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| SPECIFICATION SHEET NO. | R1125- RF02N470J500NI | |
| ORIGINAL MFG/PART NO. | Aillen Capacitors/RF0402N470J500NI | |
| NEXTGEN PART CODE | RF02N470J500NI | Indicate This Code For RFQ/Order |
| DATE | Nov. 25, 2024 | |
| REVISION | A5 | Updated With Most Recent Data |
| DESCRIPTION AND MAIN PARAMETRICS | <p>High Q/Low ESR Multilayer Ceramic Chip Capacitors (MLCC), RF Series Case 0402 Metric 1005, Dimension L1.00*W0.50*H0.50mm Thickness: 0.55mm Max. Dielectric NPO, Capacitance 47pF, Tolerance ±5%, Rated Voltage 50V Operating Temp. Range -55°C ~+125°C Package in Tape/Reel, 10,000pcs/Reel REACH/RoHS/RoHS III Compliant</p> | |
| CUSTOMER | | |
| CUSTOMER PART NUMBER | | |
| CROSS REF. PART NUMBER | | |
| MEMO | | |

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| VENDOR APPROVE | | |
| Issued/Checked/Approved |  |  |
| |  | |
| Effective Date: Nov. 25 2024 | | |

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| CUSTOMER APPROVE |
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| 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. RF series MLCC is used at high frequencies generally have a small temperature coefficient of capacitance, typical within the $\pm 30\text{ppm}/^\circ\text{C}$ required for NP0 (COG) classification and have excellent conductivity internal electrode.



Image shown is a representation only.

Exact specifications should be

obtained from the product dimension.

MAIN FEATURE

- Rated Voltage Range 6.3V ~ 500V
- High Q And Low ESR Performance At High Frequency
- Ultra Low Capacitance To 0.1pF
- Can Offer High Precision Tolerance To $\pm 0.05\text{pF}$
- Quality Improvement Of Telephone Calls For Low Power Loss And Better Performance.
- REACH/RoHS/RoHS III Compliant



APPLICATION

- Telecommunication products & equipment: Mobile phone, WLAN, Base station.
- RF module: Power amplifier, VCO
- Tuners

ELECTRICAL CHARACTERISTICS

- See Page 4~Page 8 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 RF02N470J500NI For RFQ and Order.

RFQ
Request For Quotation

PART CODE GUIDE

| CODE | NAME | KEY SPECIFICATION OPTION |
|------|-------------------------|--|
| RF | Product code | High Q/Low ESR Multilayer Ceramic Chip Capacitors (MLCC), RF Series |
| 02 | Size Code | 01: 0201 (0603): L0.60*W0.30mm; 02: 0402 (1005): L1.00*W0.50mm 03: 0603 (1608): L1.60*W0.80mm; 04: 01005 (0402): L0.40*W0.20mm 05: 0805 (2012): L2.00*W1.25mm; 11: 1111 (2828): L2.79*W2.79mm; 14: 0505 (1414): L1.40*W1.40mm |
| N | Temperature Coefficient | N: NP0 (COG) |
| 470 | Capacitance | Two significant digits followed by number of Zero, The 3rd digit signifies the multiplying factor, and letter R is decimal point. 0R9: 0.9pF; 1R8: 1.8pF; 3R9: 3.9pF; 470: 47pF; 330: 33pF |
| J | Tolerance | A: ±0.05pF; B: ±0.1pF; C: ±0.25pF; D: ±0.5pF; F: ±1%; G: ±2%; J: ±5% |
| 500 | Rated Voltage | Two significant digits followed by No. of zeros. "R" is in place of decimal point. e.g.: 6R3: 6.3VDC; 101: 100 VDC; 201: 200 VDC; 250: 25 VDC; 251: 250 VDC 500: 50 VDC; 501: 500 VDC; |
| N | Thickness | N: 0.50±0.05mm, See Page 9 (T's Symbol) for Different part code |
| I | Package | A: 1Kpcs/Reel; B: 2Kpcs/Reel; C: 3Kpcs/Reel; D: 4Kpcs/Reel; E: 15Kpcs/Reel; I: 10Kpcs/Reel |
| () | Internal Control | Blank: N/A; XX: Letter A~Z, a~z or digits (0~9) for Special/Custom Parameters |

ELECTRICAL CHARACTERISTICS – 25V NP0 (COG) FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| RF01N150J250LE | NP0 (COG) | 15 pF | ±5% | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N1R0B250LE | NP0 (COG) | 1 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N1R2B250LE | NP0 (COG) | 1.2 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N1R5B250LE | NP0 (COG) | 1.5 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N1R8B250LE | NP0 (COG) | 1.8 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N2R0B250LE | NP0 (COG) | 2 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N2R4B250LE | NP0 (COG) | 2.4 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N2R7B250LE | NP0 (COG) | 2.7 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N330J250LE | NP0 (COG) | 33 pF | ±5% | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N3R0B250LE | NP0 (COG) | 3 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N3R3B250LE | NP0 (COG) | 3.3 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N4R0B250LE | NP0 (COG) | 4 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N4R7B250LE | NP0 (COG) | 4.7 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N5R6B250LE | NP0 (COG) | 5.6 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N8R2B250LE | NP0 (COG) | 8.2 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N9R0B250LE | NP0 (COG) | 9 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N0R3A250LE | NP0 (COG) | 0.3 pF | ±0.05pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N0R4A250LE | NP0 (COG) | 0.4 pF | ±0.05pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N0R5B250LE | NP0 (COG) | 0.5 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N0R6B250LE | NP0 (COG) | 0.6 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |

ELECTRICAL CHARACTERISTICS – 25V NP0 (COG) FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|----------------------|----------------------|-------------|-----------|---------|---------------------|--------------------------|-------------------------------|
| | - | - | - | V | mm | °C | - |
| RF01NR75B250LE | NP0 (COG) | 0.75 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N0R8B250LE | NP0 (COG) | 0.8 pF | ±0.1pF | 25 | 0.33 | -55 ~+125 | ±30ppm/°C |
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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 | - |
| RF01N0R2A500LE | NP0 (COG) | 0.2 pF | ±0.05pF | 50 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N100J500LE | NP0 (COG) | 10 pF | ±5% | 50 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N180J500LE | NP0 (COG) | 18 pF | ±5% | 50 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N1R3B500LE | NP0 (COG) | 1.3 pF | ±0.1pF | 50 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N1R8B500LE | NP0 (COG) | 1.8 pF | ±0.1pF | 50 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF01N2R0B500LE | NP0 (COG) | 2 pF | ±0.1pF | 50 | 0.33 | -55 ~+125 | ±30ppm/°C |
| RF02N0R2A500NI | NP0 (COG) | 0.2 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R3A500NI | NP0 (COG) | 0.3 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R5A500NI | NP0 (COG) | 0.5 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R5B500NI | NP0 (COG) | 0.5 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R8A500NI | NP0 (COG) | 0.8 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R8B500NI | NP0 (COG) | 0.8 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R9B500NI | NP0 (COG) | 0.9 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N100C500NI | NP0 (COG) | 10 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N100J500NI | NP0 (COG) | 10 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N120J500NI | NP0 (COG) | 12 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N150F500NI | NP0 (COG) | 15 pF | ±1% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N150J500NI | NP0 (COG) | 15 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N1R0A500NI | NP0 (COG) | 1 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |

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 | - |
| RF02N1R0C500NI | NP0 (COG) | 1 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N1R5B500NI | NP0 (COG) | 1.5 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N1R6B500NI | NP0 (COG) | 1.6 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N1R8C500NI | NP0 (COG) | 1.8 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N200J500NI | NP0 (COG) | 20 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N220J500NI | NP0 (COG) | 22 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N270J500NI | NP0 (COG) | 27 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N2R0B500NI | NP0 (COG) | 2 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N2R2B500NI | NP0 (COG) | 2.2 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N2R4B500NI | NP0 (COG) | 2.4 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N2R7B500NI | NP0 (COG) | 2.7 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N330J500NI | NP0 (COG) | 33 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N3R3A500NI | NP0 (COG) | 3.3 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N3R3B500NI | NP0 (COG) | 3.3 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N3R3C500NI | NP0 (COG) | 3.3 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N3R6B500NI | NP0 (COG) | 3.6 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N3R9C500NI | NP0 (COG) | 3.9 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N470J500NI | NP0 (COG) | 47 pF | ±5% | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N4R7B500NI | NP0 (COG) | 4.7 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N5R6C500NI | NP0 (COG) | 5.6 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |

