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|---|--|--|
| SPECIFICATION SHEET NO. | R1212- 0603W475K250XD | |
| ORIGINAL MFG/PART NO. | Aillen Capacitors/0603W475K250XD | |
| NEXTGEN PART CODE | 0603W475K250XD | Indicate This Code For RFQ/Order |
| DATE | Dec. 12, 2024 | |
| REVISION | A9 | Updated With Most Recent Data |
| DESCRIPTION AND MAIN PARAMETRICS | <p>Low Voltage Multilayer Ceramic Chip Capacitors (MLCC), 0603 Series Case 1608 Metric 0603, Dimension L1.60*W0.80*H0.80mm Thickness: 1.00mm Max. Dielectric X5R, Capacitance 4.7μF, Tolerance ±10% Rated Voltage 25V Operating Temp. Range -55°C ~+85°C Package in Tape/Reel, 4,000pcs/Reel REACH/RoHS/RoHS III Compliant</p> | |
| CUSTOMER | | |
| CUSTOMER PART NUMBER | | |
| CROSS REF. PART NUMBER | | |
| MEMO | | |

| | | | |
|-------------------------------|---|--|---|
| VENDOR APPROVE | | | |
| Issued/Checked/Approved |  |  |  |
| Effective Date: Dec. 12, 2024 | | | |

| | |
|-------------------------|--|
| CUSTOMER APPROVE | |
| | |
| DATE: | |

DESCRIPTION

MLCC consists of a conducting material and electrodes. To manufacture a chip-type SMT and achieve miniaturization, high density and high efficiency, ceramic condensers are used. MLCC is made by NP0 (COG), X7R, X5R And X6S dielectric material and which provides product with high electrical precision, stability and reliability.



Image shown is a representation only.

Exact specifications should be obtained from the product dimension.

MAIN FEATURE

- A Wide Selection Of Size Is Available
- Rated Voltage Range 6.3V ~ 100V
- High Capacitance In Given Case Size
- Temperature Characteristics: NP0 (COG), X7R, X5R and X6S
- Capacitor With Lead-free Termination (Pure Tin)
- REACH/RoHS/RoHS III Compliant



APPLICATION

- General Digital Circuit
- Power Supply by pass capacitors
- Consumer Electronics
- Telecommunication

ELECTRICAL CHARACTERISTICS

- See Page 4 ~Page 25 For Different Part Code And Rated Voltage.
- All Products Parameters are Subject To NextGen Components' Final Confirmation.

HOW TO ORDER

- Please Follow Up Part Code Guide And Indicate NextGen Part Code 0603W475K250XD For RFQ and Order.

RFQ
[Request For Quotation](#)

PART CODE GUIDE

| CODE | NAME | KEY SPECIFICATION OPTION |
|------|-------------------------|---|
| 0603 | Size | 0201 (0603 Metric): L0.60*W0.30mm; 0402 (1005 Metric): L1.00*W0.50mm 0603 (1608 Metric): L1.60*W0.80mm; 0805 (2012 Metric): L2.00*W1.25mm 1206 (3216 Metric): L3.20*W1.60mm; 1210 (3225 Metric): L3.20*W2.50mm 1812 (4532 Metric): L4.50*W3.20mm; 1825 (4563 Metric):L4.50*W6.30mm 2220 (5750 Metric): L5.70*W5.00mm; 2225 (5763 Metric): L5.70*W6.30mm |
| W | Temperature Coefficient | N: NPO (COG); B: X7R; W: X5R; S: X6S |
| 475 | Capacitance | Two significant digits followed by number of Zero, The 3rd digit signifies the multiplying factor, and letter R is decimal point. 8R2: 8.2pF; 331: 330pF; 472: 4700pF; 101: 100pF; 330: 33pF; 475: 4.7μF |
| K | Tolerance | A: ±0.05pF; B: ±0.1pF; C: ±0.25pF; D: ±0.5pF; F: ±1%; G: ±2%; J: ±5%; K: ±10% M: ±20% ; Z: -20/+80% |
| 250 | Rated Voltage | Two significant digits followed by No. of zeros. "R" is in place of decimal point. 4R0: 4.0VDC; 6R3: 6.3VDC; 100: 10VDC; 160: 16 VDC; 250: 25 VDC; 500: 50 VDC; 101: 100VDC |
| X | Thickness | X: 0.80 ± 0.20mm, See Page 26 ~ page 28 (T's Symbol) for Different part code |
| D | Package | A: 1Kpcs/Reel; B: 2Kpcs/Reel; C: 3Kpcs/Reel; D: 4Kpcs/Reel; E: 15Kpcs/Reel; I: 10Kpcs/Reel; J: 2.5Kpcs/Reel; K: 0.5 Kpcs/Reel |
| () | Internal Control | Blank: N/A; XX: Letter A~Z, a~z or digits (0~9) for Special/Custom Parameters |

ELECTRICAL CHARACTERISTICS – 6.3V X5R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0201W104K6R3LE | X5R | 0.1 µf | ±10% | 6.3 | 0.39 | -55 ~+85 | ±15% |
| 0201W105K6R3LE | X5R | 1 µF | ±10% | 6.3 | 0.39 | -55 ~+85 | ±15% |
| 0201W105M6R3LE | X5R | 1 µF | ±20% | 6.3 | 0.39 | -55 ~+85 | ±15% |
| 0402W105K6R3HI | X5R | 1 µF | ±10% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0402W105M6R3HI | X5R | 1 µF | ±20% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0402W106M6R3HI | X5R | 10 µF | ±20% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0402W224K6R3HI | X5R | 0.22 µF | ±10% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0402W225K6R3HI | X5R | 2.2 µF | ±10% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0402W225M6R3HI | X5R | 2.2 µF | ±20% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0402W475M6R3HI | X5R | 4.7 µF | ±20% | 6.3 | 0.70 | -55 ~+85 | ±15% |
| 0603W106K6R3XD | X5R | 10 µF | ±10% | 6.3 | 1.00 | -55 ~+85 | ±15% |
| 0603W106M6R3XD | X5R | 10 µF | ±20% | 6.3 | 1.00 | -55 ~+85 | ±15% |
| 0603W225K6R3XD | X5R | 2.2 µF | ±10% | 6.3 | 1.00 | -55 ~+85 | ±15% |
| 0603W226M6R3XD | X5R | 22 µF | ±20% | 6.3 | 1.00 | -55 ~+85 | ±15% |
| 0603W475K6R3XD | X5R | 4.7 µF | ±10% | 6.3 | 1.00 | -55 ~+85 | ±15% |
| 0603W475M6R3XD | X5R | 4.7 µF | ±20% | 6.3 | 1.00 | -55 ~+85 | ±15% |
| 0805W106K6R3CC | X5R | 10 µF | ±10% | 6.3 | 1.45 | -55 ~+85 | ±15% |
| 0805W226M6R3CC | X5R | 22 µF | ±20% | 6.3 | 1.45 | -55 ~+85 | ±15% |
| 0805W476M6R3CC | X5R | 47 µF | ±20% | 6.3 | 1.45 | -55 ~+85 | ±15% |
| 1206W107M6R3PB | X5R | 100 µF | ±20% | 6.3 | 1.90 | -55 ~+85 | ±15% |

ELECTRICAL CHARACTERISTICS – 10V X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0201W104K100LE | X5R | 0.1 µF | ±10% | 10 | 0.39 | -55 ~+85 | ±15% |
| 0201W105M100LE | X5R | 1 µF | ±20% | 10 | 0.39 | -55 ~+85 | ±15% |
| 0402W104K100HI | X5R | 0.1 µF | ±10% | 10 | 0.70 | -55 ~+85 | ±15% |
| 0402W105K100HI | X5R | 1 µF | ±10% | 10 | 0.70 | -55 ~+85 | ±15% |
| 0402W106M100HI | X5R | 10 µF | ±20% | 10 | 0.70 | -55 ~+85 | ±15% |
| 0402W224K100HI | X5R | 0.22 µF | ±10% | 10 | 0.70 | -55 ~+85 | ±15% |
| 0402W225K100HI | X5R | 2.2 µF | ±10% | 10 | 0.70 | -55 ~+85 | ±15% |
| 0603B105K100XD | X7R | 1 µF | ±10% | 10 | 1.00 | -55 ~+125 | ±15% |
| 0603B225K100XD | X7R | 2.2 µF | ±10% | 10 | 1.00 | -55 ~+125 | ±15% |
| 0603W105K100XD | X5R | 1 µF | ±10% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0603W106M100XD | X5R | 10 µF | ±20% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0603W225K100XD | X5R | 2.2 µF | ±10% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0603W226M100BD | X5R | 22 µF | ±20% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0603W335K100XD | X5R | 3.3 µF | ±10% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0603W475K100XD | X5R | 4.7 µF | ±10% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0603W475M100XD | X5R | 4.7 µF | ±20% | 10 | 1.00 | -55 ~+85 | ±15% |
| 0805B105K100CC | X7R | 1.0 µF | ±10% | 10 | 1.45 | -55 ~+125 | ±15% |
| 0805W226M100CC | X5R | 22 µF | ±20% | 10 | 1.45 | -55 ~+85 | ±15% |
| 0805B475K100CC | X7R | 4.7 µF | ±10% | 10 | 1.45 | -55 ~+125 | ±15% |
| 1206B475K100PB | X7R | 4.7 µF | ±10% | 10 | 1.90 | -55 ~+125 | ±15% |

ELECTRICAL CHARACTERISTICS – 16V X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0402B104K160HI | X7R | 0.1 μF | ±10% | 16 | 0.70 | -55 ~+125 | ±15% |
| 0402B223K160HI | X7R | 0.022 μF | ±10% | 16 | 0.70 | -55 ~+125 | ±15% |
| 0402W105K160HI | X5R | 1 μF | ±10% | 16 | 0.70 | -55 ~+85 | ±15% |
| 0603W106M160XD | X5R | 10 μF | ±20% | 16 | 1.00 | -55 ~+85 | ±15% |
| 0603B104K160SD | X7R | 0.1 μF | ±10% | 16 | 0.90 | -55 ~+125 | ±15% |
| 0603B105K160XD | X7R | 1 μF | ±10% | 16 | 1.00 | -55 ~+125 | ±15% |
| 0603B224K160SD | X7R | 0.22 μF | ±10% | 16 | 0.90 | -55 ~+125 | ±15% |
| 0603W105K160XD | X5R | 1 μF | ±10% | 16 | 1.00 | -55 ~+85 | ±15% |
| 0603W106K160XD | X5R | 10 μF | ±10% | 16 | 1.00 | -55 ~+85 | ±15% |
| 0603W225K160XD | X5R | 2.2 μF | ±10% | 16 | 1.00 | -55 ~+85 | ±15% |
| 0603W475K160XD | X5R | 4.7 μF | ±10% | 16 | 1.00 | -55 ~+85 | ±15% |
| 0805B105K160CC | X7R | 1.0 μF | ±10% | 16 | 1.45 | -55 ~+125 | ±15% |
| 0805B225K160CC | X7R | 2.2 μF | ±10% | 16 | 1.45 | -55 ~+125 | ±15% |
| 0805B475K160CC | X7R | 4.7 μF | ±10% | 16 | 1.45 | -55 ~+125 | ±15% |
| 1206B105K160JC | X7R | 1 μF | ±10% | 16 | 1.35 | -55 ~+125 | ±15% |
| 1206W106K160PB | X5R | 10 μF | ±10% | 16 | 1.90 | -55 ~+85 | ±15% |
| 1206W226K160PB | X5R | 22 μF | ±10% | 16 | 1.90 | -55 ~+85 | ±15% |
| 1210B106K160KA | X7R | 10 μF | ±10% | 16 | 2.20 | -55 ~+125 | ±15% |
| 1210B226K160MA | X7R | 22 μF | ±10% | 16 | 2.80 | -55 ~+125 | ±15% |
| 1210B226M160MA | X7R | 22 μF | ±20% | 16 | 2.80 | -55 ~+125 | ±15% |

ELECTRICAL CHARACTERISTICS – 25V NP0 (COG), X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0201N100J250LE | NP0 (COG) | 10 pF | ±5% | 25 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N101J250LE | NP0 (COG) | 100 pF | ±5% | 25 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N6R8C250LE | NP0 (COG) | 6.8 pF | ±0.25pF | 25 | 0.39 | -55 ~+125 | ±30ppm |
| 0402B102K250HI | X7R | 1000 pF | ±10% | 25 | 0.70 | -55 ~+125 | ±15% |
| 0402B104K250HI | X7R | 0.1 μF | ±10% | 25 | 0.70 | -55 ~+125 | ±15% |
| 0402B123K250HI | X7R | 0.012 μF | ±10% | 25 | 0.70 | -55 ~+125 | ±15% |
| 0402B473K250HI | X7R | 0.047 μF | ±10% | 25 | 0.70 | -55 ~+125 | ±15% |
| 0402N102J250HI | NP0 (COG) | 1000 pF | ±5% | 25 | 0.70 | -55 ~+125 | ±30ppm |
| 0402W224K250HI | X5R | 0.22 μF | ±10% | 25 | 0.70 | -55 ~+85 | ±15% |
| 0603B101K250SD | X7R | 100 pF | ±10% | 25 | 0.90 | -55 ~+125 | ±15% |
| 0603B104J250SD | X7R | 0.1 μF | ±5% | 25 | 0.90 | -55 ~+125 | ±15% |
| 0603B104K250SD | X7R | 0.1 μF | ±10% | 25 | 0.90 | -55 ~+125 | ±15% |
| 0603B105K250XD | X7R | 1 μF | ±10% | 25 | 1.00 | -55 ~+125 | ±15% |
| 0603B223K250SD | X7R | 0.022 μF | ±10% | 25 | 0.90 | -55 ~+125 | ±15% |
| 0603B224K250SD | X7R | 0.22 μF | ±10% | 25 | 0.90 | -55 ~+125 | ±15% |
| 0603B224K250XD | X7R | 0.22 μF | ±10% | 25 | 1.00 | -55 ~+125 | ±15% |
| 0603B472K250SD | X7R | 4700 pF | ±10% | 25 | 0.90 | -55 ~+125 | ±15% |
| 0603W105K250BD | X5R | 1 μF | ±10% | 25 | 1.00 | -55 ~+85 | ±15% |
| 0603W105K250XD | X5R | 1 μF | ±10% | 25 | 1.00 | -55 ~+85 | ±15% |
| 0603W106M250XD | X5R | 10 μF | ±20% | 25 | 1.00 | -55 ~+85 | ±15% |

