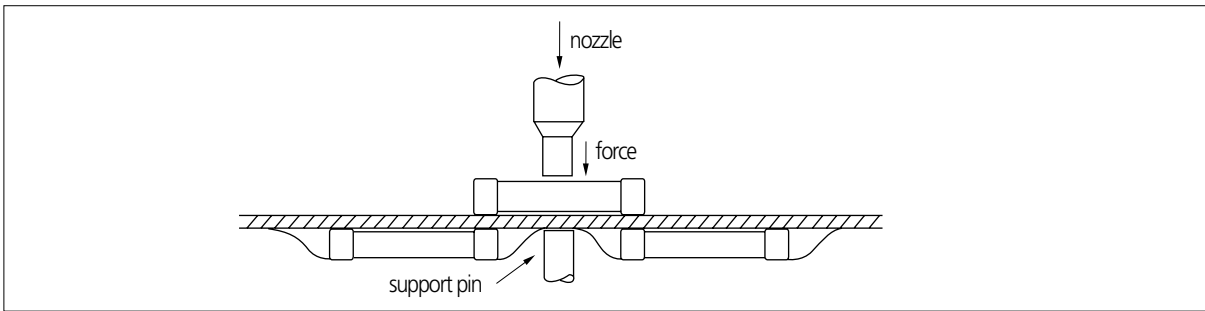
4. Mounting

4-1. Mounting Head Pressure

Excessive pressure will cause chip capacitors to crack. The pressure between nozzle and chip capacitor will be 300g maximum during mounting.

4-2. Bending Stress

Bending of printed circuit board by mounting head when double-sided circuit boards are used, chip capacitors first are mounted and soldered onto one side of the board. When the capacitors are mounted onto the other side, it is important to support the board as shown in the illustration. If the circuit board is not supported, it may bend, causing the already-installed capacitors to crack.



5. Flux

Although highly-activated flux gives better solderability, substances which increase activity may also degrade the insulation of the chip capacitors. To avoid such degradation, it is recommended that a mildly activated rosin flux (less than 0.2% chlorine) be used.

6. Soldering

Since a multilayer ceramic chip capacitor comes into direct contact with melted solder during soldering, it is exposed to potentially mechanical stress caused by the sudden temperature change. The capacitor may also be subject to silver migration, and to contamination by the flux. Because of these factors, soldering technique is critical.

6-1. Soldering Methods

| Method | Classification | |
|------------------|--------------------------------|---|
| Reflow soldering | · Overall heating | · Infrared rays · Hot plate · VPS (Vapor phase) |
| | · Local heating | · Air heater · Laser · Light beam |
| Flow Soldering | · Single wave · Double wave | |

6-2. Soldering Profile

To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph.

Part Numbering System

General Capacitors

High Capacitance Capacitors

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Medium-High Voltage Capacitors

Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

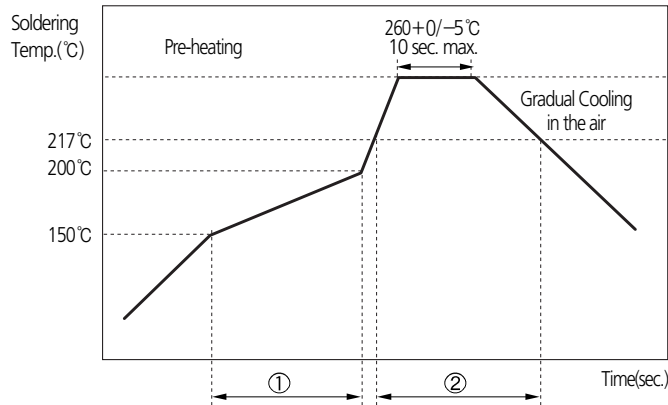
Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting

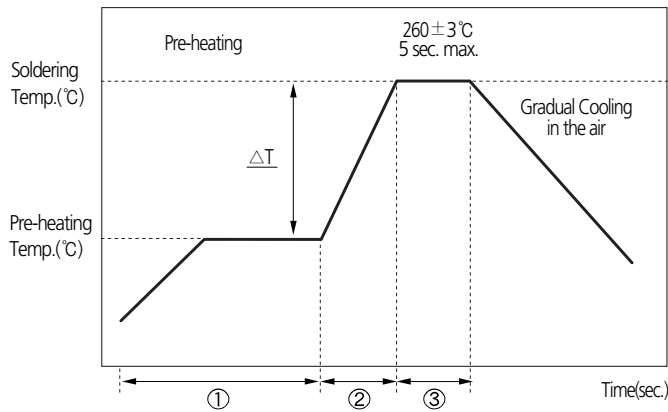
6-2-1 Pb-Free (Sn 100%) Plating

▪ **REFLOW SOLDERING**



| Soldering Temp. (°C) | Pre-heating Time (①, sec.) | Soldering Time (②, sec.) |
|----------------------|----------------------------|--------------------------|
| 260+0/-5°C | 60~120 | 60~150 |