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 | - |
| RF02N6R8B500NI | NP0 (COG) | 6.8 pF | ±0.1pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N6R8C500NI | NP0 (COG) | 6.8 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N8R0C500NI | NP0 (COG) | 8 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N8R0D500NI | NP0 (COG) | 8 pF | ±0.5pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N8R2C500NI | NP0 (COG) | 8.2 pF | ±0.25pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R4A500NI | NP0 (COG) | 0.4 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R6A500NI | NP0 (COG) | 0.6 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF02N0R7A500NI | NP0 (COG) | 0.7 pF | ±0.05pF | 50 | 0.55 | -55 ~+125 | ±30ppm/°C |
| RF03N1R5C500SD | NP0 (COG) | 1.5 pF | ±0.25pF | 50 | 0.87 | -55 ~+125 | ±30ppm/°C |
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ELECTRICAL CHARACTERISTICS – 250V NP0 (COG) FOR DIFFERENT PART CODE

| NEXTGEN PART CODE | TEMP. COEFFICIENT | CAPACITANCE | TOLERANCE | VOLTAGE | THICKNESS (MAX.) | OPERATING TEMP. RANGE | CAPACITANCE CHARACTERISTIC |
|-------------------|-------------------|-------------|-----------|---------|------------------|-----------------------|----------------------------|
| | - | - | - | V | mm | °C | - |
| RF03N330J251SD | NP0 (COG) | 33 pF | ±5% | 250 | 0.87 | -55 ~+125 | ±30ppm/°C |
| | | | | | | | |

DIMENSION (Unit: mm)



| SIZE CODE | METRIC CODE | L | W | T (SYMBOL) | | SOLDERING METHOD | M B |
|-----------|-------------|---------------------|---------------------|------------|---|------------------|---------------------|
| | | | | | | | |
| 1005 | 0402 | 0.40±0.02 | 0.20±0.02 | 0.20±0.02 | V | # | 0.10+0.03 |
| 0201 | 0603 | 0.60±0.03 | 0.30±0.03 | 0.3±0.03 | L | # | 0.15+0.05 |
| 0402 | 1005 | 1.00±0.05 | 0.50±0.05 | 0.50±0.05 | N | # | 0.25 +0.05/-0.10 |
| 0603 | 1608 | 1.60±0.10 | 0.80±0.10 | 0.80±0.07 | S | | 0.40±0.15 |
| | | 1.60 +0.15/-0.10 | 0.80 +0.15/-0.10 | 0.50±0.10 | H | | |
| 0805 | 2012 | 2.00±0.15 | 1.25±0.10 | 0.60±0.10 | A | | 0.50±0.20 |
| | | 2.00±0.20 | 1.25±0.20 | 0.85±0.10 | T | | |
| 0505 | 1414 | 1.40 +0.38/-0.25 | 1.40±0.38 | 1.15±0.15 | J | # | 0.25 +0.25/-0.13 |
| 1111 | 2828 | 2.79 +0.51/-0.25 | 2.79±0.38 | ≤ 1.78 | G | # | 0.38±0.25 |

Reflow soldering only is recommended.

GENERAL ELECTRICAL CHARACTERISTICS

| | |
|-----------------------------|--|
| DIELECTRIC | NPO (COG) |
| Size | 01005, 0201, 0402, 0505, 0603, 0805, 1111 |
| Capacitance range* | 0.1pF to 1000pF |
| Capacitance Tolerance | Cap≤5pF: A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%) |
| Rated Voltage | 6.3V, 10V, 25V, 50V, 100V, 200V, 250V, 500V |
| Q* | 01005, 0201, 0402/25V~50V: Cap<30pF:Q≥400+20C; Cap≥30pF:Q≥1000 0402/100V~200V, 0603, 0805, 0505, 1111: Cap<30pF:Q≥800+20C; Cap≥30pF:Q≥1400 |
| Insulation resistance at Ur | ≥10GΩ or RxC≥100Ω-F whichever is smaller. |
| Operating Temperature | -55 ~+125°C |
| Capacitance change | ±30ppm/° C; 0201Cap≥22pF, ±60ppm/° C |
| Termination | Ni/Sn (lead-free termination) |

Note:

- 1) * Measured at the condition of 30~70% related humidity.
- 2) 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.

CAPACITANCE RANGE - NP0 (COG) DIELECTRIC – SIZE 01005

Table 1-A

| SIZE | 01005 | | TOLERANCE |
|---------------------|-------|----|-----------|
| | 16 | 25 | |
| RATED VOLTAGE (VDC) | | | |
| 0.2pF (0R2) | V | V | A, B |
| 0.3pF (0R3) | V | V | A, B |
| 0.4pF (0R4) | V | V | A, B |
| 0.5pF (0R5) | V | V | A, B, C |
| 0.6pF (0R6) | V | V | A, B, C |
| 0.7pF (0R7) | V | V | A, B, C |
| 0.75pF (R75) | V | V | A, B, C |
| 0.8pF (0R8) | V | V | A, B, C |
| 0.9pF (0R9) | V | V | A, B, C |
| 1.0pF (1R0) | V | V | A, B, C |
| 1.2pF (1R2) | V | V | A, B, C |
| 1.5pF (1R5) | V | V | A, B, C |
| 1.8pF (1R8) | V | V | A, B, C |
| 2.0pF (2R0) | V | V | A, B, C |
| 2.2pF (2R2) | V | V | A, B, C |
| 2.7pF (2R7) | V | V | A, B, C |
| 3.0pF (3R0) | V | V | A, B, C |
| 3.3pF (3R3) | V | V | A, B, C |
| 3.9pF (3R9) | V | V | A, B, C |
| 4.0pF (4R0) | V | V | A, B, C |
| 4.7pF (4R7) | V | V | A, B, C |
| 5.0pF (5R0) | V | V | A, B, C |
| 5.6pF (5R6) | V | V | B, C, D |
| 6.0pF (6R0) | V | V | B, C, D |
| 6.8pF (6R8) | V | | B, C, D |
| 7.0pF (7R0) | V | | B, C, D |
| 8.0pF (8R0) | V | | B, C, D |
| 8.2pF (8R2) | V | | B, C, D |
| 9.0pF (9R0) | V | | B, C, D |
| 10pF (100) | V | V | C, D, G |
| 12pF (120) | V | V | J |
| 15pF (150) | V | V | J |
| 20pF (200) | V | V | J |
| 22pF (220) | V | V | J |