ELECTRICAL CHARACTERISTICS – 25V X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|-----------------------|----------------------|---------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0603W225K250XD | X5R | 2.2 μ F | \pm 10% | 25 | 1.00 | -55 ~+85 | \pm 15% |
| 0603W475K250XD | X5R | 4.7 μ F | \pm 10% | 25 | 1.00 | -55 ~+85 | \pm 15% |
| 0805B105J250CC | X7R | 1.0 μ F | \pm 5% | 25 | 1.45 | -55 ~+125 | \pm 15% |
| 0805B105K250CC | X7R | 1.0 μ F | \pm 10% | 25 | 1.45 | -55 ~+125 | \pm 15% |
| 0805B225K250CC | X7R | 2.2 μ F | \pm 10% | 25 | 1.45 | -55 ~+125 | \pm 15% |
| 0805B333K250BD | X7R | 0.033 μ F | \pm 10% | 25 | 1.00 | -55 ~+125 | \pm 15% |
| 0805B334K250CC | X7R | 0.33 μ F | \pm 10% | 25 | 1.45 | -55 ~+125 | \pm 15% |
| 0805B475K250CC | X7R | 4.7 μ F | \pm 10% | 25 | 1.45 | -55 ~+125 | \pm 15% |
| 0805B684K250CC | X7R | 0.68 μ F | \pm 10% | 25 | 1.45 | -55 ~+125 | \pm 15% |
| 0805W106K250CC | X5R | 10 μ F | \pm 10% | 25 | 1.45 | -55 ~+85 | \pm 15% |
| 0805W225K250CC | X5R | 2.2 μ F | \pm 10% | 25 | 1.45 | -55 ~+85 | \pm 15% |
| 0805W475K250CC | X5R | 4.7 μ F | \pm 10% | 25 | 1.45 | -55 ~+85 | \pm 15% |
| 1206B105K250JC | X7R | 1 μ F | \pm 10% | 25 | 1.35 | -55 ~+125 | \pm 15% |
| 1206B106K250PB | X7R | 10 μ F | \pm 10% | 25 | 1.90 | -55 ~+125 | \pm 15% |
| 1206W106K250PB | X5R | 10 μ F | \pm 10% | 25 | 1.90 | -55 ~+85 | \pm 15% |
| 1206W226K250PB | X5R | 22 μ F | \pm 10% | 25 | 1.90 | -55 ~+85 | \pm 15% |
| 1210B106K250KA | X7R | 10 μ F | \pm 10% | 25 | 2.20 | -55°C ~ 125 | \pm 15% |
| 1210B226K250YA | X7R | 22 μ F | \pm 10% | 25 | 1.90 | -55°C ~ 125 | \pm 15% |
| 1210B226M250MA | X7R | 22 μ F | \pm 20% | 25 | 2.80 | -55°C ~ 125 | \pm 15% |
| 1210B474K250IC | X7R | 0.47 μ F | \pm 10% | 25 | 1.05 | -55°C ~ 125 | \pm 15% |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG) & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0201N100J500LE | NP0 (COG) | 10 pF | ±5% | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N151J500LE | NP0 (COG) | 150 pF | ±5% | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N330J500LE | NP0 (COG) | 33 pF | ±5% | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N3R0C500LE | NP0 (COG) | 3 pF | ±0.25pF | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N3R3B500LE | NP0 (COG) | 3.3 pF | ±0.1pF | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N4R0C500LE | NP0 (COG) | 4 pF | ±0.25pF | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0201N6R2C500LE | NP0 (COG) | 6.2 pF | ±0.25pF | 50 | 0.39 | -55 ~+125 | ±30ppm |
| 0402B104K500HI | X7R | 0.1 μF | ±10% | 50 | 0.70 | -55 ~+125 | ±15% |
| 0402B102K500HI | X7R | 1000 pF | ±10% | 50 | 0.70 | -55 ~+125 | ±15% |
| 0402B103K500HI | X7R | 0.01 μF | ±10% | 50 | 0.70 | -55 ~+125 | ±15% |
| 0402B223K500HI | X7R | 0.022 μF | ±10% | 50 | 0.70 | -55 ~+125 | ±15% |
| 0402B682K500HI | X7R | 6800 pF | ±10% | 50 | 0.70 | -55 ~+125 | ±15% |
| 0402N0R3B500HI | NP0 (COG) | 0.3 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N0R8B500HI | NP0 (COG) | 0.8 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N0R9B500HI | NP0 (COG) | 0.9 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N100J500HI | NP0 (COG) | 10 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N101J500HI | NP0 (COG) | 100 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N180J500HI | NP0 (COG) | 18 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R0A500HI | NP0 (COG) | 1 pF | ±0.05pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R0B500HI | NP0 (COG) | 1 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG) FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0402N1R0C500HI | NP0 (COG) | 1 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R2A500HI | NP0 (COG) | 1.2 pF | ±0.05pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R2B500HI | NP0 (COG) | 1.2 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R2C500HI | NP0 (COG) | 1.2 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R3A500HI | NP0 (COG) | 1.3 pF | ±0.05pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R3B500HI | NP0 (COG) | 1.3 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R5C500HI | NP0 (COG) | 1.5 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R6A500HI | NP0 (COG) | 1.6 pF | ±0.05pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R8B500HI | NP0 (COG) | 1.8 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N1R8C500HI | NP0 (COG) | 1.8 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N220J500HI | NP0 (COG) | 22 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N221J500HI | NP0 (COG) | 220 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N2R0B500HI | NP0 (COG) | 2 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N2R2B500HI | NP0 (COG) | 2.2 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N2R2C500HI | NP0 (COG) | 2.2 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N2R4B500HI | NP0 (COG) | 2.4 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N2R4C500HI | NP0 (COG) | 2.4 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N2R7C500HI | NP0 (COG) | 2.7 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N330J500HI | NP0 (COG) | 33 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N391F500HI | NP0 (COG) | 390 pF | ±1% | 50 | 0.70 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG), X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0402N3R3C500HI | NP0 (COG) | 3.3 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N471J500HI | NP0 (COG) | 470 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N4R0C500HI | NP0 (COG) | 4 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N4R7B500HI | NP0 (COG) | 4.7 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N4R7C500HI | NP0 (COG) | 4.7 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N5R6B500HI | NP0 (COG) | 5.6 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N5R6C500HI | NP0 (COG) | 5.6 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N6R0B500HI | NP0 (COG) | 6 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N6R0C500HI | NP0 (COG) | 6 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N6R2B500HI | NP0 (COG) | 6.2 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N6R8B500HI | NP0 (COG) | 6.8 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N6R8D500HI | NP0 (COG) | 6.8 pF | ±0.5pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N8R0C500HI | NP0 (COG) | 8.0 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402N8R2C500HI | NP0 (COG) | 8.2 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0402W104K500HI | X5R | 0.1 μF | ±10% | 50 | 0.70 | -55 ~+85 | ±15% |
| 0603B101K500SD | X7R | 100 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B102K500SD | X7R | 1000 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B103K500SD | X7R | 0.01 μF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B104J500XD | X7R | 0.1 μF | ±5% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0603B104K500XD | X7R | 0.1 μF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG) & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0603B105K500XD | X7R | 1 μF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0603B152K500SD | X7R | 1500 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B221K500SD | X7R | 220 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B222K500SD | X7R | 2200 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B223K500SD | X7R | 0.022 μF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B224K500XD | X7R | 0.22 μF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0603B333K500XD | X7R | 0.033 μF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0603B334K500XD | X7R | 0.33 μF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0603B471K500SD | X7R | 470 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B472K500SD | X7R | 4700 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B474K500XD | X7R | 0.47 μF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0603B681K500SD | X7R | 680 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603B682K500SD | X7R | 6800 pF | ±10% | 50 | 0.90 | -55 ~+125 | ±15% |
| 0603N0R5B500SD | NP0 (COG) | 0.5 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N100D500SD | NP0 (COG) | 10 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N100F500SD | NP0 (COG) | 10 pF | ±1% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N100G500SD | NP0 (COG) | 10 pF | ±2% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N100J500SD | NP0 (COG) | 10 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N101J500SD | NP0 (COG) | 100 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N102J500SD | NP0 (COG) | 1000 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG) FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0603N120F500SD | NP0 (COG) | 12 pF | ±1% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N120J500SD | NP0 (COG) | 12 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N150J500SD | NP0 (COG) | 15 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N180J500SD | NP0 (COG) | 18 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N1R0B500SD | NP0 (COG) | 1.0 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N1R2B500SD | NP0 (COG) | 1.2 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N1R5B500SD | NP0 (COG) | 1.5 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N1R5C500SD | NP0 (COG) | 1.5 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N200J500SD | NP0 (COG) | 20 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N220J500SD | NP0 (COG) | 22 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N270J500SD | NP0 (COG) | 27 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N2R0C500SD | NP0 (COG) | 2 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N2R2B500SD | NP0 (COG) | 2.2 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N2R4B500SD | NP0 (COG) | 2.4 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N2R5B500SD | NP0 (COG) | 2.5 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N2R7B500SD | NP0 (COG) | 2.7 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N300J500SD | NP0 (COG) | 30 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N330J500SD | NP0 (COG) | 33 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N331J500SD | NP0 (COG) | 330 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N391J500SD | NP0 (COG) | 390 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG) FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0603N3R0B500SD | NP0 (COG) | 3 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N3R3B500SD | NP0 (COG) | 3.3 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N3R3C500SD | NP0 (COG) | 3.3 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N3R3D500SD | NP0 (COG) | 3.3 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N3R9C500SD | NP0 (COG) | 3.9 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N3R9D500SD | NP0 (COG) | 3.9 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N470J500SD | NP0 (COG) | 47 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N471J500SD | NP0 (COG) | 470 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N4R0B500SD | NP0 (COG) | 4 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N560J500SD | NP0 (COG) | 56 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N5R0C500SD | NP0 (COG) | 5 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N5R0D500SD | NP0 (COG) | 5 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N5R6C500SD | NP0 (COG) | 5.6 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N5R6D500SD | NP0 (COG) | 5.6 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N680J500SD | NP0 (COG) | 68 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N6R0B500SD | NP0 (COG) | 6 pF | ±0.1pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N6R8C500SD | NP0 (COG) | 6.8 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N6R8D500SD | NP0 (COG) | 6.8 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N7R0D500SD | NP0 (COG) | 7 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N820J500SD | NP0 (COG) | 82 pF | ±5% | 50 | 0.90 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG), X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0603N8R0D500SD | NP0 (COG) | 8 pF | ±0.5pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N8R2C500SD | NP0 (COG) | 8.2 pF | ±0.25pF | 50 | 0.90 | -55 ~+125 | ±30ppm |
| 0603W105K500XD | X5R | 1 µF | ±10% | 50 | 1.00 | -55 ~+85 | ±15% |
| 0603W225K500XD | X5R | 22 µF | ±10% | 50 | 1.00 | -55 ~+85 | ±15% |
| 0805B101K500BD | X7R | 100 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B102K500BD | X7R | 1000 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B103K500BD | X7R | 0.01 µF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B104J500BD | X7R | 0.1 µF | ±5% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B104K500BD | X7R | 0.1 µF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B105K500CC | X7R | 1.0 µF | ±10% | 50 | 1.45 | -55 ~+125 | ±15% |
| 0805B221K500BD | X7R | 220 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B224K500CC | X7R | 0.22 µF | ±10% | 50 | 1.45 | -55 ~+125 | ±15% |
| 0805B225K500CC | X7R | 2.2 µF | ±10% | 50 | 1.45 | -55 ~+125 | ±15% |
| 0805B331K500BD | X7R | 330 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B332K500BD | X7R | 3300 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B333K500BD | X7R | 0.033 µF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B334K500CC | X7R | 0.33 µF | ±10% | 50 | 1.45 | -55 ~+125 | ±15% |
| 0805B471K500BD | X7R | 470 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B472K500BD | X7R | 4700 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B474K500CC | X7R | 0.47 µF | ±10% | 50 | 1.45 | -55 ~+125 | ±15% |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG) & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0805B682K500BD | X7R | 6800 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 0805B684K500CC | X7R | 0.68 μF | ±10% | 50 | 1.45 | -55 ~+125 | ±15% |
| 0805N101J500AD | NP0 (COG) | 100 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N102J500BD | NP0 (COG) | 1000 pF | ±5% | 50 | 1.00 | -55 ~+125 | ±30ppm |
| 0805N103J500AD | NP0 (COG) | 0.01 μF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N121J500AD | NP0 (COG) | 120 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N150J500AD | NP0 (COG) | 15 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N180J500AD | NP0 (COG) | 18 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N1R5C500AD | NP0 (COG) | 1.5 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N220J500AD | NP0 (COG) | 22 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N221J500AD | NP0 (COG) | 220 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N2R7C500AD | NP0 (COG) | 2.7 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N330J500AD | NP0 (COG) | 33 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N331J500AD | NP0 (COG) | 330 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N391J500AD | NP0 (COG) | 390 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N3R3C500AD | NP0 (COG) | 3.3 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N470J500AD | NP0 (COG) | 47 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N471J500BD | NP0 (COG) | 470 pF | ±5% | 50 | 1.00 | -55 ~+125 | ±30ppm |
| 0805N4R7B500AD | NP0 (COG) | 4.7 pF | ±0.1pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N560J500AD | NP0 (COG) | 56 pF | ±5% | 50 | 0.70 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 50V NP0 (COG), X5R & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0805N5R0C500AD | NP0 (COG) | 5 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N681J500BD | NP0 (COG) | 680 pF | ±5% | 50 | 1.00 | -55 ~+125 | ±30ppm |
| 0805N6R8C500AD | NP0 (COG) | 6.8 pF | ±0.25pF | 50 | 0.70 | -55 ~+125 | ±30ppm |
| 0805W106K500CC | X5R | 10 µF | ±10% | 50 | 1.45 | -55 ~+85 | ±15% |
| 0805W225K500CC | X5R | 2.2 µF | ±10% | 50 | 1.45 | -55 ~+85 | ±15% |
| 0805W475K500CC | X5R | 4.7 µF | ±10% | 50 | 1.45 | -55 ~+85 | ±15% |
| 0805W475M500CC | X5R | 4.7 µF | ±20% | 50 | 1.45 | -55 ~+85 | ±15% |
| 1206B102K500BD | X7R | 1000 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 1206B104K500BD | X7R | 0.1 µF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 1206B105K500PB | X7R | 1 µF | ±10% | 50 | 1.90 | -55 ~+125 | ±15% |
| 1206B331K500BD | X7R | 330 pF | ±10% | 50 | 1.00 | -55 ~+125 | ±15% |
| 1206B475K500PB | X7R | 4.7 µF | ±10% | 50 | 1.90 | -55 ~+125 | ±15% |
| 1206N1R5C500BD | NP0 (COG) | 1.5 pF | ±0.25pF | 50 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N7R5C500BD | NP0 (COG) | 7.5 pF | ±0.25pF | 50 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N8R2D500BD | NP0 (COG) | 8.2 pF | ±0.5pF | 50 | 1.00 | -55 ~+125 | ±30ppm |
| 1210B105K500CC | X7R | 1 µF | ±10% | 50 | 1.45 | -55°C ~ 125 | ±15% |
| 1210B106K500MA | X7R | 10 µF | ±10% | 50 | 2.80 | -55°C ~ 125 | ±15% |
| 1210B106M500MA | X7R | 10 µF | ±20% | 50 | 2.80 | -55°C ~ 125 | ±15% |
| 1210N472J500IC | NP0 (COG) | 4700 pF | ±5% | 50 | 1.05 | -55°C ~ 125 | ±30ppm |
| 1210W106K500MA | X5R | 10 µF | ±10% | 50 | 2.80 | -55°C ~ +85 | ±15% |

ELECTRICAL CHARACTERISTICS – 100V NP0 (COG) & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0603B101K101SD | X7R | 100 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603B102K101SD | X7R | 1000 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603B103K101SD | X7R | 0.01 µF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603B104K101XD | X7R | 0.1 µF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0603B332K101SD | X7R | 3300 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603B472K101SD | X7R | 4700 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603B681K101SD | X7R | 680 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603B682K101SD | X7R | 6800 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±15% |
| 0603N101J101SD | NP0 (COG) | 100 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N221G101SD | NP0 (COG) | 220 pF | ±2% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N330J101SD | NP0 (COG) | 33 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N331J101SD | NP0 (COG) | 330 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N470J101SD | NP0 (COG) | 47 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N471J101SD | NP0 (COG) | 470 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N511J101SD | NP0 (COG) | 510 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N680F101SD | NP0 (COG) | 68 pF | ±1% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N680J101SD | NP0 (COG) | 68 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N680K101SD | NP0 (COG) | 68 pF | ±10% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0603N820J101SD | NP0 (COG) | 82 pF | ±5% | 100 | 0.90 | -55 ~+125 | ±30ppm |
| 0805B101K101BD | X7R | 100 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |

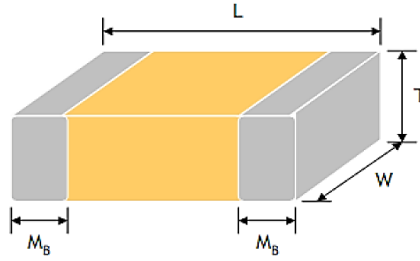
ELECTRICAL CHARACTERISTICS – 100V NP0 (COG) & X7R FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0805B102K101BD | X7R | 1000 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B104K101CC | X7R | 0.1 µF | ±10% | 100 | 1.45 | -55 ~+125 | ±15% |
| 0805B152K101BD | X7R | 1500 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B153K101BD | X7R | 0.015 µF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B221K101BD | X7R | 220 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B222K101BD | X7R | 2200 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B223K101BD | X7R | 0.022 µF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B224K101CC | X7R | 0.22 µF | ±10% | 100 | 1.45 | -55 ~+125 | ±15% |
| 0805B272K101BD | X7R | 2700 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B471K101BD | X7R | 470 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B472K101BD | X7R | 4700 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 0805B473K101CC | X7R | 0.047 µF | ±10% | 100 | 1.45 | -55 ~+125 | ±15% |
| 0805N100J101AD | NP0 (COG) | 10 pF | ±5% | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N101J101AD | NP0 (COG) | 100 pF | ±5% | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N221J101AD | NP0 (COG) | 220 pF | ±5% | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N222K101XD | NP0 (COG) | 2200 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 0805N2R2C101AD | NP0 (COG) | 2.2 pF | ±0.25pF | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N331J101AD | NP0 (COG) | 330 pF | ±5% | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N332J101CC | NP0 (COG) | 3300 pF | ±5% | 100 | 1.45 | -55 ~+125 | ±30ppm |
| 0805N470J101AD | NP0 (COG) | 47 pF | ±5% | 100 | 0.70 | -55 ~+125 | ±30ppm |