▪ **FLOW SOLDERING**



| ΔT (°C) | Soldering Temp. (°C) | Pre-heating Time (①+②, sec.) | Soldering Time (③, sec.) |
|-------------------------------|----------------------|------------------------------|--------------------------|
| ≤150 (1206 and below size) | 260±3 | ≥120 | ≤5 |

▪ **SOLDER IRON(Hand Soldering)**

| Variation of Temp.(°C) | Soldering Temp(°C) | Pre-heating Time(sec.) | Soldering Time(sec.) | Cooling Time(sec.) | Condition of Iron Facilities | | |
|------------------------|--------------------|------------------------|----------------------|--------------------|------------------------------|--------------|----------------|
| | | | | | Wattage | Tip Diameter | Soldering Time |
| ΔT≤130 | 300±10°C max. | ≥ 60 sec. | ≤ 4 sec. | - | 20W max. | 3mm max. | 4 sec max. |

※ Caution - Iron tip should not contact with ceramic body directly

6-3. Manual Soldering

Manual soldering can pose a great risk of creating thermal cracks in chip capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator's carelessness may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and close attention must be paid to the selection of the soldering iron tip and to temperature control of the tip.

6-4. Amount of Solder

| | | |
|-------------------|--|--|
| Too much Solder | | Cracks tend to occur due to large stress. |
| Not enough solder | | Weak holding force may cause bad connections or detaching of the capacitor |

6-5. Cooling

Natural cooling using air is recommended. If the chips are dipped into solvent for cleaning, the temperature difference (ΔT) must be less than 100°C

6-6. Cleaning

If rosin flux is used, cleaning usually is unnecessary. When strongly activated flux is used, chlorine in the flux may dissolve into some types of cleaning fluids, thereby affecting the chip capacitors. This means that the cleaning fluid must be carefully selected, and should always be new.

7. Notes for Separating Multiple, Shared PC Boards

A multi-PC board is separated into many individual circuit boards after soldering has been completed. If the board is bent or distorted at the time of separation, cracks may occur in the chip capacitors. Carefully choose a separation method that minimizes the bending of the circuit board.

Part Numbering System

General Capacitors

High Capacitance Capacitors

Super Small Size Capacitors

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Array Type Capacitors

Low ESL Capacitors

Reliability Test Condition

Premium Capacitors for Automotive Applications

Packaging Specification

Application Manual for Surface Mounting



SAMSUNG
ELECTRO-MECHANICS



Sony Green Partner

**Certificate
Green Partner**

Presented To: **SKD 5431**

**Samsung Japan Corporation
SAMSUNG ELECTRO-MECHANICS CO., LTD. SUMON FACTORY**

This is to certify that you have successfully established an environmental management system that has met the requirements of the Sony Green Partner Program

Term of Validity: 2010/6/1 ~ 2012/5/31
Issued on: 2010/5/31
Approved and issued by: Procurement Group, Sony Corporation

Kazuaki Takano
Product Procurement Group, Sony Corporation

SONY 87574

ISO/TS 16949

**Certificate
of Registration**

QUALITY MANAGEMENT SYSTEM - ISO/TS 16949:2009

This is to certify that **Samsung Electro-Mechanics Co., Ltd.** (Samsung ECU, #114, Maetan-3-dong, Yongsong-gu, Gyeonggi-do, 442-743, Republic of Korea)

has successfully established and operates a Quality Management System which complies with the requirements of ISO/TS 16949:2009 for the following scope:

The design and manufacture of multi-layer ceramic capacitors.

Presented to: **SKD 5431**

For and on behalf of: **BSI**

Managing Director, 2/F, 3901
Original registered: 2010/09/01
Date of Issue: 2010/09/01
Expiry Date: 2013/08/31
Page 1 of 2

ISO 14001

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the environmental management system of **Samsung High Tech Electro-mechanics (Tianjin) Co., Ltd.** (At: 1, Weisan Road, Micro-Electronics Industrial Park, Xiqing District, Tianjin, 300381, P.R. China)

is conforming with **GB/T24001-2004 / ISO14001:2004**

This certificate is valid for the following scope:

Chip-resistor, Light Emitting Diode, Image Sensor Module Production Manage Activity because it is involved.

This certificate is valid from April 26, 2009 to April 27, 2012. It is valid within the scope of validity of all the examinations and certification. In the case that the organizational structure, scope, premises, processes, this certificate shall be valid when used together with the Rules for Maintenance of Issue of Certificates and scope.