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

Table 1-B

| SIZE | 0201 | | | | 0402 | | | | TOLERANCE |
|--------------|---------------------|-----|----|----|------|----|----|-----|-----------|
| | RATED VOLTAGE (VDC) | 6.3 | 10 | 25 | 50 | 25 | 50 | 100 | |
| 0.1pF (0R1) | L | L | L | L | N | N | N | N | B |
| 0.2pF (0R2) | L | L | L | L | N | N | N | N | A, B |
| 0.3pF (0R3) | L | L | L | L | N | N | N | N | A, B |
| 0.4pF (0R4) | L | L | L | L | N | N | N | N | A, B |
| 0.5pF (0R5) | L | L | L | L | N | N | N | N | A, B, C |
| 0.6pF (0R6) | L | L | L | L | N | N | N | N | A, B, C |
| 0.7pF (0R7) | L | L | L | L | N | N | N | N | A, B, C |
| 0.75pF (R75) | L | L | L | L | N | N | N | N | A, B, C |
| 0.8pF (0R8) | L | L | L | L | N | N | N | N | A, B, C |
| 0.9pF (0R9) | L | L | L | L | N | N | N | N | A, B, C |
| 1.0pF (1R0) | L | L | L | L | N | N | N | N | A, B, C |
| 1.1pF (1R1) | L | L | L | L | N | N | N | N | A, B, C |
| 1.2pF (1R2) | L | L | L | L | N | N | N | N | A, B, C |
| 1.3pF (1R3) | L | L | L | L | N | N | N | N | A, B, C |
| 1.4pF (1R4) | L | L | L | L | N | N | N | N | A, B, C |
| 1.5pF (1R5) | L | L | L | L | N | N | N | N | A, B, C |
| 1.6pF (1R6) | L | L | L | L | N | N | N | N | A, B, C |
| 1.7pF (1R7) | L | L | L | L | N | N | N | N | A, B, C |
| 1.8pF (1R8) | L | L | L | L | N | N | N | N | A, B, C |
| 1.9pF (1R9) | L | L | L | L | N | N | N | N | A, B, C |
| 2.0pF (2R0) | L | L | L | L | N | N | N | N | A, B, C |
| 2.1pF (2R1) | L | L | L | L | N | N | N | N | A, B, C |
| 2.2pF (2R2) | L | L | L | L | N | N | N | N | A, B, C |
| 2.3pF (2R3) | L | L | L | L | N | N | N | N | A, B, C |
| 2.4pF (2R4) | L | L | L | L | N | N | N | N | A, B, C |
| 2.5pF (2R5) | L | L | L | L | N | N | N | N | A, B, C |
| 2.6pF (2R6) | L | L | L | L | N | N | N | N | A, B, C |
| 2.7pF (2R7) | L | L | L | L | N | N | N | N | A, B, C |
| 2.8pF (2R8) | L | L | L | L | N | N | N | N | A, B, C |
| 2.9pF (2R9) | L | L | L | L | N | N | N | N | A, B, C |
| 3.0pF (3R0) | L | L | L | L | N | N | N | N | A, B, C |
| 3.1pF (3R1) | L | L | L | L | N | N | N | N | A, B, C |
| 3.2pF (3R2) | L | L | L | L | N | N | N | N | A, B, C |
| 3.3pF (3R3) | L | L | L | L | N | N | N | N | A, B, C |
| 3.4pF (3R4) | L | L | L | L | N | N | N | N | A, B, C |

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

Table 1-C

| SIZE | 0201 | | | | 0402 | | | | TOLERANCE |
|-------------|---------------------|-----|----|----|------|----|----|-----|-----------|
| | RATED VOLTAGE (VDC) | 6.3 | 10 | 25 | 50 | 25 | 50 | 100 | |
| 3.5pF (3R5) | L | L | L | L | N | N | N | N | A, B, C |
| 3.6pF (3R6) | L | L | L | L | N | N | N | N | A, B, C |
| 3.7pF (3R7) | L | L | L | L | N | N | N | N | A, B, C |
| 3.8pF (3R8) | L | L | L | L | N | N | N | N | A, B, C |
| 3.9pF (3R9) | L | L | L | L | N | N | N | N | A, B, C |
| 4.0pF (4R0) | L | L | L | L | N | N | N | N | A, B, C |
| 4.1pF (4R1) | L | L | L | L | N | N | N | N | A, B, C |
| 4.2pF (4R2) | L | L | L | L | N | N | N | N | A, B, C |
| 4.3pF (4R3) | L | L | L | L | N | N | N | N | A, B, C |
| 4.4pF (4R4) | L | L | L | L | N | N | N | N | A, B, C |
| 4.5pF (4R5) | L | L | L | L | N | N | N | N | A, B, C |
| 4.6pF (4R6) | L | L | L | L | N | N | N | N | A, B, C |
| 4.7pF (4R7) | L | L | L | L | N | N | N | N | A, B, C |
| 4.8pF (4R8) | L | L | L | L | N | N | N | N | A, B, C |
| 4.9pF (4R9) | L | L | L | L | N | N | N | N | A, B, C |
| 5.0pF (5R0) | L | L | L | L | N | N | N | N | A, B, C |
| 5.1pF (5R1) | L | L | L | L | N | N | N | N | B, C, D |
| 5.2pF (5R2) | L | L | L | L | N | N | N | N | B, C, D |
| 5.3pF (5R3) | L | L | L | L | N | N | N | N | B, C, D |
| 5.4pF (5R4) | L | L | L | L | N | N | N | N | B, C, D |
| 5.5pF (5R5) | L | L | L | L | N | N | N | N | B, C, D |
| 5.6pF (5R6) | L | L | L | L | N | N | N | N | B, C, D |
| 5.7pF (5R7) | L | L | L | L | N | N | N | N | B, C, D |
| 5.8pF (5R8) | L | L | L | L | N | N | N | N | B, C, D |
| 5.9pF (5R9) | L | L | L | L | N | N | N | N | B, C, D |
| 6.0pF (6R0) | L | L | L | L | N | N | N | N | B, C, D |
| 6.1pF (6R1) | L | L | L | L | N | N | N | N | B, C, D |
| 6.2pF (6R2) | L | L | L | L | N | N | N | N | B, C, D |
| 6.3pF (6R3) | L | L | L | L | N | N | N | N | B, C, D |
| 6.4pF (6R4) | L | L | L | L | N | N | N | N | B, C, D |
| 6.5pF (6R5) | L | L | L | L | N | N | N | N | B, C, D |
| 6.6pF (6R6) | L | L | L | L | N | N | N | N | B, C, D |
| 6.7pF (6R7) | L | L | L | L | N | N | N | N | B, C, D |
| 6.8pF (6R8) | L | L | L | L | N | N | N | N | B, C, D |
| 6.9pF (6R9) | L | L | L | L | N | N | N | N | B, C, D |

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

Table 1-D

| SIZE | 0201 | | | | 0402 | | | | TOLERANCE |
|-------------|------|----|----|----|------|----|-----|-----|-----------|
| | 6.3 | 10 | 25 | 50 | 25 | 50 | 100 | 200 | |
| 7.0pF (7R0) | L | L | L | L | N | N | N | N | B, C, D |
| 7.1pF (7R1) | L | L | L | L | N | N | N | N | B, C, D |
| 7.2pF (7R2) | L | L | L | L | N | N | N | N | B, C, D |
| 7.3pF (7R3) | L | L | L | L | N | N | N | N | B, C, D |
| 7.4pF (7R4) | L | L | L | L | N | N | N | N | B, C, D |
| 7.5pF (7R5) | L | L | L | L | N | N | N | N | B, C, D |
| 7.6pF (7R6) | L | L | L | L | N | N | N | N | B, C, D |
| 7.7pF (7R7) | L | L | L | L | N | N | N | N | B, C, D |
| 7.8pF (7R8) | L | L | L | L | N | N | N | N | B, C, D |
| 7.9pF (7R9) | L | L | L | L | N | N | N | N | B, C, D |
| 8.0pF (8R0) | L | L | L | L | N | N | N | N | B, C, D |
| 8.1pF (8R1) | L | L | L | L | N | N | N | N | B, C, D |
| 8.2pF (8R2) | L | L | L | L | N | N | N | N | B, C, D |
| 8.3pF (8R3) | L | L | L | L | N | N | N | N | B, C, D |
| 8.4pF (8R4) | L | L | L | L | N | N | N | N | B, C, D |
| 8.5pF (8R5) | L | L | L | L | N | N | N | N | B, C, D |
| 8.6pF (8R6) | L | L | L | L | N | N | N | N | B, C, D |
| 8.7pF (8R7) | L | L | L | L | N | N | N | N | B, C, D |
| 8.8pF (8R8) | L | L | L | L | N | N | N | N | B, C, D |
| 8.9pF (8R9) | L | L | L | L | N | N | N | N | B, C, D |
| 9.0pF (9R0) | L | L | L | L | N | N | N | N | B, C, D |
| 9.1pF (9R1) | L | L | L | L | N | N | N | N | B, C, D |
| 9.2pF (9R2) | L | L | L | L | N | N | N | N | B, C, D |
| 9.3pF (9R3) | L | L | L | L | N | N | N | N | B, C, D |
| 9.4pF (9R4) | L | L | L | L | N | N | N | N | B, C, D |
| 9.5pF (9R5) | L | L | L | L | N | N | N | N | B, C, D |
| 9.6pF (9R6) | L | L | L | L | N | N | N | N | B, C, D |
| 9.7pF (9R7) | L | L | L | L | N | N | N | N | B, C, D |
| 9.8pF (9R8) | L | L | L | L | N | N | N | N | B, C, D |
| 9.9pF (9R9) | L | L | L | L | N | N | N | N | B, C, D |
| 10pF (100) | L | L | L | L | N | N | N | N | F, G, J |
| 11pF (110) | L | L | L | L | N | N | N | N | F, G, J |
| 12pF (120) | L | L | L | L | N | N | N | N | F, G, J |
| 13pF (130) | L | L | L | L | N | N | N | N | F, G, J |
| 15pF (150) | L | L | L | L | N | N | N | N | F, G, J |