ELECTRICAL CHARACTERISTICS – 100V NP0 (COG) & X7R FOR DIFFERENT PART CODE

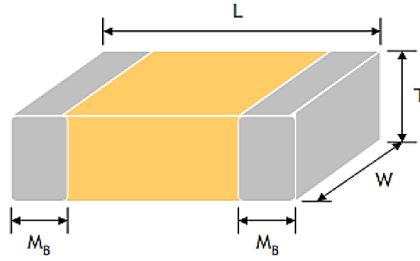
| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| 0805N4R7C101AD | NP0 (COG) | 4.7 pF | ±0.25pF | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N561J101AD | NP0 (COG) | 560 pF | ±5% | 100 | 0.70 | -55 ~+125 | ±30ppm |
| 0805N681J101XD | NP0 (COG) | 680 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 0805N821J101XD | NP0 (COG) | 820 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1206B102K101BD | X7R | 1000 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 1206B104K101CC | X7R | 0.1 μF | ±10% | 100 | 1.45 | -55 ~+125 | ±15% |
| 1206B105K101PB | X7R | 1 μF | ±10% | 100 | 1.90 | -55 ~+125 | ±15% |
| 1206B222K101BD | X7R | 2200 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 1206B224K101DC | X7R | 0.22 μF | ±10% | 100 | 1.80 | -55 ~+125 | ±15% |
| 1206B225K101PB | X7R | 2.2 μF | ±10% | 100 | 1.90 | -55 ~+125 | ±15% |
| 1206B334K101DC | X7R | 0.33 μF | ±10% | 100 | 1.80 | -55 ~+125 | ±15% |
| 1206B471K101BD | X7R | 470 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 1206B472K101BD | X7R | 4700 pF | ±10% | 100 | 1.00 | -55 ~+125 | ±15% |
| 1206N101J101BD | NP0 (COG) | 100 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N102J101BD | NP0 (COG) | 1000 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N152J101BD | NP0 (COG) | 1500 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N471J101BD | NP0 (COG) | 470 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N472J101BD | NP0 (COG) | 4700 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1206N680J101BD | NP0 (COG) | 68 pF | ±5% | 100 | 1.00 | -55 ~+125 | ±30ppm |
| 1210B105K101KA | X7R | 1.0 μF | ±10% | 100 | 2.20 | -55°C ~ 125 | ±15% |

DIMENSION (Unit: mm)



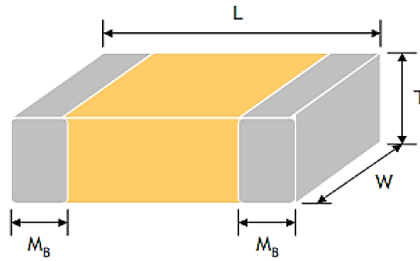
| SIZE CODE | METRIC CODE | L | W | T (SYMBOL) | | SOLDERING METHOD | Mb |
|-----------|-------------|---------------|---------------|-----------------|---|------------------|------------------------|
| | | | | | | | |
| 0201 | 0603 | 0.6 ±0.09 | 0.30 ±0.09 | 0.3±0.09 | L | R | 0.15 +0.1/-0.05 |
| | | | | | | | |
| 0402 | 1005 | 1.00 ±0.20 | 0.50 ±0.20 | 0.50±0.05 | N | R | 0.25 +0.05/-0.10 |
| | | | | 0.50±0.10 | E | R | |
| | | | | 0.50±0.20 | H | R | |
| 0603 | 1608 | 1.60 ±0.20 | 0.80 ±0.20 | 0.50 ± 0.20 | H | R/W | 0.40 ±0.15 |
| | | | | 0.80±0.10 | S | R/W | |
| | | | | 0.85±0.15 | B | R/W | |
| | | | | 0.80±0.20 | X | R/W | |
| 0805 | 2012 | 2.00 ±0.20 | 1.25 ±0.20 | 0.50 ± 0.20 | H | R | 0.50 ±0.20 |
| | | | | 0.60±0.10 | A | R/W | |
| | | | | 0.80±0.20 | X | R/W | |
| | | | | 0.85±0.15 | B | R/W | |
| | | | | 1.25±0.20 | C | R | |
| 1206 | 3216 | 3.20 ±0.30 | 1.60 ±0.30 | 0.85±0.15 | B | R/W | 0.60±0.20 0.50±0.25 |
| | | | | 0.95±0.10 | I | R | |
| | | | | 1.25±0.20 | C | R | |
| | | | | 1.15±0.20 | J | R | |
| | | | | 1.60±0.20 | D | R | |
| | | | | 1.60 ± 0.30 | Y | R | |
| | | | | 1.60+0.30/-0.10 | P | R | |

DIMENSION (Unit: mm)



| SIZE CODE | METRIC CODE | L | W | T (SYMBOL) | | SOLDERING METHOD | Mb |
|-----------|-------------|---------------|---------------|-------------|---|------------------|--|
| | | | | | | | |
| 1210 | 3225 | 3.20 ±0.40 | 2.50 ±0.30 | 0.85±0.15 | B | R | 0.75±0.25 |
| | | | | 0.95±0.10 | I | R | |
| | | | | 1.25±0.20 | C | R | |
| | | | | 1.60±0.20 | D | R | |
| | | | | 1.60±0.30 | Y | R | |
| | | | | 2.00±0.20 | K | R | |
| | | | | 2.50±0.30 | M | R | |
| 1808 | 4520 | 4.50 ±0.40 | 2.03 ±0.25 | 1.25±0.20 | C | R | 0.75±0.25 0.50±0.25* |
| | | | | 1.40±0.20 | F | R | |
| | | | | 1.60±0.20 | D | R | |
| | | | | 2.00±0.20 | K | R | |
| 1812 | 4532 | 4.50 ±0.40 | 3.20 ±0.40 | 1.25±0.20 | C | R | 0.75±0.25 0.50±0.25* |
| | | | | 1.60±0.20 | D | R | |
| | | | | 2.00±0.20 | K | R | |
| | | | | 2.50±0.30 | M | R | |
| | | | | 2.80±0.30 | U | R | |
| 1825 | 4563 | 4.50 ±0.40 | 6.30 ±0.40 | 1.60±0.20 | D | R | 0.75±0.35 0.85±0.35 0.85±0.35 0.85±0.35 |
| | | | | 2.00±0.20 | K | R | |
| | | | | 2.50±0.30 | M | R | |
| | | | | 2.80±0.30 | U | R | |

DIMENSION (Unit: mm)



| SIZE CODE | METRIC CODE | L | W | T (SYMBOL) | | SOLDERING METHOD | Mb |
|-----------|-------------|---------------|---------------|-------------|---|------------------|-----------|
| | | | | | | | |
| 2211 | 5728 | 5.70 ±0.40 | 2.80 ±0.30 | 1.60±0.20 | D | R | 0.75±0.35 |
| | | | | 2.00±0.20 | K | | |
| | | | | 2.50±0.30 | M | | |
| | | | | 2.80±0.30 | U | | |
| 2220 | 5750 | 5.70 ±0.40 | 5.00 ±0.40 | 1.60±0.20 | D | R | 0.75±0.35 |
| | | | | 2.00±0.20 | K | | |
| | | | | 2.50±0.30 | M | | |
| | | | | 2.80±0.30 | U | | |
| 2225 | 5763 | 5.70 ±0.40 | 6.30 ±0.40 | 1.60±0.20 | D | R | 0.75±0.35 |
| | | | | 2.00±0.20 | K | | |
| | | | | 2.50±0.30 | M | | |
| | | | | 2.80±0.30 | U | | |

GENERAL ELECTRICAL CHARACTERISTICS

| DIELECTRIC | NPO (COG) | X7R | X5R | X6S |
|----------------------------|---|-----------------------------------|-----------------------|-----------------------|
| Size | 0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225 | | | |
| Capacitance Range* | 0.1pF to 0.1μF | 100pF to 47μF | 100pF to 220μF | 0.1μF to 100μF |
| Capacitance Tolerance | Cap. ≤ 5pF (Note #1): A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF < Cap < 10pF: C (±0.25pF), D (±0.5pF) Cap ≥ 10pF: F (±1%), G (±2%), J (±5%), K (±10%) | J (±5%), K (±10%), M (±20%) | K (±10%), M (±20%) | K (±10%), M (±20%) |
| Rated Voltage | 10V, 16V, 25V, 50V, 100V | 6.3V, 10V, 16V, 25V, 50V, 100V | | |
| Operating Temperature | -55 ~ +125°C | | -55 ~ +85°C | -55 ~ +105°C |
| Capacitance Characteristic | ±30ppm | ±15% | ±15% | ±22% |
| Termination | Ni/Sn (lead-free termination) | | | |

Note:

- #1: NPO, 0.1pF product only provide B tolerance; 0603N0R4 provide B&C tolerance; 0603N0R3 only provide C tolerance.
- * Measured at the condition of 30~70% related humidity.
- NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap ≤ 1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap > 1000pF, 25°C at ambient temperature.
- X7R/X6S/X5R/X6S: Please refer to “Reliability test conditions and requirements” for detail.
- ** Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour and then leave in ambient condition for 24±2 hours before measurement.

X7R

Table 1

| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | |
|------------|--------|---------------------|--|
| ≥100V | ≤ 2.5% | ≤ 3% | 1206 ≥ 0.47μF |
| | | ≤ 5% | 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; |
| | | ≤ 10% | 0805 > 0.22μF; 1210 ≥ 3.3μF |
| 50V | ≤ 2.5% | ≤3% | 0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF |
| | | ≤5% | 0201≥0.01uF; 1210≥4.7μF |
| | | ≤10% | 0402≥0.012μF; 0603>0.1μF; 0805/X7R>0.47μF; 1206≥2.2μF; 1210≥10μF; |
| 35V | ≤ 3.5% | ≤10% | 0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF |
| 25V | ≤ 3.5% | ≤5% | 0201≥0.01μF; 0805≥1μF; 1210/X7R≥10μF |
| | | ≤7% | 0603≥0.33μF |
| | | ≤10% | 0201≥0.1μF; 0402/X7R≥0.056μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF |
| | | ≤12.5% | 0402≥0.47μF |
| 16V | ≤3.5% | ≤5% | 0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF |
| | | ≤10% | 0201/X7R≥0.022μF; 0402≥ 0.22uF; 0603>0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF; |
| 10V | ≤ 5.0% | ≤10% | 0201≥0.012μF;0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF;1210≥22μF:01R5/X5R |
| | | ≤15% | 0201≥0.1μF; 0402≥1μF |
| 6.3V | ≤ 10% | ≤15% | 0201≥0.1μF; 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF 1210 ≥100μF |
| | | ≤20% | 0402≥2.2μF |
| 4V | ≤15% | - | - |

X5R

Table 2

| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | |
|------------|--------|---------------------|---|
| ≥100V | ≤ 2.5% | ≤3% | 1206 ≥ 0.47μF |
| | | ≤ 5% | 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; |
| | | ≤10% | 0805 > 0.22μF; 1210 ≥ 3.3μF |
| 50V | ≤ 2.5% | ≤3% | 0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF |
| | | ≤5% | 0201≥0.01uF; 1210≥4.7μF |
| | | ≤10% | 0402≥0.012μF; 0603>0.1μF; 0805≥1μF; 1206≥2.2μF;1210≥10μF; |
| 35V | ≤ 3.5% | ≤10% | 0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF |
| 25V | ≤ 3.5% | ≤5% | 0201≥0.01μF; 0805≥1μF; 1210/X7R≥10μF |
| | | ≤7% | 0603≥0.33μF |
| | | ≤10% | 0201≥0.1μF; 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210/X5R≥10μF; |
| | | ≤12.5% | 0402≥0.47μF |
| 16V | ≤ 3.5% | ≤5% | 0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF |
| | | ≤10% | 0201≥0.1uF; 0402≥ 0.22uF; 01R5/X5R 0603>0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF |
| 10V | ≤ 5.0% | ≤10% | 0201≥0.012μF; 0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF |
| | | ≤15% | 0201≥0.1μF; 0402≥1μF |
| 6.3V | ≤ 10% | ≤15% | 0201≥0.1μF; 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF 1210 ≥100μF |
| | | ≤20% | 0402≥2.2μF |
| 4V | ≤15% | - | - |

X6S

Table 3

| RATED VOL. | D.F. \leq | EXCEPTION OF D.F. \leq | |
|-------------|--------------|--------------------------|--|
| $\geq 100V$ | $\leq 2.5\%$ | $\leq 3\%$ | 1206 $\geq 0.47\mu F$ |
| | | $\leq 5\%$ | 0603 $\geq 0.068\mu F$; 0805 > 0.1 μF ; 1206 $\geq 1\mu F$; 1210 $\geq 2.2\mu F$; |
| | | $\leq 10\%$ | 0805 > 0.22 μF ; 1210 $\geq 3.3\mu F$ |
| 50V | $\leq 2.5\%$ | $\leq 3\%$ | 0201(50V); 0603 $\geq 0.047\mu F$; 0805 $\geq 0.18\mu F$; 1206 $\geq 0.47\mu F$ |
| | | $\leq 5\%$ | 0201 $\geq 0.01\mu F$; 1210 $\geq 4.7\mu F$ |
| | | $\leq 10\%$ | 0402 $\geq 0.012\mu F$; 0603 > 0.1 μF ; 0805 $\geq 1\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 10\mu F$; |
| 35V | $\leq 3.5\%$ | $\leq 10\%$ | 0603 $\geq 1\mu F$; 0805 $\geq 2.2\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 10\mu F$ |
| 25V | $\leq 3.5\%$ | $\leq 5\%$ | 0201 $\geq 0.01\mu F$; 0805 $\geq 1\mu F$; 1210/X7R $\geq 10\mu F$ |
| | | $\leq 7\%$ | 0603 $\geq 0.33\mu F$ |
| | | $\leq 10\%$ | 0201 $\geq 0.1\mu F$; 0402 $\geq 0.10\mu F$; 0603 $\geq 0.47\mu F$; 0805 $\geq 2.2\mu F$; 1206 $\geq 4.7\mu F$; 1210 $\geq 22\mu F$; |
| | | $\leq 12.5\%$ | 0402 $\geq 0.47\mu F$ |
| 16V | $\leq 3.5\%$ | $\leq 5\%$ | 0201 $\geq 0.01\mu F$; 0402 $\geq 0.033\mu F$; 0603 $\geq 0.15\mu F$; 0805 $\geq 0.68\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 4.7\mu F$ |
| | | $\leq 10\%$ | 0201 $\geq 0.1\mu F$; 0402 $\geq 0.22\mu F$; 0603 > 0.47 μF ; 0805 $\geq 2.2\mu F$; 1206 $\geq 4.7\mu F$; 1210 $\geq 22\mu F$ |
| 10V | $\leq 5.0\%$ | $\leq 10\%$ | 0201 $\geq 0.012\mu F$; 0402 $\geq 0.22\mu F$; 0603 $\geq 0.33\mu F$; 0805 $\geq 2.2\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 22\mu F$ |
| | | $\leq 15\%$ | 0201 $\geq 0.1\mu F$; 0402 $\geq 1\mu F$ |
| 6.3V | $\leq 10\%$ | $\leq 15\%$ | 0201 $\geq 0.1\mu F$; 0402/X6S $\geq 0.47\mu F$; 0603 $\geq 10\mu F$; 0805 $\geq 4.7\mu F$; 1206 $\geq 47\mu F$ 1210 $\geq 100\mu F$ |
| | | $\leq 20\%$ | 0402 $\geq 2.2\mu F$ |
| 4V | $\leq 15\%$ | - | - |