China Certification Center, Inc. General Manager: **Sheng**
Date of Issue: April 26, 2009

OHSAS18001

**Certificate
of Registration**

This is to certify that **Samsung Electro-Mechanics Co., Ltd.** (Samsung ECU, #114, Maetan-3-dong, Yongsong-gu, Gyeonggi-do, 442-743, Korea)

has successfully established and operates an Occupational Health and Safety Management System which complies with the requirements of OHSAS 18001:2007 for the following scope:

The manufacture of computer peripheral, network products and components for personal mobile communication, various radio units.

The manufacture of IC/High Density Interconnectors, MCM/MLB Laser Diode components, MCM/MLB Laser Chip Drivers, IC/High Density Interconnectors (HDI) (Image Sensor Module) and PCB/Flexible Printed Circuit Board.

The design of printed circuit board.

For and on behalf of: **BSI**

Certification Manager, Systems Assessment
Originally registered: 24 May 2009. Latest issue: 16 Jul 2009. Expiry date: 09 Jul 2009. Page 1 of 2

QC 080000 IECQ HSPM

IEC QUALITY ASSESSMENT SYSTEM (IECQ)
Component, Electronic Components, Assembly, Related Materials and Processes
for sales and resale of the IECQ and non-IECQ

**IECQ Certificate of Conformity
Hazardous Substance Process Management**

IECQ Certificate No.: IECQ-HSPM-1011 Issue No.: 1 Status: Current
Expiry Date: 2013/07/01 Issued Date: 2010/07/01
CB Certificate Number: KR-HSPM-1011 Expiration: 2013/07/01

Assessment by: **Samsung Electronics 2009/06/01** (Final)
Other activities: **Other activities**

Samsung Electro-Mechanics Co., Ltd. SUMON HQ
#114 Maetan-3-dong, Yongsong-gu,
Gyeonggi-do, 442-743, Korea

The organization has developed and implemented Hazardous Substance Process Management procedures and related processes which have been assessed and found to conform with the IECQ HSPM (IECQ 01) and Rules of Procedure, QC 080000 of IECQ and approved which are incorporated into the organization's Management System (Quality Management System for Electronic Components (IECQ)) and with respect to the IECQ Specification (QC 080000).

This Certificate is valid within the scope, assessed, stated activity and processes of the following scope of activities:
The design and manufacture of multi-layer ceramic capacitors
(File Number: 20090305)

Certificate issued by the Certification Body (CB): **UL**
Certification Body Sponsoring HQ: **ECCB**

UL Management Systems Solutions (Taiwan) Inc.
Authorized person: **Rock Chen**
Feng-Yuan City, Taichung/Taiwan, Taiwan

Electronic Components Certification Board
Mishawaka, Texas 75958 UNITED STATES
Web Site: www.eccb.org

Quality System Certification status for each factory site

| Certification | Suwon (Korea) | Busan (Korea) | Calamba (Philippines) | Tianjin (China) | Binhai (China) |
|--------------------|--|--|--|---|---|
| ISO / TS 16949 | BSI TS 91430-000 2010-11-22 ~2013-11-21 | BSI TS 91430-001 2010-08-14 ~2013-08-13 | BSI TS 91430-005 2009-08-14 ~2012-08-13 | BSI TS 91430-007 2011-11-29 ~2014-11-28 | BSI FM 573288 2011-06-17 ~2014-06-16 |
| ISO 14001 | UL 20003847 UM 2010-07-12 ~2013-07-11 | UL 20003857 UM 2010-07-11 ~2013-07-10 | BSI EMS 77354 2009-08-04 ~2012-08-03 | CCCI 02107E1044R4L 2009-04-28 ~2012-04-27 | |
| OHSAS 18001 | UL 20003847 BSOH 2010-07-25 ~2013-07-24 | UL 20003857 BSOH 2010-07-25 ~2013-07-24 | BSI OHS 568723 2010-12-21 ~2013-12-20 | CCCI 02109S10089R2L 2009-04-28 ~2012-04-27 | |
| Sony Green Partner | Sony SKD 5431 2010-06-01 ~2012-05-31 | Sony SKD 5432 2010-06-01 ~2012-05-31 | Sony SKD 5434 2010-06-01 ~2012-05-31 | Sony SKD 5437 2010-06-01 ~2012-05-31 | |
| QC 080000 | UL KR-HSPM-1011 2010-07-02 ~2013-07-01 | UL KR-HSPM-1012 2010-07-20 ~2013-07-19 | UL PI-HSPM-1001 2010-07-05 ~2013-07-04 | UL PRC-HSPM-1767 2010-07-27 ~2013-07-26 | |



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