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

Table 1-E

| SIZE | 0201 | | | | 0402 | | | | TOLERANCE |
|---------------------|------|----|----|----|------|----|-----|-----|-----------|
| | 6.3 | 10 | 25 | 50 | 25 | 50 | 100 | 200 | |
| RATED VOLTAGE (VDC) | | | | | | | | | |
| 16pF (160) | L | L | L | L | N | N | N | N | F, G, J |
| 18pF (180) | L | L | L | L | N | N | N | N | F, G, J |
| 20pF (200) | L | L | L | L | N | N | N | N | F, G, J |
| 22pF (220) | L | L | L | | N | N | N | N | F, G, J |
| 24pF (240) | L | L | L | | N | N | N | N | F, G, J |
| 27pF (270) | L | L | L | | N | N | N | N | F, G, J |
| 30pF (300) | L | L | L | | N | N | N | N | F, G, J |
| 33pF (330) | L | L | L | | N | N | N | N | F, G, J |
| 36pF (360) | | | | | N | N | N | | F, G, J |
| 39pF (390) | | | | | N | N | N | | F, G, J |
| 43pF (430) | | | | | N | N | N | | F, G, J |
| 47pF (470) | | | | | N | N | N | | F, G, J |
| 56pF (560) | | | | | N | N | N | | F, G, J |
| 68pF (680) | | | | | N | N | | | F, G, J |
| 82pF (820) | | | | | N | N | | | F, G, J |
| 100pF (101) | | | | | N | N | | | F, G, J |

CAPACITANCE RANGE - NP0 DIELECTRIC SIZE 0505, 0603, 0805

Table 1-F

| SIZE | 0505 | | | 0603 | | | 0805 | | | | TOLERANCE |
|---------------------|------|-----|-----|------|-----|-----|------|-----|-----|-----|-----------|
| | 50 | 100 | 250 | 50 | 100 | 250 | 50 | 100 | 250 | 500 | |
| RATED VOLTAGE (VDC) | | | | | | | | | | | |
| 0.1pF (0R1) | | | | H | H | H | | | | | A, B |
| 0.2pF (0R2) | | | | H | H | H | A | A | A | A | A, B |
| 0.3pF (0R3) | | | | S | S | S | T | T | T | T | A, B |
| 0.4pF (0R4) | J | J | J | S | S | S | T | T | T | T | A, B |
| 0.5pF (0R5) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 0.6pF (0R6) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 0.7pF (0R7) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 0.8pF (0R8) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 0.9pF (0R9) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.0pF (1R0) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.1pF (1R1) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.2pF (1R2) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.3pF (1R3) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.4pF (1R4) | J | J | J | S | S | S | T | T | T | T | A, B, C |

CAPACITANCE RANGE -NPO (COG) DIELECTRIC - SIZE 0505, 0603, 0805

Table 1-G

| SIZE | 0505 | | | 0603 | | | 0805 | | | | TOLERANCE |
|-------------|------|-----|-----|------|-----|-----|------|-----|-----|-----|-----------|
| | 50 | 100 | 250 | 50 | 100 | 250 | 50 | 100 | 250 | 500 | |
| 1.5pF (1R5) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.6pF (1R6) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.7pF (1R7) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.8pF (1R8) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 1.9pF (1R9) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.0pF (2R0) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.1pF (2R1) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.2pF (2R2) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.3pF (2R3) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.4pF (2R4) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.5pF (2R5) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.6pF (2R6) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.7pF (2R7) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.8pF (2R8) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 2.9pF (2R9) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.0pF (3R0) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.1pF (3R1) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.2pF (3R2) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.3pF (3R3) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.4pF (3R4) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.5pF (3R5) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.6pF (3R6) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.7pF (3R7) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.8pF (3R8) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 3.9pF (3R9) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.0pF (4R0) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.1pF (4R1) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.2pF (4R2) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.3pF (4R3) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.4pF (4R4) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.5pF (4R5) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.6pF (4R6) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.7pF (4R7) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 4.8pF (4R8) | J | J | J | S | S | S | T | T | T | T | A, B, C |

CAPACITANCE RANGE -NPO (COG) DIELECTRIC - SIZE 0505, 0603, 0805

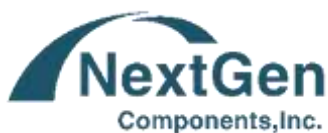
Table 1-H

| SIZE | 0505 | | | 0603 | | | 0805 | | | | TOLERANCE |
|-------------|---------------------|----|-----|------|----|-----|------|----|-----|-----|-----------|
| | RATED VOLTAGE (VDC) | 50 | 100 | 250 | 50 | 100 | 250 | 50 | 100 | 250 | |
| 4.9pF (4R9) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 5.0pF (5R0) | J | J | J | S | S | S | T | T | T | T | A, B, C |
| 5.1pF (5R1) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.2pF (5R2) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.3pF (5R3) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.4pF (5R4) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.5pF (5R5) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.6pF (5R6) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.7pF (5R7) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.8pF (5R8) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 5.9pF (5R9) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.0pF (6R0) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.1pF (6R1) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.2pF (6R2) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.3pF (6R3) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.4pF (6R4) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.5pF (6R5) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.6pF (6R6) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.7pF (6R7) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.8pF (6R8) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 6.9pF (6R9) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.0pF (7R0) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.1pF (7R1) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.2pF (7R2) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.3pF (7R3) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.4pF (7R4) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.5pF (7R5) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.6pF (7R6) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.7pF (7R7) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.8pF (7R8) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 7.9pF (7R9) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.0pF (8R0) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.1pF (8R1) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.2pF (8R2) | J | J | J | S | S | S | T | T | T | T | B, C, D |

CAPACITANCE RANGE -NPO (COG) DIELECTRIC - SIZE 0505, 0603, 0805

Table 1-I

| SIZE | 0505 | | | 0603 | | | 0805 | | | | TOLERANCE |
|-------------|------|-----|-----|------|-----|-----|------|-----|-----|-----|-----------|
| | 50 | 100 | 250 | 50 | 100 | 250 | 50 | 100 | 250 | 500 | |
| 8.3pF (8R3) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.4pF (8R4) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.5pF (8R5) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.6pF (8R6) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.7pF (8R7) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.8pF (8R8) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 8.9pF (8R9) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.0pF (9R0) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.1pF (9R1) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.2pF (9R2) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.3pF (9R3) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.4pF (9R4) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.5pF (9R5) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.6pF (9R6) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.7pF (9R7) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.8pF (9R8) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 9.9pF (9R9) | J | J | J | S | S | S | T | T | T | T | B, C, D |
| 10pF (100) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 11pF (110) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 12pF (120) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 13pF (130) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 15pF (150) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 16pF (160) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 18pF (180) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 20pF (200) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 22pF (220) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 24pF (240) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 27pF (270) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 30pF (300) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 33pF (330) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 36pF (360) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 39pF (390) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 43pF (430) | J | J | J | S | S | S | T | T | T | T | F, G, J |
| 47pF (470) | J | J | J | S | S | S | T | T | T | T | F, G, J |