CAPACITANCE RANGE - NP0 (COG) DIELECTRIC SIZE 0201, 0402, 0603

Table 4-A

| SIZE | 0201 | | | 0402 | | | | | 0603 | | | | |
|-------------|------|----|----|------|----|----|----|-----|------|----|----|-----|-----|
| VDC (V) | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 0.1pF (0R1) | L | L | L | H | H | H | H | | | | | | |
| 0.2pF (0R2) | L | L | L | H | H | H | H | | | | | | |
| 0.3pF (0R3) | L | L | L | H | H | H | H | | | | | | |
| 0.4pF (0R4) | L | L | L | H | H | H | H | | | | | | |
| 0.5pF (0R5) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 0.6pF (0R6) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 0.7pF (0R7) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 0.8pF (0R8) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 0.9pF (0R9) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 1.0pF (1R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 1.2pF (1R2) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 1.5pF (1R5) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 1.6pF (1R6) | | | | | | | H | | | | | | |
| 1.8pF (1R8) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 2.0pF (2R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 2.2pF (2R2) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 2.7pF (2R7) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 3.0pF (3R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 3.3pF (3R3) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 3.9pF (3R9) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 4.0pF (4R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 4.7pF (4R7) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 5.0pF (5R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 5.6pF (5R6) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 6.0pF (6R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 6.8pF (6R8) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 7.0pF (7R0) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 8.0pF (8R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 8.2pF (8R2) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 9.0pF (9R0) | L | L | L | H | H | H | H | H | S | S | S | S | S |

CAPACITANCE RANGE - NPO (COG) DIELECTRIC SIZE 0201, 0402, 0603

Table 4-B

| SIZE | 0201 | | | 0402 | | | | | 0603 | | | | |
|---------------|------|----|----|------|----|----|-----|-----|------|----|-----|-----|-----|
| VDC (V) | 16 | 25 | 50 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 10pF (100) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 12pF (120) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 15pF (150) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 18pF (180) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 22pF (220) | L | L | L | H | H | H | H/N | H | S | S | S | S/B | S |
| 27pF (270) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 30pF (300) | | | | | | H | | | | | | | |
| 33pF (330) | L | L | L | H | H | H | H | H | S | S | S/B | S/B | S |
| 39pF (390) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 47pF (470) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 56pF (560) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 68pF (680) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 82pF (820) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 100pF (101) | L | L | L | H | H | H | H/N | H | S | S | S | S/B | S |
| 120pF (121) | L | L | L | H | H | H | H | H | S | S | S | S/B | S |
| 150pF (151) | L | L | L | H | H | H | H | H | S | S | S | S | S |
| 180pF (181) | | | | H | H | H | H | H | S | S | S | S | S |
| 220pF (221) | | | | H | H | H | H | H | S | S | S | S | S |
| 270pF (271) | L | | | H | H | H | H | | S | S | S | S/B | S |
| 330pF (331) | L | | | H | H | H | H | | S | S | S | S/B | S |
| 390pF (391) | L | | | H | H | H | H | | S | S | S | S | S |
| 470pF (471) | L | | | H | H | H | H | | S | S | S | S | S |
| 560pF (561) | L | | | H | H | H | H | | S | S | S | S | S |
| 680pF (681) | | | | H | H | H | H | | S | S | S | S | S |
| 820pF (821) | | L | | H | H | H | H | | S | S | S | S | S |
| 1,000pF (102) | | | | H | H | H | H | | S | S | S/B | S | S |
| 1,200pF (122) | | | | | | | | | X | X | X | X | X |
| 1,500pF (152) | | | | | | | | | X | X | X | X | X |
| 1,800pF (182) | | | | | | | | | X | X | X | X | |

CAPACITANCE RANGE - NP0 (COG) DIELECTRIC SIZE 0603

Table 4-C

| SIZE | 0603 | | | |
|---------------|------|----|----|-----|
| VDC (V) | 10 | 16 | 25 | 50 |
| 2,200pF (222) | X | X | X | X/B |
| 2,700pF (272) | X | X | X | X/B |
| 3,300pF (332) | X | X | X | X |
| 3,900pF (392) | X | X | X | X |
| 4,700pF (472) | X | X | X | X |
| 5,600pF (562) | X | X | X | X |
| 6,800pF (682) | X | X | X | S/X |
| 8,200pF (822) | X | X | X | X |
| 0.010μF (103) | X | X | X | X |

CAPACITANCE RANGE - NP0 (COG) DIELECTRIC - SIZE 0805, 1206

Table 4-D

| SIZE | 0805 | | | | | 1206 | | | | |
|-------------|------|----|----|----|-----|------|----|----|----|-----|
| | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 0.5pF (0R5) | A | A | A | A | A | | | | | |
| 0.6pF (0R6) | A | A | A | A | A | | | | | |
| 0.7pF (0R7) | A | A | A | A | A | | | | | |
| 0.8pF (0R8) | A | A | A | A | A | | | | | |
| 0.9pF (0R9) | A | A | A | A | A | | | | | |
| 1.0pF (1R0) | A | A | A | A | A | | | | B | |
| 1.2pF (1R2) | A | A | A | A | A | B | B | B | B | B |
| 1.5pF (1R5) | A | A | A | A | A | B | B | B | B | B |
| 1.8pF (1R8) | A | A | A | A | A | B | B | B | B | B |
| 2.0pF (2R0) | A | A | A | A | A | | | | | |
| 2.2pF (2R2) | A | A | A | A | A | B | B | B | B | B |
| 2.7pF (2R7) | A | A | A | A | A | B | B | B | B | B |
| 3.0pF (3R0) | A | A | A | A | A | | | | | |
| 3.3pF (3R3) | A | A | A | A | A | B | B | B | B | B |
| 3.9pF (3R9) | A | A | A | A | A | B | B | B | B | B |
| 4.0pF (4R0) | A | A | A | A | A | | | | | |

CAPACITANCE RANGE - NPO (COG) DIELECTRIC SIZE 0805, 1206

Table 4-E

| SIZE | 0805 | | | | | 1206 | | | | |
|-------------|------|----|----|----|-----|------|----|----|----|-----|
| VDC (V) | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 4.7pF (4R7) | A | A | A | A | A | B | B | B | B | B |
| 5.0pF (5R0) | A | A | A | A | A | | | | | |
| 5.6pF (5R6) | A | A | A | A | A | B | B | B | B | B |
| 6.0pF (6R0) | A | A | A | A | A | | | | | |
| 6.8pF (6R8) | A | A | A | A | A | B | B | B | B | B |
| 7.0pF (7R0) | A | A | A | A | A | B | B | B | B | B |
| 8.0pF (8R0) | A | A | A | A | A | | | | | |
| 8.2pF (8R2) | A | A | A | A | A | B | B | B | B | B |
| 9.0pF (9R0) | A | A | A | A | A | | | | | |
| 10pF (100) | A | A | A | A | A | B | B | B | B | B |
| 12pF (120) | A | A | A | A | A | | | | | |
| 15pF (150) | A | A | A | A | A | B | B | B | B | B |
| 18pF (180) | A | A | A | A | A | B | B | B | B | B |
| 22pF (220) | A | A | A | A | A | B | B | B | B | B |
| 27pF (270) | A | A | A | A | A | B | B | B | B | B |
| 33pF (330) | A | A | A | A | A | B | B | B | B | B |
| 39pF (390) | A | A | A | A | A | B | B | B | B | B |
| 47pF (470) | A | A | A | A | A | B | B | B | B | B |
| 56pF (560) | A | A | A | A | A | B | B | B | B | B |
| 68pF (680) | A | A | A | A | A | B | B | B | B | B |
| 82pF (820) | A | A | A | A | A | B | B | B | B | B |
| 100pF (101) | A | A | A | A | A | B | B | B | B | B |
| 120pF (121) | A | A | A | A | A | B | B | B | B | B |
| 150pF (151) | A | A | A | A | A | B | B | B | B | B |
| 180pF (181) | A | A | A | A | A | B | B | B | B | B |
| 220pF (221) | A | A | A | A | A | B | B | B | B | B |
| 270pF (271) | A | A | A | A | A | B | B | B | B | B |
| 330pF (331) | A | A | A | A | A | B | B | B | B | B |
| 390pF (391) | B | B | B | B | B | B | B | B | B | B |
| 470pF (471) | B | B | B | B | B | | | | | |

CAPACITANCE RANGE - NPO (COG) DIELECTRIC SIZE 0805, 1206

Table 4-F

| SIZE | 0805 | | | | | 1206 | | | | |
|---------------|------|----|----|----|-----|------|----|----|----|-----|
| VDC (V) | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 560pF (561) | B | B | B | B | B | B | B | B | B | B |
| 680pF (681) | B | B | B | B | B | B | B | B | B | B |
| 820pF (821) | B | B | B | B | B | B | B | B | B | B |
| 1,000pF (102) | B | B | B | B | B | B | B | B | B | B |
| 1,200pF (122) | B | B | B | B | B | B | B | B | B | B |
| 1,500pF (152) | B | B | B | B | B | B | B | B | B | B |
| 1,800pF (182) | B | B | B | B | B | B | B | B | B | B |
| 2,200pF (222) | B | B | B | B | B | B | B | B | B | B |
| 2,700pF (272) | C | C | C | C | C | B | B | B | B | B |
| 3,300pF (332) | C | C | C | C | C | B | B | B | B | B |
| 3,900pF (392) | C | C | C | C | C | B | B | B | B | B |
| 4,700pF (472) | C | C | C | C | C | B | B | B | B | B |
| 5,600pF (562) | C | C | C | C | C | B | B | B | B | B |
| 6,800pF (682) | C | C | C | C | C | I | I | I | I | I |
| 8,200pF (822) | C | C | C | C | | C | C | C | C | C |
| 0.010μF (103) | C | C | C | C | | C | C | C | C | C |
| 0.012μF (123) | B | B | B | B | | P | P | P | P | P |
| 0.015μF (153) | | | | | | P | P | P | P | P |
| 0.018μF (183) | C | C | C | C | | P | P | P | P | P |
| 0.022μF (223) | C | C | C | C | | P | P | P | P | P |
| 0.027μF (273) | | | | | | P | P | P | P | |
| 0.033μF (333) | | | | | | P | P | P | P | |
| 0.039μF (393) | | | | | | P | P | P | P | |
| 0.047μF (473) | | | | | | J | J | J | J | |
| 0.056μF (563) | | | | | | J | J | J | J | |
| 0.068μF (683) | | | | | | D | D | D | D | |
| 0.082μF (823) | | | | | | D | D | D | D | |
| 0.1μF (104) | | | | | | D | D | D | D | |

CAPACITANCE RANGE - NPO (COG) DIELECTRIC SIZE 1210, 1812

Table 4-G

| SIZE | 1210 | | | | | 1812 | | |
|---------------|------|----|----|----|-----|------|----|-----|
| VDC (V) | 10 | 16 | 25 | 50 | 100 | 16 | 50 | 100 |
| 10pF (100) | I | I | I | I | I | C | C | C |
| 15pF (150) | I | I | I | I | I | C | C | C |
| 18pF (180) | I | I | I | I | I | C | C | C |
| 22pF (220) | I | I | I | I | I | C | C | C |
| 27pF (270) | I | I | I | I | I | C | C | C |
| 33pF (330) | I | I | I | I | I | C | C | C |
| 39pF (390) | I | I | I | I | I | C | C | C |
| 47pF (470) | I | I | I | I | I | C | C | C |
| 56pF (560) | I | I | I | I | I | C | C | C |
| 68pF (680) | I | I | I | I | I | C | C | C |
| 82pF (820) | I | I | I | I | I | C | C | C |
| 100pF (101) | I | I | I | I | I | C | C | C |
| 120pF (121) | I | I | I | I | I | C | C | C |
| 150pF (151) | I | I | I | I | I | C | C | C |
| 180pF (181) | I | I | I | I | I | C | C | C |
| 220pF (221) | I | I | I | I | I | C | C | C |
| 270pF (271) | I | I | I | I | I | C | C | C |
| 330pF (331) | I | I | I | I | I | C | C | C |
| 390pF (391) | I | I | I | I | I | C | C | C |
| 560pF (561) | I | I | I | I | I | C | C | C |
| 680pF (681) | I | I | I | I | I | C | C | C |
| 820pF (821) | I | I | I | I | I | C | C | C |
| 1,000pF (102) | I | I | I | I | I | C | C | C |
| 1,200pF (122) | I | I | I | I | I | C | C | C |
| 1,500pF (152) | I | I | I | I | I | C | C | C |
| 1,800pF (182) | I | I | I | I | I | C | C | C |
| 2,200pF (222) | I | I | I | I | I | C | C | C |
| 2,700pF (272) | I | I | I | I | I | C | C | C |
| 3,300pF (332) | I | I | I | I | I | C | C | C |
| 3,900pF (392) | I | I | I | I | I | C | C | C |

CAPACITANCE RANGE - NP0 (COG) DIELECTRIC SIZE 1825, 2220, 2225

Table 4- I

| SIZE | 1825 | | 2220 | | 2225 | |
|---------------|------|-----|------|-----|------|-----|
| | 50 | 100 | 50 | 100 | 50 | 100 |
| VDC (V) | 50 | 100 | 50 | 100 | 50 | 100 |
| 10pF (100) | K | K | K | K | K | K |
| 12pF (120) | K | K | K | K | K | K |
| 15pF (150) | K | K | K | K | K | K |
| 18pF (180) | K | K | K | K | K | K |
| 22pF (220) | K | K | K | K | K | K |
| 27pF (270) | K | K | K | K | K | K |
| 33pF (330) | K | K | K | K | K | K |
| 39pF (390) | K | K | K | K | K | K |
| 47pF (470) | K | K | K | K | K | K |
| 56pF (560) | K | K | K | K | K | K |
| 68pF (680) | K | K | K | K | K | K |
| 82pF (820) | K | K | K | K | K | K |
| 100pF (101) | K | K | K | K | K | K |
| 120pF (121) | K | K | K | K | K | K |
| 150pF (151) | K | K | K | K | K | K |
| 180pF (181) | K | K | K | K | K | K |
| 220pF (221) | K | K | K | K | K | K |
| 270pF (271) | K | K | K | K | K | K |
| 330pF (331) | K | K | K | K | K | K |
| 390pF (391) | K | K | K | K | K | K |
| 470pF (471) | K | K | K | K | K | K |
| 560pF (561) | K | K | K | K | K | K |
| 680pF (681) | K | K | K | K | K | K |
| 820pF (821) | K | K | K | K | K | K |
| 1,000pF (102) | K | K | K | K | K | K |
| 1,200pF (122) | K | K | K | K | K | K |
| 1,500pF (152) | K | K | K | K | K | K |
| 1,800pF (182) | K | K | K | K | K | K |
| 2,200pF (222) | K | K | K | K | K | K |
| 2,700pF (272) | K | K | K | K | K | K |

CAPACITANCE RANGE – X7R DIELECTRIC SIZE 0201, 0402

Table 5-A

| SIZE | 0201 | | | | | 0402 | | | | | |
|---------------|------|----|----|----|----|------|----|----|----|----|-----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | 100 |
| 100pF (101) | L | L | L | L | L | H | H | H | H | H | H |
| 120pF (121) | L | L | L | L | L | H | H | H | H | H | H |
| 150pF (151) | L | L | L | L | L | H | H | H | H | H | H |
| 180pF (181) | L | L | L | L | L | H | H | H | H | H | H |
| 220pF (221) | L | L | L | L | L | H | H | H | H | H | H |
| 270pF (271) | L | L | L | L | L | H | H | H | H | H | H |
| 330pF (331) | L | L | L | L | L | H | H | H | H | H | H |
| 390pF (391) | L | L | L | L | L | H | H | H | H | H | H |
| 470pF (471) | L | L | L | L | L | H | H | H | H | H | H |
| 560pF (561) | L | L | L | L | L | H | H | H | H | H | H |
| 680pF (681) | L | L | L | L | L | H | H | H | H | H | H |
| 820pF (821) | L | L | L | L | L | H | H | H | H | H | H |
| 1,000pF (102) | L | L | L | L | L | H | H | H | H | H | H |
| 1,200pF (122) | L | L | L | L | L | H | H | H | H | H | H |
| 1,500pF (152) | L | L | L | L | L | H | H | H | H | H | H |
| 1,800pF (182) | L | L | L | L | L | H | H | H | H | H | H |
| 2,200pF (222) | L | L | L | L | L | H | H | H | H | H | H |
| 2,700pF (272) | L | L | L | L | L | H | H | H | H | H | H |
| 3,300pF (332) | L | L | L | L | L | H | H | H | H | H | H |
| 3,900pF (392) | L | L | L | L | L | H | H | H | H | H | H |
| 4,700pF (472) | L | L | L | L | L | H | H | H | H | H | H |
| 5,600pF (562) | L | L | L | L | L | H | H | H | H | H | |
| 6,800pF (682) | L | L | L | L | L | H | H | H | H | H | |
| 8,200pF (822) | L | L | L | L | L | H | H | H | H | H | |
| 0.010μF (103) | L | L | L | L | L | H | H | H | H | H | |
| 0.012μF (123) | | | | | | H | H | H | H | H | |
| 0.015μF (153) | | | | | | H | H | H | H | H | |
| 0.018μF (183) | | | | | | H | H | H | H | H | |
| 0.022μF (223) | | | | | | H | H | H | H | H | |

CAPACITANCE RANGE - NP0 (COG) DIELECTRIC SIZE 1210, 1812

Table 5-B

| SIZE | 0402 | | | | |
|---------------|------|----|----|----|----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 |
| 0.027µF (273) | H | H | H | H | H |
| 0.033µF (333) | H | H | H | H | H |
| 0.039µF (393) | H | H | H | H | H |
| 0.047µF (473) | H | H | H | H | H |
| 0.056µF (563) | H | H | H | H | H |
| 0.068µF (683) | H | H | H | H | H |
| 0.082µF (823) | H | H | H | H | H |
| 0.10µF (104) | H | H | H | H | H |
| 0.15µF (154) | H | H | H | | |
| 0.22µF (224) | H | H | H | H | |
| 0.47µF (474) | H | H | | | |
| 1.0µF (105) | H | H | | | |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 0603, 0805

Table 5-C

| SIZE | 0603 | | | | | | 0805 | | | | | |
|---------------|------|----|----|-----|-----|-----|------|----|----|----|----|-----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 6.3 | 10 | 16 | 25 | 50 | 100 |
| 100pF (101) | S | S | S | S/B | S/B | S | B | B | B | B | B | B |
| 120pF (121) | S | S | S | S | S | S | B | B | B | B | B | B |
| 150pF (151) | S | S | S | S | S | S | B | B | B | B | B | B |
| 180pF (181) | S | S | S | S | S | S/B | B | B | B | B | B | B |
| 220pF (221) | S | S | S | S | S/B | S | B | B | B | B | B | B |
| 270pF (271) | S | S | S | S | S | S | B | B | B | B | B | B |
| 330pF (331) | S | S | S | S | S | S | B | B | B | B | B | B |
| 390pF (391) | S | S | S | S | S | S | B | B | B | B | B | B |
| 470pF (471) | S | S | S | S | S/B | S | B | B | B | B | B | B |
| 560pF (561) | S | S | S | S | S | S | B | B | B | B | B | B |
| 680pF (681) | S | S | S | S | S | S | B | B | B | B | B | B |
| 820pF (821) | S | S | S | S | S | S | B | B | B | B | B | B |
| 1,000pF (102) | S | S | S | S/B | S/B | S/B | B | B | B | B | B | B |
| 1,200pF (122) | S | S | S | S | S | S | B | B | B | B | B | B |
| 1,500pF (152) | S | S | S | S/B | S | S | B | B | B | B | B | B |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 0603, 0805

Table 5-D

| SIZE | 0603 | | | | | | 0805 | | | | | | |
|---------------|---------|-----|-----|-----|-----|----|------|-----|----|----|----|----|-----|
| | VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 6.3 | 10 | 16 | 25 | 50 | 100 |
| 1,800pF (182) | S | S | S | S | S | S | S | B | B | B | B | B | B |
| 2,200pF (222) | S | S | S | S | S/B | S | S | B | B | B | B | B | B |
| 2,700pF (272) | S | S | S | S | S/B | S | S | B | B | B | B | B | B |
| 3,300pF (332) | S | S | S | S | S | S | S | B | B | B | B | B | B |
| 3,900pF (392) | S | S | S | S | S | S | S | B | B | B | B | B | B |
| 4,700pF (472) | S | S | S | S | S | S | S | B | B | B | B | B | B |
| 5,600pF (562) | S | S | S | S | S | S | S | B | B | B | B | B | B |
| 6,800pF (682) | S | S | S | S/B | S | S | S | B | B | B | B | B | B |
| 8,200pF (822) | S | S | S | S | S | S | S | B | B | B | B | B | B |
| 0.010μF (103) | S | S | S | S/B | S/B | S | S | B | B | B | B | B | B |
| 0.012μF (123) | S | S | S | S | S | X | X | B | B | B | B | B | B |
| 0.015μF (153) | S | S | S | S/B | S/B | X | X | B | B | B | B | B | B |
| 0.018μF (183) | S | S | S | S | S | X | X | B | B | B | B | B | B |
| 0.022μF (223) | S | S | S | S | S/B | X | X | B | B | B | B | B | B |
| 0.027μF (273) | S | S | S | S | S/B | X | X | B | B | B | B | B | C |
| 0.033μF (333) | S | S | S | S | X/B | X | X | B | B | B | B | B | C |
| 0.039μF (393) | S | S | S | S | X | X | X | B | B | B | B | B | C |
| 0.047μF (473) | S | S | S | S | X | X | X | B | B | B | B | B | C |
| 0.056μF (563) | S | S | S | S | X | X | X | B | B | B | B | B | C |
| 0.068μF (683) | S | S | S | S | X/B | X | X | B | B | B | B | B | C |
| 0.082μF (823) | S | S | S | S | X | X | X | B | B | B | B | B | C |
| 0.10μF (104) | S | S | S/B | S/B | X | X | X | B | B | B | B | B | C |
| 0.12μF (124) | S | S | S | X | | | | B | B | B | B | C | C |
| 0.15μF (154) | S | S | S/B | X | | | | C | C | C | C | C | C |
| 0.18μF (184) | S | S | S | X | | | | C | C | C | C | C | C |
| 0.22μF (224) | S | S | S/B | X/B | X | | | C | C | C | C | C | C |
| 0.27μF (274) | X | X | X | X | | | | C | C | C | C | C | |
| 0.33μF (334) | X | X | X | X | | | | C | C | C | C | C | |
| 0.39μF (394) | X | X | X | X | | | | C | C | C | C | C | |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 0603, 0805

Table 5-E

| SIZE | 0603 | | | | | 0805 | | | | | | |
|--------------|---------|-----|-----|-----|----|------|-----|----|----|----|----|-----|
| | VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 | 100 |
| 0.47µF (474) | X | X | X/B | X/B | X | | C | C | C | C | C | C |
| 0.56µF (564) | X | X | X | | | | C | C | C | C | | |
| 0.68µF (684) | X | X | X | | | | C | C | C | C | | |
| 0.82µF (824) | X | X | X | | | | C | C | C | C | | |
| 1.0µF (105) | X | X | X | X | X | | C | C | C | C | C | |
| 1.5µF (155) | | | | | | | C | C | C | C | | |
| 2.2µF (225) | X | X/B | X | | | | C | C | C | C | C | |
| 4.7µF (475) | X | X | X | | | | C | C | C | C | | |
| 10µF (106) | | | | | | | C* | C* | C* | | | |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 1206, 1210

Table 5-F

| SIZE | 1206 | | | | | | 1210 | | | | | |
|---------------|---------|-----|----|----|----|----|------|----|----|----|----|-----|
| | VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 150pF (151) | B | B | B | B | B | B | B | | | | | |
| 180pF (181) | B | B | B | B | B | B | B | | | | | |
| 220pF (221) | B | B | B | B | B | B | B | | | | | |
| 270pF (271) | B | B | B | B | B | B | B | | | | | |
| 330pF (331) | B | B | B | B | B | B | B | | | | | |
| 390pF (391) | B | B | B | B | B | B | B | | | | | |
| 470pF (471) | B | B | B | B | B | B | B | | | | | |
| 560pF (561) | B | B | B | B | B | B | B | | | | | |
| 680pF (681) | B | B | B | B | B | B | B | | | | | |
| 820pF (821) | B | B | B | B | B | B | B | | | | | |
| 1,000pF (102) | B | B | B | B | B | B | B | I | I | I | I | I |
| 1,200pF (122) | B | B | B | B | B | B | B | I | I | I | I | I |
| 1,500pF (152) | B | B | B | B | B | B | B | I | I | I | I | I |
| 1,800pF (182) | B | B | B | B | B | B | B | I | I | I | I | I |
| 2,200pF (222) | B | B | B | B | B | B | B | I | I | I | I | I |
| 2,700pF (272) | B | B | B | B | B | B | B | I | I | I | I | I |
| 3,300pF (332) | B | B | B | B | B | B | B | I | I | I | I | I |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 1206, 1210

Table 5-G

| SIZE | 1206 | | | | | | 1210 | | | | |
|---------------|------|----|----|----|-----|-----|------|----|----|----|-----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 3,900pF (392) | B | B | B | B | B | B | I | I | I | I | I |
| 4,700pF (472) | B | B | B | B | B | B | I | I | I | I | I |
| 5,600pF (562) | B | B | B | B | B | B | I | I | I | I | I |
| 6,800pF (682) | B | B | B | B | B | B | I | I | I | I | I |
| 8,200pF (822) | B | B | B | B | B | B | I | I | I | I | I |
| 0.010μF (103) | B | B | B | B | B | B | I | I | I | I | I |
| 0.012μF (123) | B | B | B | B | B | B | I | I | I | I | I |
| 0.015μF (153) | B | B | B | B | B | B | I | I | I | I | I |
| 0.018μF (183) | B | B | B | B | B | B | I | I | I | I | I |
| 0.022μF (223) | B | B | B | B | B | B | I | I | I | I | I |
| 0.027μF (273) | B | B | B | B | B | B | I | I | I | I | I |
| 0.033μF (333) | B | B | B | B | B | B | I | I | I | I | I |
| 0.039μF (393) | B | B | B | B | B | B | I | I | I | I | I |
| 0.047μF (473) | B | B | B | B | B | B | I | I | I | I | I |
| 0.056μF (563) | B | B | B | B | B | B | I | I | I | I | I |
| 0.068μF (683) | B | B | B | B | B | B | I | I | I | I | I |
| 0.082μF (823) | B | B | B | B | B | C | I | I | I | I | I |
| 0.10μF (104) | B | B | B | B | B | C | I | I | I | I | I |
| 0.12μF (124) | B | B | B | B | B | C | I | I | I | I | I |
| 0.15μF (154) | I | I | I | I | I | D | I | I | I | I | C |
| 0.18μF (184) | I | I | I | I | I | D | I | I | I | I | C |
| 0.22μF (224) | I | I | I | I | I/B | D | I | I | I | I | C |
| 0.27μF (274) | I | I | I | I | C | D | I | I | I | I | D |
| 0.33μF (334) | I | I | I | I | C | D | I | I | I | C | D |
| 0.39μF (394) | I | I | I | J | P | D | I | I | I | C | M |
| 0.47μF (474) | J | J | J | J | P | D | I | I | I | C | M |
| 0.56μF (564) | J | J | J | J | P | P | C | C | C | C | M |
| 0.68μF (684) | J | J | J | J | P | P | C | C | C | C | K |
| 0.82μF (824) | J | J | J | J | P | P | C | C | C | C | K |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 1206, 1210

Table 5-H

| SIZE | 1206 | | | | | | 1210 | | | | |
|-------------|------|----|----|----|----|-----|------|----|----|----|-----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| 1.0μF (105) | J | J | J | J | P | P | C | C | C | C | K |
| 1.5μF (155) | J | J | J | P | | | | D | D | M | M |
| 2.2μF (225) | J | J | J | P | P | P | | D | D | M | M |
| 3.3μF (475) | P | P | P | P | | | | D | D | M | |
| 4.7μF (475) | P | P | P | P | P | | K | K | K | M | M |
| 10μF (106) | P | P | P | P | | | K | K | K | M | |
| 22μF (226) | P* | P* | P* | | | | M | M | M | | |
| 47μF (476) | | | | | | | M | | | | |
| 100μF (107) | P* | P* | | | | | | | | | |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 1812

Table 5-I

| SIZE | 1812 | | | | |
|---------------|------|----|----|----|-----|
| VDC (V) | 10 | 16 | 25 | 50 | 100 |
| 1,000pF (102) | C | C | C | C | C |
| 1,200pF (122) | C | C | C | C | C |
| 1,500pF (152) | C | C | C | C | C |
| 1,800pF (182) | C | C | C | C | C |
| 2,200pF (222) | C | C | C | C | C |
| 2,700pF (272) | C | C | C | C | C |
| 3,300pF (332) | C | C | C | C | C |
| 3,900pF (392) | C | C | C | C | C |
| 4,700pF (472) | C | C | C | C | C |
| 5,600pF (562) | C | C | C | C | C |
| 6,800pF (682) | C | C | C | C | C |
| 8,200pF (822) | C | C | C | C | C |
| 0.010μF (103) | C | C | C | C | C |
| 0.012μF (123) | C | C | C | C | C |
| 0.015μF (153) | C | C | C | C | C |
| 0.018μF (183) | C | C | C | C | C |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 1812

Table 5-J

| SIZE | 1812 | | | | |
|---------------|------|----|----|----|-----|
| VDC (V) | 10 | 16 | 25 | 50 | 100 |
| 0.022µF (223) | C | C | C | C | C |
| 0.027µF (273) | C | C | C | C | C |
| 0.033µF (333) | C | C | C | C | C |
| 0.039µF (393) | C | C | C | C | C |
| 0.047µF (473) | C | C | C | C | C |
| 0.056µF (563) | C | C | C | C | C |
| 0.068µF (683) | C | C | C | C | C |
| 0.082µF (823) | C | C | C | C | C |
| 0.10µF (104) | C | C | C | C | C |
| 0.12µF (124) | C | C | C | C | C |
| 0.15µF (154) | C | C | C | C | C |
| 0.18µF (184) | C | C | C | C | C |
| 0.22µF (224) | C | C | C | C | C |
| 0.27µF (274) | C | C | C | C | C |
| 0.33µF (334) | C | C | C | C | C |
| 0.39µF (394) | C | C | C | C | C |
| 0.47µF (474) | C | C | C | C | K |
| 0.56µF (564) | C | C | C | C | K |
| 0.68µF (684) | C | C | C | K | K |
| 0.82µF (824) | C | C | C | K | K |
| 1.0µF (105) | C | C | C | K | K |
| 1.5µF (155) | | | | K | K |
| 2.2µF (225) | | | | M | M |
| | | | | | |
| | | | | | |
| | | | | | |

CAPACITANCE RANGE - X7R DIELECTRIC - SIZE 1825, 2220, 2225

Table 5-K

| SIZE | 1825 | | 2220 | | | 2225 | | |
|---------------|------|-----|------|----|-----|------|----|-----|
| | 50 | 100 | 25 | 50 | 100 | 25 | 50 | 100 |
| 1,000pF (102) | K | K | K | K | K | K | K | K |
| 1,200pF (122) | K | K | K | K | K | K | K | K |
| 1,500pF (152) | K | K | K | K | K | K | K | K |
| 1,800pF (182) | K | K | K | K | K | K | K | K |
| 2,200pF (222) | K | K | K | K | K | K | K | K |
| 2,700pF (272) | K | K | K | K | K | K | K | K |
| 3,300pF (332) | K | K | K | K | K | K | K | K |
| 3,900pF (392) | K | K | K | K | K | K | K | K |
| 4,700pF (472) | K | K | K | K | K | K | K | K |
| 5,600pF (562) | K | K | K | K | K | K | K | K |
| 6,800pF (682) | K | K | K | K | K | K | K | K |
| 8,200pF (822) | K | K | K | K | K | K | K | K |
| 0.010μF (103) | K | K | K | K | K | K | K | K |
| 0.012μF (123) | K | K | K | K | K | K | K | K |
| 0.015μF (153) | K | K | K | K | K | K | K | K |
| 0.018μF (183) | K | K | K | K | K | K | K | K |
| 0.022μF (223) | K | K | K | K | K | K | K | K |
| 0.027μF (273) | K | K | K | K | K | K | K | K |
| 0.033μF (333) | K | K | K | K | K | K | K | K |
| 0.039μF (393) | K | K | K | K | K | K | K | K |
| 0.047μF (473) | K | K | K | K | K | K | K | K |
| 0.056μF (563) | K | K | K | K | K | K | K | K |
| 0.068μF (683) | K | K | K | K | K | K | K | K |
| 0.082μF (823) | K | K | K | K | K | K | K | K |
| 0.10μF (104) | K | K | K | K | K | K | K | K |
| 0.12μF (124) | K | K | K | K | K | K | K | K |
| 0.15μF (154) | K | K | K | K | K | K | K | K |
| 0.18μF (184) | K | K | K | K | K | K | K | K |
| 0.22μF (224) | K | K | K | K | K | K | K | K |