PART CODE: **RF02N470J500NI**

HIGH Q/LOW ESR MULTILAYER CERAMIC CHIP CAPACITORS

CAPACITANCE RANGE -NPO (COG) DIELECTRIC - SIZE 0505, 0603, 0805

Table 1-J

| SIZE | 0505 | | | 0603 | | | 0805 | | | | TOLERANCE | |
|---------------------|------|-----|-----|------|-----|-----|------|-----|-----|-----|-----------|--|
| | 50 | 100 | 250 | 50 | 100 | 250 | 50 | 100 | 250 | 500 | | |
| RATED VOLTAGE (VDC) | | | | | | | | | | | | |
| 56pF (560) | J | J | J | S | S | S | T | T | T | T | F, G, J | |
| 68pF (680) | J | J | J | S | S | S | T | T | T | T | F, G, J | |
| 82pF (820) | J | J | J | S | S | S | T | T | T | | F, G, J | |
| 100pF (101) | J | J | J | S | S | S | T | T | T | | F, G, J | |
| 120pF (120) | | | | | | | T | T | T | | F, G, J | |
| 150pF (150) | | | | | | | T | T | T | | F, G, J | |
| 180pF (180) | | | | | | | T | T | T | | F, G, J | |
| 220pF (221) | | | | | | | T | T | T | | F, G, J | |
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CAPACITANCE RANGE -NPO (COG) DIELECTRIC - SIZE 1111

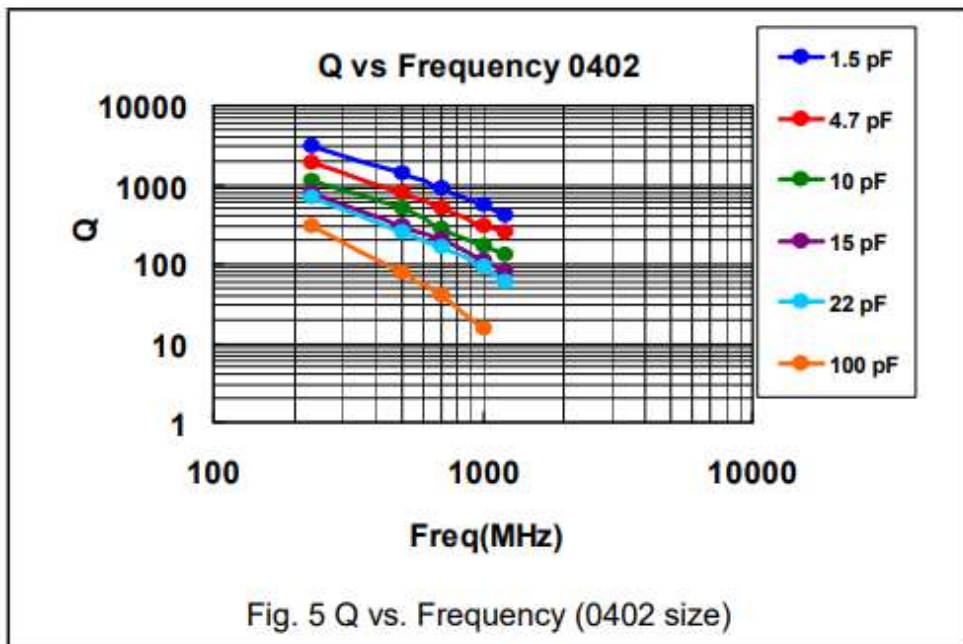
Table 1-K

| SIZE | 1111 | | | | | TOLERANCE |
|--------------|------|-----|-----|-----|-----|-----------|
| | 50 | 100 | 200 | 250 | 500 | |
| 2.0pF (2R0) | G | G | G | G | G | A, B, C |
| 2.2pF (2R2) | G | G | G | G | G | A, B, C |
| 2.7pF (2R7) | G | G | G | G | G | A, B, C |
| 3.3pF (3R3) | G | G | G | G | G | A, B, C |
| 3.9pF (3R9) | G | G | G | G | G | A, B, C |
| 4.7pF (4R7) | G | G | G | G | G | A, B, C |
| 5.6pF (5R6) | G | G | G | G | G | B, C, D |
| 6.8pF (6R8) | G | G | G | G | G | B, C, D |
| 8.2pF (8R2) | G | G | G | G | G | B, C, D |
| 10pF (100) | G | G | G | G | G | F, G, J |
| 12pF (120) | G | G | G | G | G | F, G, J |
| 15pF (150) | G | G | G | G | G | F, G, J |
| 18pF (180) | G | G | G | G | G | F, G, J |
| 22pF (220) | G | G | G | G | G | F, G, J |
| 27pF (270) | G | G | G | G | G | F, G, J |
| 33pF (330) | G | G | G | G | G | F, G, J |
| 39pF (390) | G | G | G | G | G | F, G, J |
| 47pF (470) | G | G | G | G | G | F, G, J |
| 56pF (560) | G | G | G | G | G | F, G, J |
| 68pF (680) | G | G | G | G | G | F, G, J |
| 82pF (820) | G | G | G | G | G | F, G, J |
| 100pF (101) | G | G | G | G | G | F, G, J |
| 120pF (121) | G | G | G | G | G | F, G, J |
| 150pF (151) | G | G | G | G | G | F, G, J |
| 180pF (181) | G | G | G | G | G | F, G, J |
| 220pF (221) | G | G | G | G | G | F, G, J |
| 270pF (271) | G | G | G | G | G | F, G, J |
| 330pF (331) | G | G | G | G | G | F, G, J |
| 390pF (391) | G | G | G | G | G | F, G, J |
| 470pF (471) | G | G | G | G | G | F, G, J |
| 560pF (561) | G | G | G | G | G | F, G, J |
| 680pF (681) | G | G | G | G | G | F, G, J |
| 820pF (821) | G | G | G | G | G | F, G, J |
| 1000pF (102) | G | G | G | G | G | F, G, J |