CAPACITANCE RANGE - X5R DIELECTRIC - SIZE 0201

Table 6-A

| SIZE | 0201 | | | |
|---------------|------|----|----|----|
| VDC (V) | 10 | 16 | 25 | 50 |
| 100pF (101) | | L | L | L |
| 120pF (121) | | L | L | L |
| 150pF (151) | | L | L | L |
| 180pF (181) | | L | L | L |
| 220pF (221) | | L | L | L |
| 270pF (271) | | L | L | L |
| 330pF (331) | | L | L | L |
| 390pF (391) | | L | L | L |
| 470pF (471) | | L | L | L |
| 560pF (561) | | L | L | L |
| 680pF (681) | | L | L | L |
| 820pF (821) | | L | L | L |
| 1,000pF (102) | L | L | L | L |
| 1,200pF (122) | L | L | L | |
| 1,500pF (152) | L | L | L | |
| 2,200pF (222) | L | L | L | |
| 2,700pF (272) | L | L | L | |
| 3,300pF (332) | L | L | L | |
| 4,700pF (472) | L | L | L | |

CAPACITANCE RANGE - X5R DIELECTRIC - SIZE 0201

Table 6-B

| SIZE | 0201 | | | | | 0402 | | | | |
|---------------|------|----|----|----|----|------|----|----|----|-----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 |
| 6,800µF (682) | | L | L | L | | | | | | |
| 0.010µF (103) | L | L | L | L | L | | | | | |
| 0.015µF (153) | L | L | | | | | | | | H |
| 0.022µF (223) | L | L | | | | | | | | H |
| 0.027µF (273) | L | L | | | | | | H | | H |
| 0.033µF (333) | L | L | | | | | | H | | H |
| 0.039µF (393) | L | L | | | | | | H | | H |
| 0.047µF (473) | L | L | | | | H | H | H | | H |
| 0.056µF (563) | L | L | | | | H | H | H | | H |
| 0.068µF (683) | L | L | | | | H | H | H | | H |
| 0.082µF (823) | L | L | | | | H | H | H | | H |
| 0.10µF (104) | L | L | L | | | H | H | H | H | H/E |
| 0.15µF (154) | | | | | | H | H | H | H | |
| 0.22µF (224) | L | L | L* | L | | H | H | H | H | H |
| 0.33µF (334) | L* | L* | | | | H | H | | | |
| 0.47µF (474) | L | | | | | H | H | H | H | H |
| 0.68µF (684) | | | | | | H | H | | | |
| 1.0µF (105) | L* | L* | L* | | | H | H | H | H | H |
| 2.2µF (225) | L* | L* | | | | H | H | H | H | |
| 4.7µF (475) | | | | | | H | H | H* | | |
| 10µF (106) | | | | | | H* | H* | H* | | |
| 22µF (226) | | | | | | H* | | | | |

CAPACITANCE RANGE - X5R DIELECTRIC - SIZE 0603

Table 6-C

| SIZE | 0603 | | | | |
|--------------|------|-----|----|----|----|
| VDC (V) | 6.3 | 10 | 16 | 25 | 50 |
| 0.22µF (224) | X | X | X | X | |
| 0.27µF (274) | | X | X | X | |
| 0.33µF (334) | X | X | X | X | |
| 0.39µF (394) | | X | X | X | |
| 0.47µF (474) | X | X/B | X | X | X |

CAPACITANCE RANGE - X5R DIELECTRIC - SIZE 0603, 0805

Table 6-D

| SIZE | 0603 | | | | | 0805 | | | | | |
|--------------|---------|-----|----|-----|-----|------|-----|----|----|----|----|
| | VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 |
| 0.68μF (684) | X | X | X | X | | | | | | | |
| 0.82μF (824) | X | X | X | X | | | | | | | |
| 1.0μF (105) | X | X | X | X/B | X/B | | C | C | C | C | |
| 1.5μF (155) | X | | | | | | C | C | C | C | |
| 2.2μF (225) | X/B | X | X | X | X | | C | C | C | C | C |
| 3.3μF (335) | X | X | | | | | C | C | C | C | |
| 4.7μF (475) | X | X | X | X | | | C | C | C | C | C |
| 10μF (106) | X/B | X | X | X* | | | C | C | C | C | C |
| 22μF (226) | X* | X* | | | | | C | C* | C* | C* | |
| 47μF (476) | | | | | | | C* | C* | | | |
| 100μF (107) | | | | | | | C* | | | | |

CAPACITANCE RANGE - X5R DIELECTRIC - SIZE 1206, 1210

Table 6-E

| SIZE | 1206 | | | | | 1210 | | | | | | | |
|-------------|---------|-----|----|-----|----|------|----|-----|----|----|----|----|----|
| | VDC (V) | 6.3 | 10 | 16 | 25 | 50 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 |
| 1.5μF (155) | | J | J | | | | | | K | K | | | |
| 2.2μF (225) | | J | J | P | P | | | | K | K | | | |
| 3.3μF (335) | | P | P | P | | | | | | | | | |
| 4.7μF (475) | P | P | P | P | P | | | | K | K | K | | |
| 6.8μF (685) | P | P | | | | | | | | | | | |
| 10μF (106) | P | P | P | P/D | P | | | K | K | K | K | M | M |
| 22μF (226) | P | P | P | P | | | | M | M | M | M | M | |
| 47μF (476) | P | P | P* | P/Y | | | | M | M | M* | M | | |
| 100μF (107) | P* | | | | | | | M* | M* | | | | |
| 220μF (227) | | | | | | | M* | M* | | | | | |

Note: 1) The letter in cell is expressed the symbol of product thickness. 2) The letter in cell with “ * ” mark is for “M tolerance” (20%) only

CAPACITANCE RANGE - X6S DIELECTRIC - SIZE 0201, 0402, 0603

Table 7-A

| SIZE | 0201 | | 0402 | | | | 0603 | | | | |
|--------------|------|-----|------|----|----|----|------|-----|----|----|----|
| VDC (V) | 4 | 6.3 | 6.3 | 10 | 16 | 25 | 4 | 6.3 | 10 | 16 | 25 |
| 0.10µF (104) | L | L | | | | | | | | | |
| 0.22µF (224) | | L | | | | | | | | | |
| 0.47µF (474) | | | H | | | | | | | | |
| 1.0µF (105) | L* | | H | H | H | H | | | | | |
| 2.2µF (225) | | | H | H | H | | | | | | |
| 4.7µF (475) | | | | | | | | X | | X | X |
| 10µF (106) | | | | | | | | X* | X* | X* | |
| 22µF (226) | | | | | | | X* | X* | | | |

CAPACITANCE RANGE - X6S DIELECTRIC - SIZE 0805, 1206, 1210

Table 7-B

| SIZE | 0805 | | | | | | 1206 | | | | 1210 | | | |
|--------------|------|-----|----|----|----|----|------|----|----|----|------|----|----|----|
| VDC (V) | 4 | 6.3 | 10 | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 6.3 | 10 | 16 | 25 |
| 0.10µF (104) | | | | | | | | | | | | | | |
| 0.22µF (224) | | | | | | | | | | | | | | |
| 0.47µF (474) | | | | | | | | | | | | | | |
| 1.0µF (105) | | | | | | | | | | | | | | |
| 2.2µF (225) | | | | | | | | | | | | | | |
| 4.7µF (475) | | | | | C | C | | | | | | | | |
| 10µF (106) | C | C | C | C | C | | | | | D | | | | |
| 22µF (226) | | C* | C* | C* | | | | P | P* | | | | | M |
| 47µF (476) | C* | | | | | | P | | | | M | M | M | |
| 100µF (107) | | | | | | | | | | | M* | | | |

Note: 1) The letter in cell is expressed the symbol of product thickness. 2) The letter in cell with “ * ” mark is for “M tolerance” (20%) only

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITION | REQUIREMENTS |
|----------------------------|---|--|
| Visual and Mechanical | - | <ul style="list-style-type: none"> * No remarkable defect. * Dimensions to conform to individual spec. sheet. |
| Capacitance | <p>Class I: (NP0)</p> <p>$\leq 1000\text{pF}$, $1.0 \pm 0.2\text{Vrms}$, $1\text{MHz} \pm 10\%$</p> <p>$> 1000\text{pF}$, $1.0 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$</p> <p>Class II: (X7R, X6S, X5R)</p> <p>$C \leq 10\mu\text{F}$, $1.0 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$</p> <p>** $C > 10\mu\text{F}$, $0.5 \pm 0.2\text{Vrms}$, $120\text{Hz} \pm 20\%$</p> <p>** Test condition: $0.5 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$</p> <p>X7R: 0805=106(6.3V), 0603/475(6.3V)</p> <p>X5R: 0201≥ 224 (6.3V,10V,16V)*, 0402≥ 475 (6.3V,16V), 0402≥ 225(10V), 0603=106 (6.3V,10V)TT18X≥ 475(10V) , TT15X series</p> <p>X6S: 0201/474(4V),0201≥ 104 (6.3V,10V)*, 0402≥ 225 (6.3V), 0402/475 (10V), 0603/106 (6.3V),</p> <p>* Excluding X5R/0201/105(6.3V); 225(10V), X6S/0201/104(10V) ($1.0 \pm 0.2\text{Vrms}$, $1\text{KHz} \pm 10\%$)</p> <p>* Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr for 24 ± 2 hrs at room temp.</p> | <p>* Shall not exceed the limits given in the detailed spec.</p> <p>NP0: Cap$\geq 30\text{pF}$, Q≥ 1000; Cap$< 30\text{pF}$, Q$\geq 400+20C$</p> <p>X7R, See <Table 1> X5R, See <Table 2> X6S: See <Table 3></p> |
| Q/D.F (Dissipation Factor) | | |
| Dielectric Strength | <ul style="list-style-type: none"> * To apply voltage ($\leq 100\text{V}$) 250%. * Duration: 1 to 5 sec. * Charge and discharge current less than 50mA. | <ul style="list-style-type: none"> * No evidence of damage or flash over during test. |
| Insulation Resistance | <ul style="list-style-type: none"> * Preconditioning for Class II MLCC: Perform a heat treatment at $150 \pm 10^\circ\text{C}$ for 1 hour, then leave in ambient condition for 24 ± 2 hours before measurement. To apply rated voltage for max. 120 sec. | <p>Class I: (NP0)</p> <p>$10\text{G}\Omega$ or $RxC \geq 500\Omega\text{-F}$ whichever is smaller.</p> <p>Class II (X7R, X5R, X6S)</p> <p>$10\text{G}\Omega$ or $RxC \geq 500\Omega\text{-F}$ whichever is smaller. See <Table 8></p> |

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITION | REQUIREMENTS |
|----------------------------------|--|--|
| Temperature Coefficient | <p>With no electrical load. @Oprating Temp. Range NP0/X7R: @ -55~125° C; X5R: -55~ 85° C ; X6S: -55~105° C ;</p> <p>* Before initial measurement (Class II only): To apply de-aging at 150° C for 1hr then set for 24±2 hrs at room temp.</p> <ul style="list-style-type: none"> • Measurement voltage for Class II: See <Table 9> | <p>NP0: Within ±30ppm/° C X7R: Within ±15% X5R: Within ±15% X6S: Within ±22%</p> |
| Adhesive Strength of Termination | <p>*Pressurizing force: 2N (0201) and 5N (≤0603) and 10N (>0603);</p> <p>* Test time: 10±1 sec.</p> | <p>* No remarkable damage or removal of the terminations.</p> |
| Vibration Resistance | <p>Vibration frequency: 10~55 Hz/min.</p> <p>* Total amplitude: 1.5mm</p> <p>* Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)</p> <p>* Before initial measurement (Class II only): To apply de-aging at 150° C for 1hr then set for 24±2 hrs at room temp.</p> <p>* Cap./DF(Q) Measurement to be made after de-aging a 150° C for 1hr then set for 24±2 hrs at room temp.</p> | <p>* No remarkable damage or removal of the terminations.</p> <p>* No remarkable damage.</p> <p>* Cap change and Q/D.F.: To meet initial spec.</p> |
| Bending Test | <p>* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec.</p> <p>*Before initial measurement (Class II only): To apply de-aging at 150° C for 1hr then set for 24±2 hrs at room temp.</p> <p>Measurement to be made after keeping at room temp. for 24±2 hrs.</p> | <p>* No remarkable damage.</p> <p>* Cap change: NP0: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S: within ±12.5%</p> <p>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</p> |

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITION | REQUIREMENTS |
|------------------------------|---|--|
| Resistance to Soldering Heat | <ul style="list-style-type: none"> * Solder temperature: 260±5° C * Dipping time: 10±1 sec * Preheating: 120 to 150° C for 1 minute before immerse the capacitor in a eutectic solder. * Before initial measurement (Class II only): To apply de-aging at 150° C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150° C for 1hr then set for 24±2 hrs at room | <ul style="list-style-type: none"> * No remarkable damage. * Cap change: NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S: within ±7.5% * Q/D.F., I.R. and dielectric strength: To meet initial requirements. * 25% max. leaching on each edge. |
| Temperature Cycle | <ul style="list-style-type: none"> *Conduct the five cycles according to the temperatures and time. Time (min.): 30±3 @ Min. operating temp.+0/-3 ° C Time (min.): 2~3 @ Room temperture Time (min.): 30±3 @ Max. operating temp.+3/-0 ° C Time (min.): 2~3 @ Room temperture * Before initial measurement (Class II only): Perform 150+0/-10° C for 1 hr and then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150° C for 1hr then set for 24±2 hrs at room. | <ul style="list-style-type: none"> * No remarkable damage. * Cap change: NP0: within ±2.5% or 0.25pF whichever is larger X7R, X5R, X6S: within ±7.5% * Q/D.F., I.R. and dielectric strength: To meet initial requirements. |
| Solder ability | <ul style="list-style-type: none"> * Solder temperature: 235±5° C * Dipping time: 2±0.5 sec. | <p>95% min. coverage of all metalized area</p> |

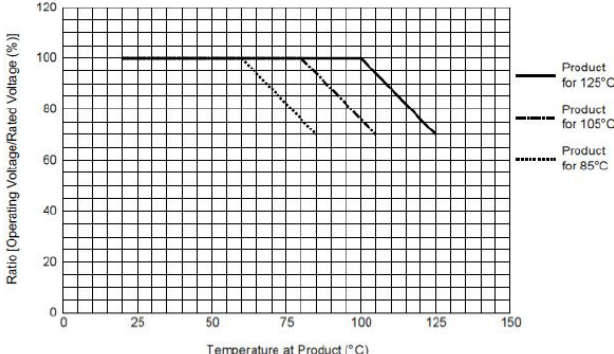
RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITION | REQUIREMENTS |
|---|--|--|
| Humidity (Damp Heat) Steady State | <ul style="list-style-type: none"> * Test temp.: 40±2° C * Humidity: 90~95% RH * Test time: 500+24/-0hrs. • Before initial measurement (Class II only): Perform 150+0/-10° C for 1 hr and then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150° C for 1hr then set for 24±2 hrs at room temp. | <ul style="list-style-type: none"> * No remarkable damage. * Cap change: NPO: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S: ≥10V**, within ±12.5%; 6.3V within ±25%; ** 10V: 0603≥4.7μF; 0402≥1μF; 0201 ≥0.1μF, within ±25%; * Q/D.F. value: NPO: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q≥200+10C X7R, X5R, X6S: See <Table 10> *I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller. Class II (X7R, X5R, X6S) See <Table 13> |

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITION | REQUIREMENTS |
|------------------------------|--|--|
| Humidity (Damp Heat) Load | <ul style="list-style-type: none"> *Test temp.: 40±2° C * Humidity: 90~95%RH * Test time: 500+24/-0 hrs. * To apply voltage: rated voltage. * Before initial measurement (Class II only): To apply de-aging at 150° C for 1hr then set for 24±2 hrs at room temp. * Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150° C for 1hr.then set for 24±2 hrs at room temp | <ul style="list-style-type: none"> * No remarkable damage. Cap change: NP0: ±7.5% or 0.75pF whichever is larger. X7R, X5R, X6S: ≥10V**, within ±12.5%; ≤ 6.3V within ±25%; **10V: 0603 4.7≥μF; 0402 ≥1μF; 0201≥0.1 μF, within ±25%; value: NP0: C≥30pF, Q≥200; C<30pF, Q≥100+10/3C X7R, X5R, X6S: See <Table 11> * I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is smaller. Class II (X7R, X5R, X6S) See <Table 13> |

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITION | REQUIREMENTS |
|--|---|--|
| <p>High Temperature Load (Endurance)</p> | <p>* Test temp.: NP0, X7R: 125±3° C X6S: 105±3° C X5R: 85±3° C</p> <p>* Test time: 1000+24/-0 hrs.</p> <p>* To apply voltage:</p> <p>(1) $\leq 6.3V$ or $C \geq 10\mu F$: 150% of rated voltage.</p> <p>(2) $10V \leq U_r < 500V$: 200% of rated voltage.</p> <p>(3) 500V: 150% of rated voltage.</p> <p>(4) $U_r \geq 630V$: 120% of rated voltage.</p> <p>(5) 100% of rated voltage for below range <i>See Table 14</i></p> <p>(6) 150% of rated voltage for below range. <i>See Table 15</i></p> <p>* Before initial measurement (Class II only): To apply de-aging at 150° C for 1hr then set for 24±2 hrs at room temp.</p> <p>* Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150° C for 1hr then set for 24±2 hrs at room temp.</p> <p>** De-rating conditions:</p>  | <p>* No remarkable damage. Cap change:</p> <p>NP0: $\pm 3.0\%$ or $\pm 0.3pF$ whichever is larger</p> <p>X7R, X5R, X6S: $\geq 10V^{**}$, within $\pm 12.5\%$; $\leq 6.3V$ within $\pm 25\%$;</p> <p>** 10V: 0603$\geq 4.7\mu F$; 0402$\geq 1\mu F$; 0201$\geq 0.1\mu F$, within $\pm 25\%$;</p> <p>Q/D.F. value:</p> <p>NP0: More than 30pF, $Q \geq 350$</p> <p>10pF$\leq C < 30pF$, $Q \geq 275 + 2.5C$</p> <p>Less than 10pF, $Q \geq 200 + 10C$</p> <p>X7R, X5R, X6S: <i>See <Table 12></i></p> <p>*I.R.: $\geq 10V$, 1GΩ or 50Ω-F whichever is smaller. Class II (X7R, X5R, X6S)</p> <p><i>See <Table 13></i></p> |

INSULATION RESISTANCE – Requirement - Class II (X7R, X5R, X6S)

Table 8

| RATED VOLTAGE | IR |
|--|--|
| 100V: All X7R | 10GΩ or $RxC \geq 100 \Omega\text{-F}$ whichever is smaller |
| 50V: 0402 > 0.01μF; 0603 $\geq 1\mu\text{F}$; 0805 $\geq 1\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$ | |
| 35V: 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$ | |
| 25V: 0402 $\geq 1\mu\text{F}$; 0603 $\geq 2.2\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 10\mu\text{F}$ | |
| 16V: 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.22\mu\text{F}$; 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 47\mu\text{F}$ | |
| 10V: 0201 $\geq 47\text{nF}$; 0402 $\geq 0.47\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 47\mu\text{F}$ | |
| 6.3V; 4V; Size ≥ 1812 | |
| All X6S items | $RxC \geq 50 \Omega\text{-F}$. |
| 100V: 1210 $\geq 3.3\mu\text{F}$ | |
| 50V: 0402 $\geq 0.1\mu\text{F}$; 0603 $\geq 2.2\mu\text{F}$; 0805 $\geq 10\mu\text{F}$; 1206 $\geq 10\mu\text{F}$ | |
| 35V: 0603 $\geq 1\mu\text{F}$ | |
| 25V: 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.22\mu\text{F}$; 0603 $\geq 10\mu\text{F}$; 0805 $\geq 10\mu\text{F}$; 1206 $\geq 22\mu\text{F}$ | |
| 16V: 0201 $\geq 0.22\mu\text{F}$; 0402 $\geq 1\mu\text{F}$; 0603 $\geq 10\mu\text{F}$ | |
| 10V: 0201 > 0.1μF; 0402 $\geq 1\mu\text{F}$; 0603 $\geq 10\mu\text{F}$; 0805 $\geq 47\mu\text{F}$ | |
| 6.3V: 0201 $\geq 0.1\mu\text{F}$; 0603 $\geq 4.7\mu\text{F}$; 0805 $\geq 47\mu\text{F}$; 1206 $\geq 10\mu\text{F}$ | |
| 4V: 0603 $\geq 22\mu\text{F}$; 0805 $\geq 47\mu\text{F}$; 1206 $\geq 100\mu\text{F}$ | |

TEMPERATURE COEFFICIENT- Test Condition Measurement voltage for Class II:

Table 9

| MEASUREMENT VOLTAGE | SIZE |
|---|-----------|
| Cap $\leq 0.01\mu\text{F}$: 0.5V; Cap. > 0.01μF: 0.2V | 01005 |
| Cap < 0.1μF: 1.0V; 0.1μF* \leq Cap. < 1.0μF: 0.2V; Cap. $\geq 1.0\mu\text{F}$: 0.1V (*: 0201x104/16V: 0.5V) | 0201 |
| Cap < 1μF: 1.0V; Cap. = 1μF: 0.5V; 1μF < Cap. < 10μF: 0.2V; Cap. $\geq 10\mu\text{F}$: 0.1V | 0402 |
| Cap < 1.0μF: 1.0V; 1.0μF* \leq Cap. $\leq 4.7\mu\text{F}$: 0.5V; Cap. > 4.7μF: 0.2V | 0603 |
| Cap < 10μF: 1.0V; Cap. = 10μF: 0.5V; Cap. > 10μF: 0.2V | 0805 |
| Cap $\leq 10\mu\text{F}$: 1.0V; 10μF < Cap. $\leq 100\mu\text{F}$: 0.5V; Cap. > 100μF: 0.2V | 1206/1210 |

HUMIDITY (DAMP HEAT) STEADY STATE -Requirement - (X7R, X5R, X6S)

Table 10

| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | |
|------------|--------|---------------------|---|
| ≥100V | ≤ 3% | ≤ 6% | 1206 ≥ 0.47μF |
| | | ≤ 7.5% | 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; |
| | | ≤ 20% | 0805 > 0.22μF; 1210 ≥ 3.3μF |
| 50V | ≤ 3% | ≤6% | 0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF |
| | | ≤10% | 0201≥0.01uF; 1210≥4.7μF |
| | | ≤20% | 0402≥0.012μF; 0603>0.1μF; 0805≥1μF(0805/X7R>0.47μF); 1206≥2.2μF; 1210≥10μF; |
| 35V | ≤ 5% | ≤20% | 0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF |
| 25V | ≤ 5% | ≤10% | 0201≥0.01μF; 0805≥1μF; 1210≥10μF |
| | | ≤14% | 0603≥0.33μF |
| | | ≤15% | 0201≥0.1μF; 0402≥0.10μF&(0402/X7R≥0.056μF);0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF;1210≥22μF(1210/X5R≥10μF) |
| | | ≤20% | 0402≥0.47μF |
| 16V | ≤5% | ≤10% | 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF |
| | | ≤15% | 0201≥0.01μF(0201/X7R≥0.022μF);0402≥0.033μF; 0603>0.47μF;0805≥2.2μF;1206≥4.7μF; 1210≥22μF |
| 10V | ≤ 7.5% | ≤15% | 0201≥0.012μF;0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF;1210≥22μF |
| | | ≤20% | 0201≥0.1μF; 0402≥1μF |
| 6.3V | ≤ 15% | ≤30% | 0201≥0.1μF; 0402≥1μF(0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210 ≥100μF |
| 4V | ≤20% | - | - |

HUMIDITY (DAMP HEAT) LOAD -REQUIREMENT - (X7R, X5R, X6S)

Table 11

| RATED VOL. | D.F. ≤ | EXCEPTION OF D.F. ≤ | |
|------------|--------|---------------------|---|
| ≥100V | ≤ 3% | ≤ 6% | 1206 ≥ 0.47μF |
| | | ≤ 7.5% | 0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF; |
| 50V | ≤ 3% | ≤6% | 0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF |
| | | ≤10% | 1210≥4.7μF |
| | | ≤20% | 0402≥0.01μF; 0603>0.1μF; 0805≥1μF; 1206≥2.2μF; 1210≥10μF; |
| 35V | ≤ 5% | ≤20% | 0603≥1μF; 0805≥2.2μF; 1210≥10μF |
| 25V | ≤ 5% | ≤10% | 0201≥0.01μF; 0805≥1μF; 1210≥10μF |
| | | ≤14% | 0603≥0.33μF; 1206≥4.7μF |
| | | ≤15% | 0402≥0.10μF;0603≥0.47μF;0805≥2.2μF;1206≥6.8μF ; 1210≥22μF |
| | | ≤20% | 0402≥1μF |
| 16V | ≤5% | ≤10% | 0201≥0.01μF;0402≥0.033μF;0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF |
| | | ≤15% | 0201≥0.01μF; 0402≥0.22μF; 0603>0.68μF;0805≥2.2μF;1206≥4.7μF; 1210≥22μF |
| 10V | ≤ 7.5% | ≤15% | 0201≥0.012μF;0402≥0.33μF(0402/X7R≥0.22μF) ;0603≥0.33μF;0805≥2.2μF;1206≥2.2μF;1210≥22μF |
| | | ≤20% | 0201≥0.1μF; 0402≥1μF |
| 6.3V | ≤ 15% | ≤30% | 0201≥0.1μF; 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210 ≥100μF |
| 4V | ≤20% | - | - |

HIGH TEMPERATURE LOAD (ENDURANCE) -REQUIREMENT - (X7R, X5R, X6S)

Table 12

| RATED VOL. | D.F. \leq | EXCEPTION OF D.F. \leq | |
|-------------|--------------|--------------------------|--|
| $\geq 100V$ | $\leq 3\%$ | $\leq 6\%$ | 1206 $\geq 0.47\mu F$ |
| | | $\leq 7.5\%$ | 0603 $\geq 0.068\mu F$; 0805 $> 0.1\mu F$; 1206 $> 1\mu F$; |
| 50V | $\leq 3\%$ | $\leq 6\%$ | 0201(50V); 0603 $\geq 0.047\mu F$; 0805 $\geq 0.18\mu F$; 1206 $\geq 0.47\mu F$ |
| | | $\leq 10\%$ | 1210 $\geq 4.7\mu F$ |
| | | $\leq 20\%$ | 0402 $\geq 0.1\mu F$; 0603 $> 0.1\mu F$; 0805 $\geq 1\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 10\mu F$ |
| 35V | $\leq 5\%$ | $\leq 20\%$ | 0603 $\geq 1\mu F$; 0805 $\geq 2.2\mu F$; 1210 $\geq 10\mu F$ |
| 25V | $\leq 5\%$ | $\leq 10\%$ | 0201 $\geq 0.01\mu F$; 0805 $\geq 1\mu F$; 1210 $\geq 10\mu F$ |
| | | $\leq 14\%$ | 0603 $\geq 0.33\mu F$; 1206 $\geq 4.7\mu F$ |
| | | $\leq 15\%$ | 0402 $\geq 0.10\mu F$; 0603 $\geq 0.47\mu F$; 0805 $\geq 2.2\mu F$; 1206 $\geq 6.8\mu F$; 1210 $\geq 22\mu F$ |
| | | $\leq 20\%$ | 0402 $\geq 1\mu F$ |
| 16V | $\leq 5\%$ | $\leq 10\%$ | 0201 $\geq 0.01\mu F$; 0402 $\geq 0.033\mu F$; 0603 $\geq 0.15\mu F$; 0805 $\geq 0.68\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 4.7\mu F$ |
| | | $\leq 15\%$ | 0201 $\geq 0.01\mu F$; 0402 $\geq 0.22\mu F$; 0603 $> 0.68\mu F$; 0805 $\geq 2.2\mu F$; 1206 $\geq 4.7\mu F$; 1210 $\geq 22\mu F$ |
| 10V | $\leq 7.5\%$ | $\leq 15\%$ | 0201 $\geq 0.012\mu F$; 0402 $\geq 0.33\mu F$ (0402/X7R $\geq 0.22\mu F$) ; 0603 $\geq 0.33\mu F$; 0805 $\geq 2.2\mu F$; 1206 $\geq 2.2\mu F$; 1210 $\geq 22\mu F$ |
| | | $\leq 20\%$ | 0201 $\geq 0.1\mu F$; 0402 $\geq 1\mu F$ |
| 6.3V | $\leq 15\%$ | $\leq 30\%$ | 0201 $\geq 0.1\mu F$; 0402 $\geq 1\mu F$; 0603 $\geq 10\mu F$; 0805 $\geq 4.7\mu F$; 1206 $\geq 47\mu F$; 1210 $\geq 100\mu F$ |
| 4V | $\leq 20\%$ | - | - |

REQUIREMENT - CLASS II (X7R, X5R, X6S)

Table 13

| MEASUREMENT VOLTAGE | IR |
|--|--|
| 100V: X7R; 1210 \geq 3.3 μ F | 1G Ω or RxC \geq 10 Ω -F whichever is smaller |
| 50V: 0402 $>$ 0.01 μ F; 0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 4.7 μ F | |
| 35V: 0603 \geq 1 μ F; 0805 \geq 2.2 μ F; 1210 \geq 10 μ F | |
| 25V: 0201 \geq 0.1 μ F; 0402 \geq 0.22 μ F; 0603 \geq 2.2 μ F; 0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 10 μ F | |
| 16V: 0201 \geq 0.1 μ F; 0402 \geq 0.22 μ F; 0603 \geq 1 μ F ;0805 \geq 2.2 μ F; 1206 \geq 10 μ F; 1210 \geq 47 μ F | |
| 10V: 0201 \geq 47nF; 0402 \geq 0.47 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 47 μ F | |
| 6.3V; 4V; All X6S items; Size \geq 1812 | |

HIGH TEMPERATURE LOAD (ENDURANCE) – Test Condition-100% of Rated Voltage

Table 14

| SIZE | DIELECTRIC | RATED VOLTAGE | CAPACITANCE |
|------|-------------|---------------|-------------|
| 0201 | X5R/X7R/X6S | ≤10V | C≥0.1μF |
| | | ≥16V | C>0.1μF |
| 0402 | X5R | ≤16V | C>1.0μF |
| | | 25V,50V | C≥1.0μF |
| | X6S | 6.3V,10V | C>1.0μF |
| | | 16V,25V | C≥1.0μF |
| X7R | 6.3V,10V | C≥1.0μF | |
| 0603 | X5R/X7R/X6S | 4V | C≥22μF |
| | | 6.3V,10V | C≥4.7μF |
| | X5R/X6S | 25V | C≥1.0μF |
| | X7R | 35V | C≥1.0μF |
| 0805 | X5R/X7R/X6S | 4V | C≥47μF |
| | | 6.3V | C≥22μF |
| | | 10V, 50V | C≥10μF |
| | X6S/X7R | 16V, 25V | C≥10μF |
| | X5R | | C≥22μF |
| 1206 | X5R/X7R/X6S | ≤6.3V | C≥47μF |
| 1210 | X5R/X7R/X6S | 16V | C≥47μF |
| | X7R | 100V | C≥3.3μF |