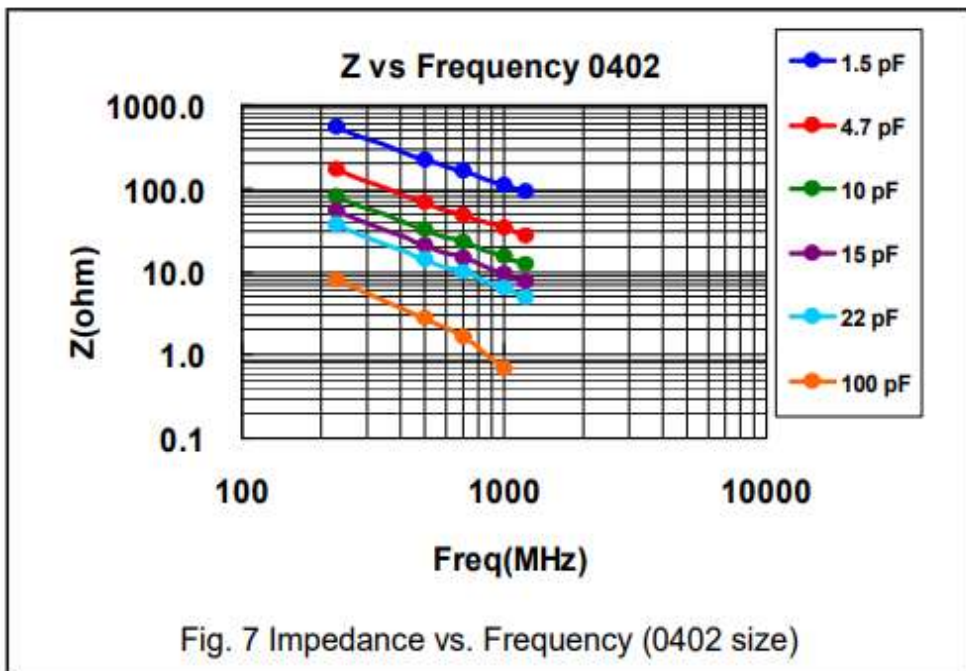
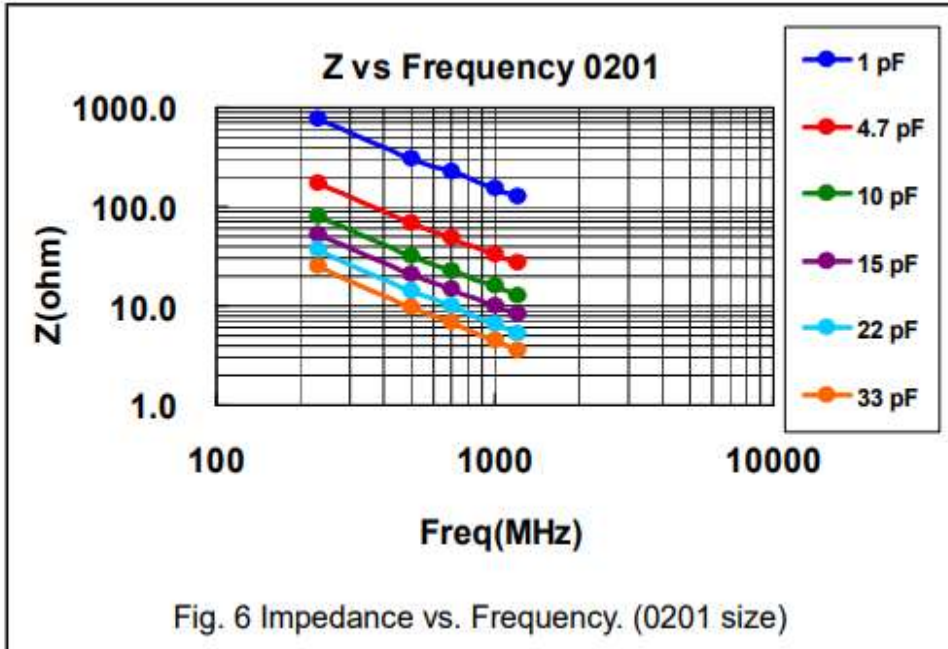
CAPACITANCE RANGE - ESR VS FREQUENCY SIZE 0201 AND 0402



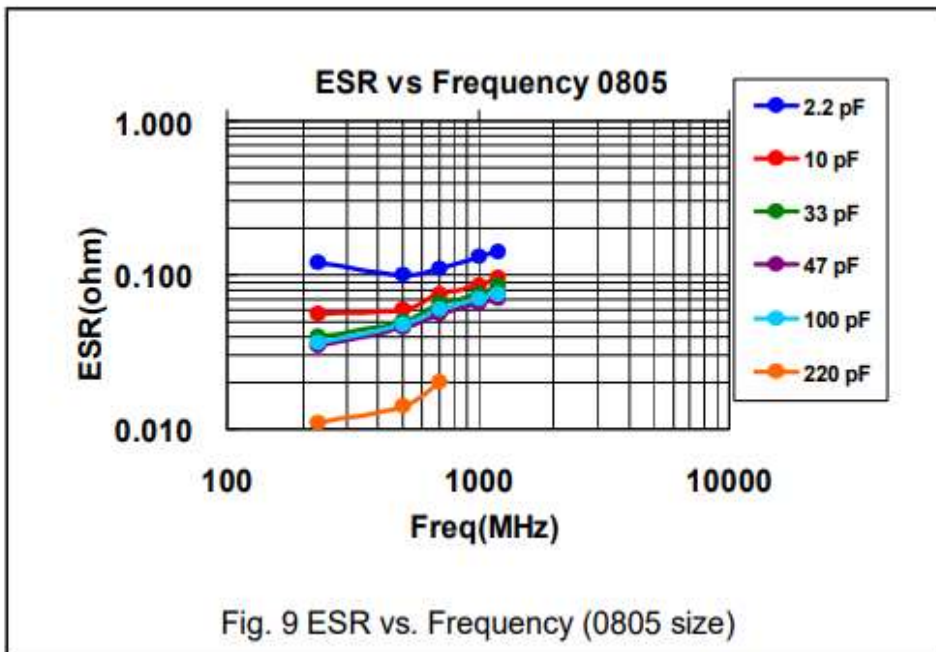
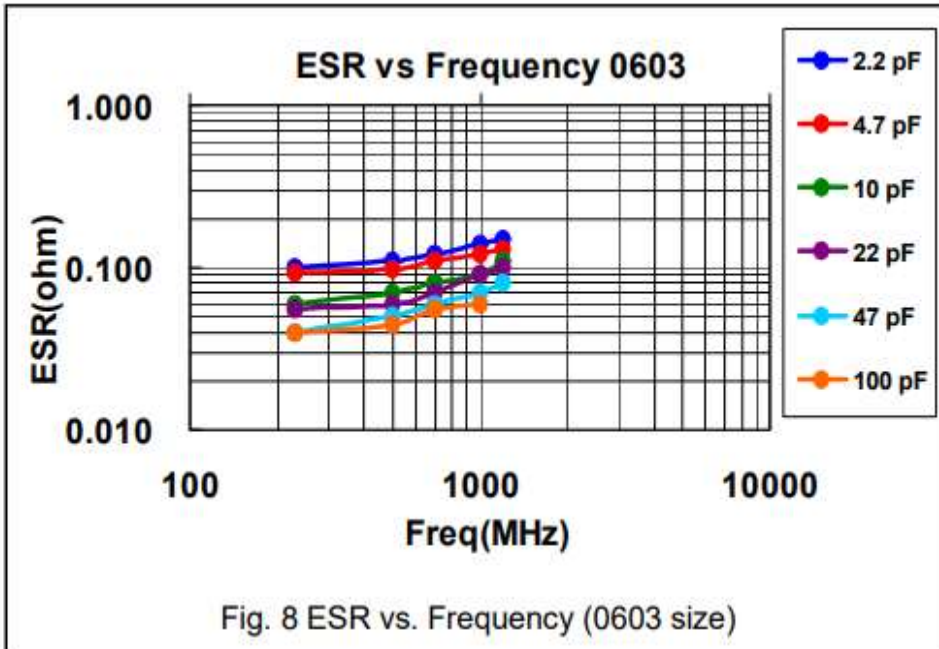
CAPACITANCE RANGE – Q. VS FREQUENCY SIZE 0201 AND 0402



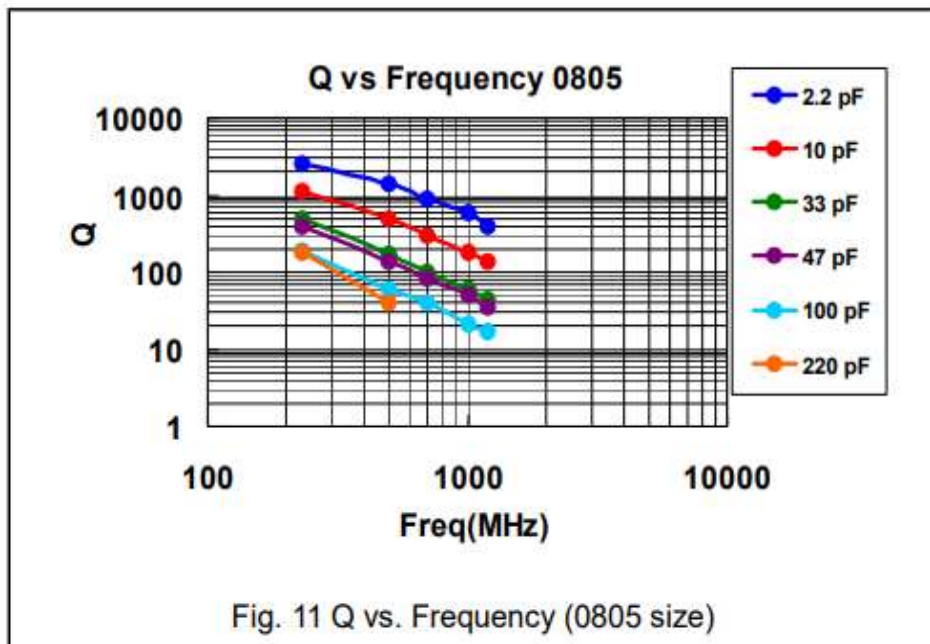
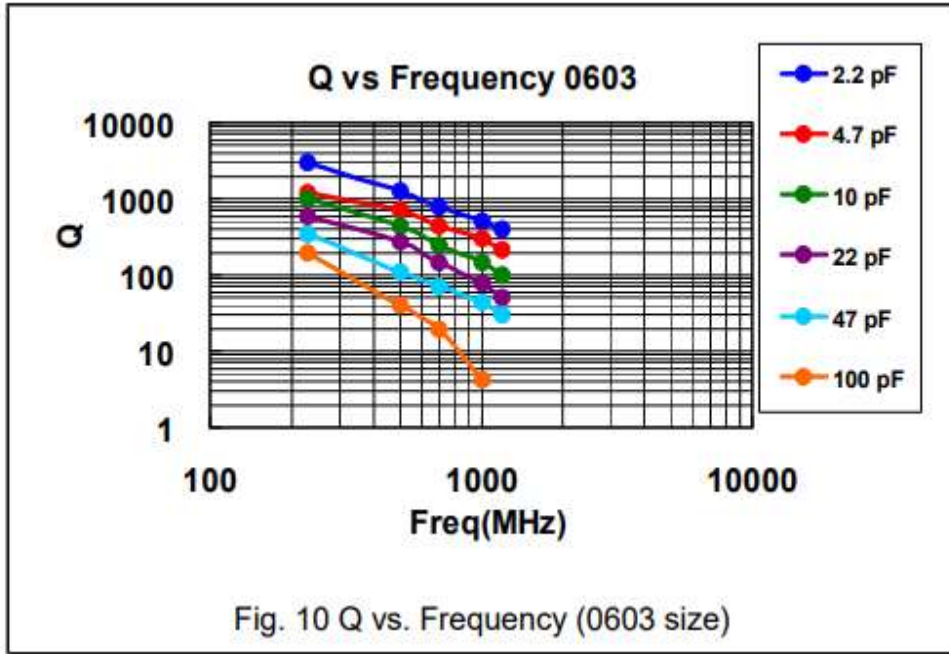
CAPACITANCE RANGE - IMPEDANCE VS FREQUENCY SIZE 0201 AND 0402



CAPACITANCE RANGE - ESR VS FREQUENCY SIZE 0603 AND 0805



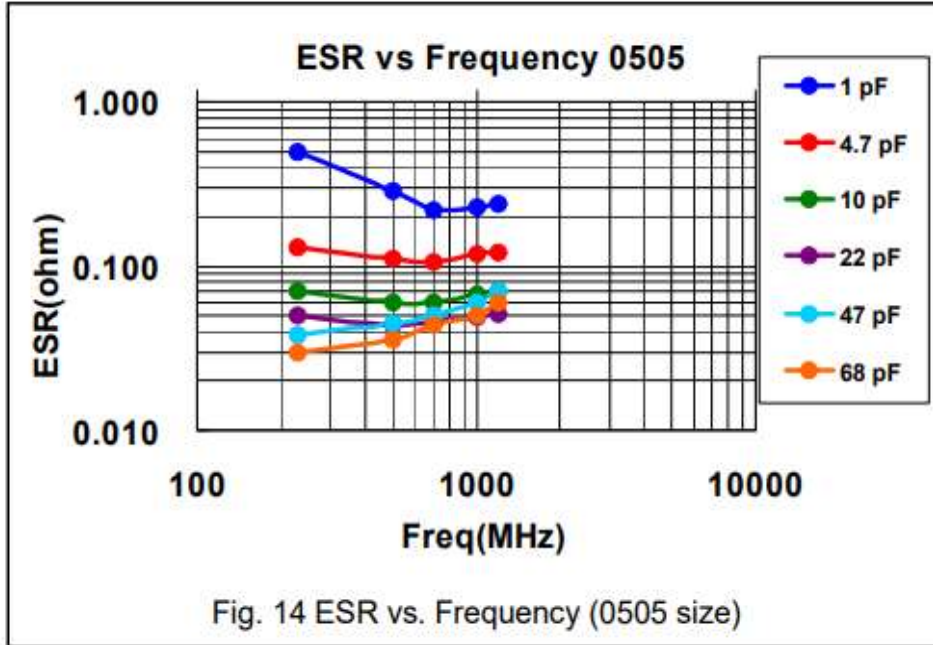
CAPACITANCE RANGE – Q. VS FREQUENCY SIZE 0603 AND 0805



CAPACITANCE RANGE – IMPEDANCE. VS FREQUENCY SIZE 0603 AND 0805



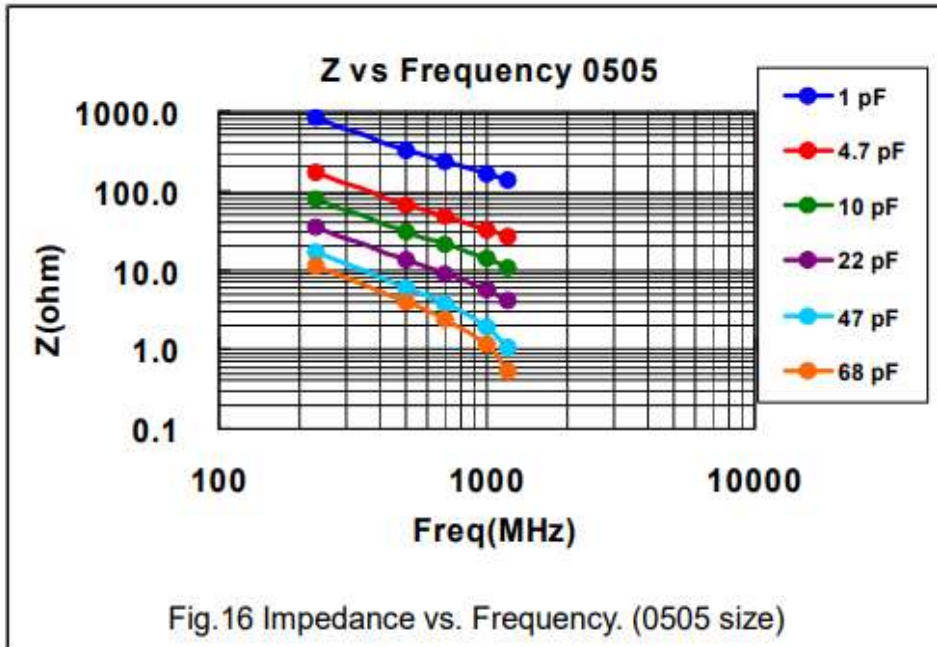
CAPACITANCE RANGE – ESR. VS FREQUENCY SIZE 0505