HIGH TEMPERATURE LOAD (ENDURANCE) – Test Condition-150% of Rated Voltage

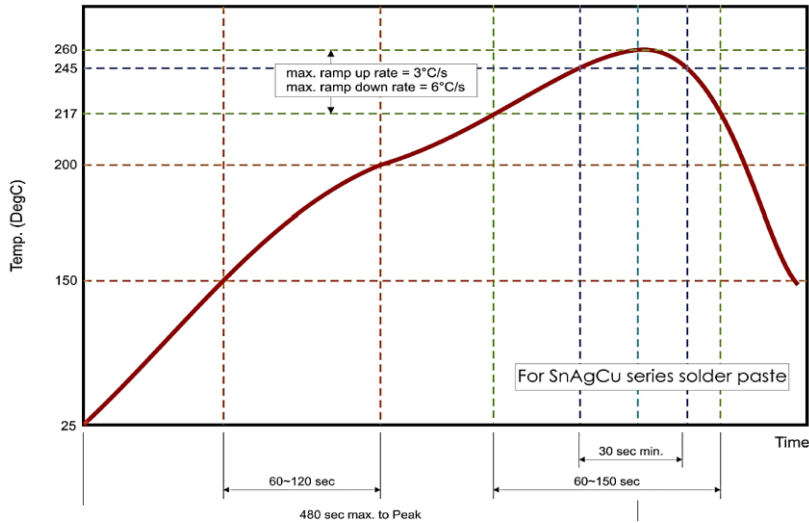
Table 15

| DIELECTRIC | RATED VOLTAGE | CAPACITANCE | DIELECTRIC |
|----------------------|---------------|-------------|------------|
| 0201 | X5R/X6S | 16V, 25V | C= 0.1μF |
| | X7R | 16V | C≥0.022μF |
| 0402 | X5R/X7R/X6S | 50V | C>0.01μF |
| | | 10-25V | C≥0.22μF |
| 0603 | Y7R | 50V | C>0.1μF |
| | | 25V | C=1.0μF |
| | X5R | 50V | C≥1.0μF |
| | X5R/X7R/X6S | 10V, 16V | C≥1.0μF |
| 0805 | X5R/X7R/X6S | 100V | C≥0.47μF |
| | | 50V | C≥1.0μF |
| | | 35V | C≥2.2μF |
| | | 10-25V | C≥4.7μF |
| 1206 | X7R | 100V | C≥1.0μF |
| | | 50V | C=4.7μF |
| | X5R/X6S | 100V | C>1.0μF |
| | | 50V | C=4.7μF |
| 1210 | X5R/X7R/X6S | 50-100V | C≥2.2μF |
| 1825 2220 2225 | X7R | 100V-250V | C≥1.0μF |

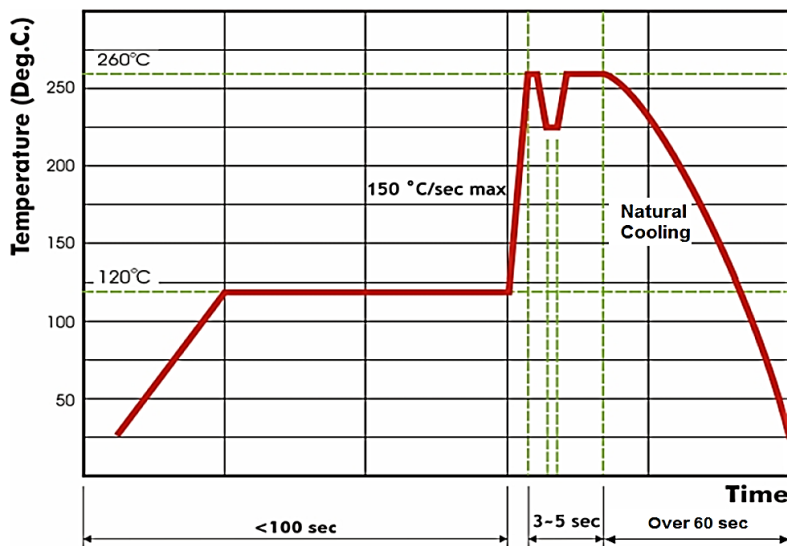
RECOMMENDED PROFILE CONDITIONS

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste.

If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N₂ within oven are recommended.



Reflow Soldering Profile For SMT Process with SnAgCu series Solder Paste



Wave Soldering Profile For SMT Process with SnAgCu series Solder Paste

STORAGE AND HANDLING CONDITIONS

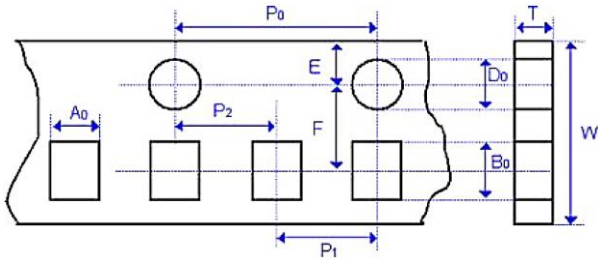
- To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- The product is recommended to be used within one year after shipment. Check solder ability in case of shelf life extension is needed.
- Don't open the tape until the parts are to be used, use the chips within 3 months after the tape is opened.
- For product of high dielectric constant (Class2 & 3, characteristics B/W & Y), the Electro static capacity changes with the passage of time due to the inherent characteristics of ceramic dielectric materials. The changed capacity reverts to nominal at the temperature it reaches during the soldering process.

CAUTIONS

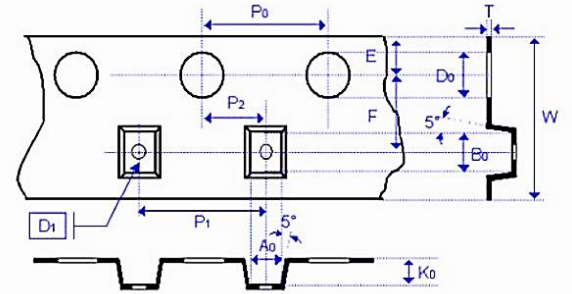
- The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solder ability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- In corrosive atmosphere, solder ability might be degraded, and silver migration might occur to cause low reliability.
- Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sun light, the solder ability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.

TAPE DIMENSION (Unit: mm)

Paper Tape



Plastic Tape



| SIZE | 0201 | 0402 | 0603 | 0805 | | |
|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| Thickness | L | H | H, S, B, X | A, H | B, X | C |
| A0 | 0.40 ±0.10 | 0.70 ±0.20 | 1.05 ±0.30 | 1.5±0.20 | 1.5 ±0.20 | < 1.80 |
| B0 | 0.70 ±0.10 | 1.20 ±0.20 | 1.80 ±0.30 | 2.30 ±0.20 | 2.30 ±0.20 | < 2.70 |
| T | ≤0.55 | ≤0.80 | ≤1.20 | ≤1.15 | ≤1.20 | 0.23 ±0.1 |
| K0 | - | - | - | - | - | < 2.50 |
| W | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 |
| P0 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 |
| 10xP0 | 40.0 ±0.10 | 40.0 ±0.10 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 |
| P1 | 2.00 ±0.05 | 2.00 ±0.05 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 |
| P2 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 |
| D0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 |
| D1 | - | - | - | - | - | 1.00 ±0.10 |
| E | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 |
| F | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 |

TAPE DIMENSION (Unit: mm)

| SIZE | 1206 | | | 1210 | | |
|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| | B | I, C, J | D, P | B | I, C, D, K | M |
| Thickness | B | I, C, J | D, P | B | I, C, D, K | M |
| A0 | 1.90 ±0.50 | < 2.00 | < 2.30 | < 3.05 | < 3.05 | < 3.20 |
| B0 | 3.50 ±0.50 | < 3.70 | < 4.00 | < 3.80 | < 3.80 | < 4.00 |
| T | ≦1.20 | 0.23 ±0.1 | 0.23 ±0.1 | 0.23 ±0.1 | 0.23 ±0.1 | 0.23 ±0.1 |
| K0 | - | < 2.50 | < 2.50 | < 1.50 | < 2.50 | < 3.20 |
| W | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 | 8.00 ±0.30 |
| P0 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 |
| 10xP0 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 |
| P1 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 |
| P2 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 | 2.00 ±0.05 |
| D0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 |
| D1 | - | 1.00 ±0.10 | 1.00 ±0.10 | 1.00 ±0.10 | 1.00 ±0.10 | 1.00 ±0.10 |
| E | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 |
| F | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 | 3.50 ±0.05 |

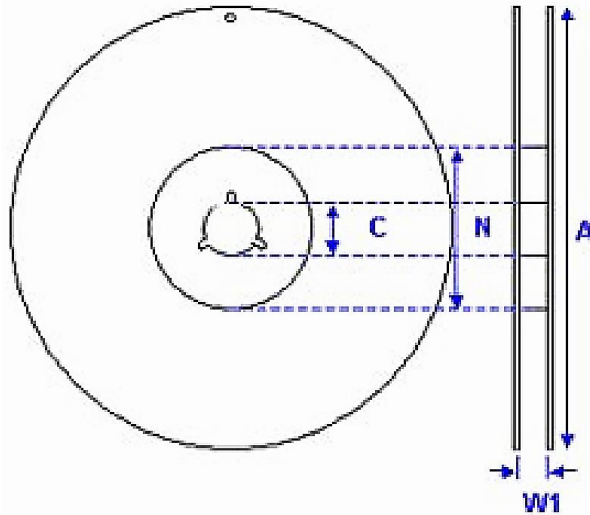
TAPE DIMENSION (Unit: mm)

| SIZE | 1812 | | 1825 | | 2220 | |
|-----------|--------------|--------------|--------------|--------------|--------------|--------------|
| Thickness | C, D, K | M, U | K | M, U | K | M, U |
| A0 | < 3.90 | < 3.90 | < 6.80 | < 6.80 | < 5.80 | < 5.80 |
| B0 | < 5.30 | < 5.30 | < 5.30 | < 5.30 | < 6.50 | < 6.50 |
| T | 0.25 ±0.1 | 0.25 ±0.1 | 0.30 ±0.1 | 0.30 ±0.1 | 0.30 ±0.1 | 0.30 ±0.1 |
| K0 | < 2.50 | < 3.50 | < 2.50 | < 3.50 | < 2.50 | < 3.50 |
| W | 12±0.30 | 12±0.30 | 12±0.30 | 12±0.30 | 12±0.30 | 12±0.30 |
| P0 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 | 4.00 ±0.10 |
| 10xP0 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 | 40.0 ±0.20 |
| P1 | 8.00 ±0.10 | 8.00 ±0.10 | 8.00 ±0.10 | 8.00 ±0.10 | 8.00 ±0.10 | 8.00 ±0.10 |
| P2 | 2.00 ±0.10 | 2.00 ±0.10 | 2.00 ±0.10 | 2.00 ±0.10 | 2.00 ±0.10 | 2.00 ±0.10 |
| D0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 |
| D1 | 1.50 ±0.10 | 1.50 ±0.10 | 1.50 ±0.10 | 1.50 ±0.10 | 1.50 ±0.10 | 1.50 ±0.10 |
| E | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 | 1.75 ±0.10 |
| F | 5.50 ±0.10 | 5.50 ±0.10 | 5.50 ±0.05 | 5.50 ±0.05 | 5.50 ±0.05 | 5.50 ±0.05 |

TAPE DIMENSION (Unit: mm)

| SIZE | 2225 | |
|-----------|--------------|--------------|
| Thickness | K | M, U |
| A0 | < 6.80 | < 6.80 |
| B0 | < 6.50 | < 6.50 |
| T | 0.30 ±0.1 | 0.30 ±0.1 |
| K0 | < 2.50 | < 3.50 |
| W | 12±0.30 | 12±0.30 |
| P0 | 4.00 ±0.10 | 4.00 ±0.10 |
| 10xP0 | 40.0 ±0.20 | 40.0 ±0.20 |
| P1 | 8.00 ±0.10 | 8.00 ±0.10 |
| P2 | 2.00 ±0.10 | 2.00 ±0.10 |
| D0 | 1.50 +0.1/-0 | 1.50 +0.1/-0 |
| D1 | 1.50 ±0.10 | 1.50 ±0.10 |
| E | 1.75 ±0.10 | 1.75 ±0.10 |
| F | 5.50 ±0.05 | 5.50 ±0.05 |

REEL DIMENSION (Unit: mm)



| SIZE CODE | 0201, 0402, 0603, 0805, 1206, 1210 | | | 1812, 1825, 2220, 2225 |
|-----------|------------------------------------|---------------|---------------|------------------------|
| Reel Size | 7" | 10" | 13" | 7" |
| C | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 |
| W 1 | 8.4+1.5/-0 | 8.4+1.5/-0 | 8.4+1.5/-0 | 12.4+2.0/-0 |
| A | 178.0±0.10 | 250.0±1.0 | 330.0±1.0 | 178.0±0.10 |
| N | 60.0+1.0/-0 | 100.0±1.0 | 100±1.0 | 60.0+1.0/-0 |

PACKAGING STYLE AND QUANTITY PER REEL

| SIZE | THICKNESS (SYMBOL) (MM) | | PAPER TAPE | | PLASTIC TAPE | |
|-------------|----------------------------|---|------------|----------|--------------|----------|
| | | | 7" REEL | 13" REEL | 7" REEL | 13" REEL |
| 0201 (0603) | 0.30±0.09 | L | 15,000 | - | - | - |
| | | | 15,000 | - | - | - |
| | | | 15,000 | - | - | - |
| 0402 (1005) | 0.50±0.05 | N | 10,000 | 50,000 | - | - |
| | 0.50±0.10 | E | 10,000 | 50,000 | - | - |
| | 0.50±0.20 | H | 10,000 | - | - | - |
| 0603 (1608) | 0.50±0.20 | H | 4,000 | - | - | - |
| | 0.80±0.10 | S | 4,000 | 15,000 | - | - |
| | 0.80±0.20 | X | 4,000 | 15,000 | - | - |
| 0805 (2012) | 0.50±0.20 | N | 4,000 | 15,000 | - | - |
| | 0.60±0.10 | A | 4,000 | 15,000 | - | - |
| | 0.85±0.15 | B | 4,000 | 15,000 | - | - |
| | 1.25±0.15 | C | - | - | 3,000 | 10,000 |
| 1206 (3216) | 0.85±0.15 | B | 4,000 | 15,000 | - | - |
| | 0.95±0.10 | I | - | - | 3,000 | 10,000 |
| | 1.15±0.15 | J | - | - | 3,000 | 10,000 |
| | 1.25±0.20 | C | - | - | 3,000 | 10,000 |
| | 1.60±0.15 | D | - | - | 2,000 | 10,000 |
| | 1.60+0.30/-0.10 | P | - | - | 2,000 | 9,000 |
| 1210 (3225) | 0.85±0.15 | B | - | - | 3,000 | 10,000 |
| | 0.95±0.10 | I | - | - | 3,000 | 10,000 |
| | 1.25±0.20 | C | - | - | 3,000 | 10,000 |
| | 1.60±0.20 | D | - | - | 2,000 | - |
| | 2.00±0.20 | K | - | - | 1,000 | 6,000 |
| | 2.50±0.30 | M | - | - | 1,000 | 6,000 |

PACKAGING STYLE AND QUANTITY PER REEL

| SIZE | THICKNESS (SYMBOL) (MM) | | PAPER TAPE | | PLASTIC TAPE | |
|-------------|----------------------------|---|------------|----------|--------------|----------|
| | | | 7" REEL | 13" REEL | 7" REEL | 13" REEL |
| 1808 (4520) | 1.25±0.20 | C | - | - | 2,000 | 10,000 |
| | 1.60±0.20 | D | - | - | 2,000 | 8,000 |
| | 2.00±0.20 | K | - | - | 1,000 | 6,000 |
| 1812 (4532) | 1.25±0.20 | C | - | - | 1,000 | 5,000 |
| | 1.60±0.20 | D | - | - | 1,000 | - |
| | 2.00±0.20 | K | - | - | 1,000 | - |
| | 2.50±0.30 | M | - | - | 500 | 3,000 |
| | 2.80±0.30 | U | - | - | 500 | - |
| 1825 (4563) | 2.00±0.20 | K | - | - | 1,000 | - |
| 2220 (5750) | 2.50±0.30 | M | - | - | 500 | - |
| 2225 (5763) | 2.80±0.30 | U | - | - | 500 | - |

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1. **ROHS COMPLIANCE:** The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU RoHS Directive (EU) 2015/863 EC (RoHS3). RoHS Test Report for this product can be obtained at Download Center.
2. **REACH COMPLIANCE:** REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, REACH Test Report for this product can be obtained at Download Center.
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