CAPACITANCE RANGE – Q. VS FREQUENCY SIZE 0505



CAPACITANCE RANGE – IMPEDANCE. VS FREQUENCY SIZE 0505



CAPACITANCE RANGE – SELF RESONANCE FREQUENCY VS CAPACITANCE SIZE 0201/0402/0603/0505/0805



RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITIONS | REQUIREMENTS |
|----------------------------------|---|---|
| Visual and Mechanical | ----- | <ul style="list-style-type: none"> * No remarkable defect. * Dimensions to conform to individual specification sheet. |
| Capacitance | $1.0 \pm 0.2V_{rms}$, $1MHz \pm 10\%$ At 25° C ambient temperature. | * Shall not exceed the limits given in the detailed spec. |
| Q/ D.F. (Dissipation Factor) | | <ul style="list-style-type: none"> * 01005, 0201, 0402/25V~50V: Cap<30pF, Q≥400+20C; Cap≥30pF, Q≥1000 * 0402/100V~200V, 0603, 0805, 0505, 1111: Cap<30pF:Q≥800+20C; Cap≥30pF:Q≥1400 |
| Dielectric Strength | *To apply voltage: $\leq 100V$: 250% of rated voltage. 200V ~ 300V : 200% of rated voltage. 500V ~ 999V : 150% of rated voltage. 1000V ~ 3000V : 120% of rated voltage. 4000V : 110% of rated voltage. *Duration: 1 to 5 sec. *Charge & discharge current less than 50mA. | * No evidence of damage or flash over during test. |
| Insulation Resistance | $\leq 100V$: To apply rated voltage for max. 120 sec. $\geq 200V$:To apply rated voltage (500V max.) for 60 sec. | $\geq 10G\Omega$ or $RxC \geq 100\Omega \cdot F$ whichever is smaller |
| Temperature Coefficient | With no electrical load. Operating temperature: -55~125° C at 25° C | *Capacitance change: within $\pm 30ppm/^{\circ}C$; 0201Cap≥22pF, within $\pm 60ppm/^{\circ}C$ |
| Adhesive Strength of Termination | *Pressurizing force: 01005: 1N; 0201: 2N; 0402 to 0603: 5N >0603: 10N * Test time: 10 ± 1 sec. | * No remarkable damage or removal of the terminations. |

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITIONS | REQUIREMENTS |
|------------------------------|--|---|
| Vibration Resistance | <ul style="list-style-type: none"> * Vibration frequency: 10~55 Hz/min. * Total amplitude: 1.5mm * Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.) *Cap./DF(Q) 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 and Q/D.F.: To meet initial spec. |
| Solderability | <ul style="list-style-type: none"> * Solder temperature: 235 ± 5° C * Dipping time: 2 ± 0.5 sec. | 95% min. coverage of all metalized area. |
| Bending Test | <ul style="list-style-type: none"> *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. * Measurement to be made after keeping at room temp. for 24 ± 2 hrs. | <ul style="list-style-type: none"> *No remarkable damage. * Cap change: within ± 5.0% or ± 0.5pF whichever is larger. (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.) |
| 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. *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: within ± 2.5% or ± 0.25pF whichever is larger. * 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 <i>See <Table 2></i> * 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: within ± 2.5% or ± 0.25pF whichever is larger. * Q/D.F., I.R. and dielectric strength: To meet initial requirements. |

RELIABILITY TEST CONDITIONS AND REQUIREMENTS

| ITEM | TEST CONDITIONS | REQUIREMENTS |
|-----------------------------------|---|--|
| Humidity (Damp Heat) Steady State | <ul style="list-style-type: none"> *Test temp.: $40 \pm 2^{\circ}$ C * Humidity: 90~95% RH * Test time: 500+24/-0hrs. * 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: within $\pm 5.0\%$ or $\pm 0.5\text{pF}$ whichever is larger. *Q/D.F. value: Cap$\geq 30\text{pF}$, Q≥ 350; 10pF\leqCap$< 30\text{pF}$, Q$\geq 275+2.5\text{C}$ Cap$< 10\text{pF}$, Q$\geq 200+10\text{C}$ * I.R.: $\geq 1\text{G}\Omega$. |
| Humidity (Damp Heat) Load | <ul style="list-style-type: none"> *Test temp.: $40 \pm 2^{\circ}$ C * Humidity: 90~95%RH * Test time: 500+24/-0 hrs. *To apply voltage: rated voltage (MAX. 500V) * 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: within $\pm 7.5\%$ or $\pm 0.75\text{pF}$ whichever is larger. *Q/D.F. value: Cap$\geq 30\text{pF}$, Q≥ 200; Cap$< 30\text{pF}$, Cap$\geq 100+10/3\text{C}$ * I.R.: $\geq 500\text{M}\Omega$. |
| High Temperature Load (Endurance) | <ul style="list-style-type: none"> * Test temp.: $125 \pm 3^{\circ}$ C * To apply voltage: <ul style="list-style-type: none"> (1) $10\text{V} \leq \text{Ur} < 500\text{V}$: 200% of rated voltage. (2) $\leq 6.3\text{V}$ or 500V: 150% of rated voltage. (3) $\text{Ur} \geq 630\text{V}$: 120% of rated voltage. * Test time: 1000+24/-0 hrs. * 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: within $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger. * Q/D.F. value: Cap$\geq 30\text{pF}$, Q≥ 350 10pF\leqCap$< 30\text{pF}$, Q$\geq 275+2.5\text{C}$ Cap$< 10\text{pF}$, Q$\geq 200+10\text{C}$ * I.R.: $\geq 1\text{G}\Omega$. |
| ESR | The ESR should be measured at room temperature and tested at frequency 1 ± 0.1 GHz. | See <Table 3> |
| | The ESR should be measured at room temperature and tested at frequency 500 ± 50 MHz | 0201, 22pF \leq Cap $\leq 33\text{pF}$: $< 300\text{m}\Omega$ |

TEMPERATURE CYCLE – TEST CONDITION

Table 2

| Step | Temp. (°C) | Time (min.) |
|------|----------------------------|-------------|
| 1 | Min. operating temp. +0/-3 | 30±3 |
| 2 | Room temp. | 2~3 |
| 3 | Max. operating temp. +3/-0 | 30±3 |
| 4 | Room temp. | 2~3 |

ESR – REQUIREMENTS

Table 3

| 01005 | 0505 |
|--------------------------|---------------------------|
| 0.2pF≤Cap≤1pF:< 700mΩ/pF | 0.4pF≤Cap<1.0pF: < 1500mΩ |
| 1pF<Cap≤2pF:< 600mΩ | 1.0pF≤Cap<10pF:< 250mΩ |
| 2pF<Cap≤5pF:< 500mΩ | 10pF≤Cap≤100pF: < 200mΩ |
| 5pF<Cap≤10pF:< 300mΩ | |
| 10pF<Cap≤22pF:< 350mΩ | |

| 0201 | 0402 |
|--------------------------|--------------------------|
| 0.1pF≤Cap≤1pF:< 350mΩ/Pf | 0.1pF≤Cap≤1pF:< 350mΩ/pF |
| 1pF<Cap≤5pF:< 300mΩ | 1pF<Cap≤5pF:< 300mΩ |
| 5pF<Cap≤22pF:< 250mΩ | 5pF<Cap≤100pF:< 250mΩ |
| 22pF≤Cap≤33pF: < 300mΩ | |

| 0603 | 0805 |
|------------------------|-------------------------|
| 0.3pF≤Cap≤1pF:< 1500mΩ | 0.3pF≤Cap≤1pF: < 1500mΩ |
| 1pF<Cap≤10pF:< 250mΩ | 1pF<Cap≤10pF: < 250mΩ |
| 10pF<Cap≤100pF:< 200mΩ | Cap>10pF: < 200mΩ |

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

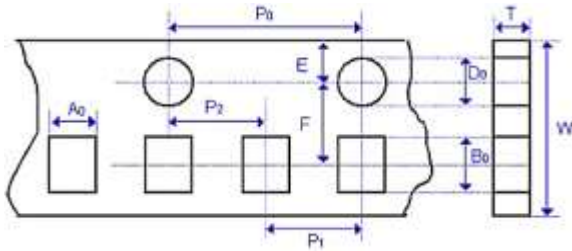
- To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- The product is recommended to be used within one year after shipment. Check solder ability in case of shelf life extension is needed.
- Don't open the tape until the parts are to be used, use the chips within 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

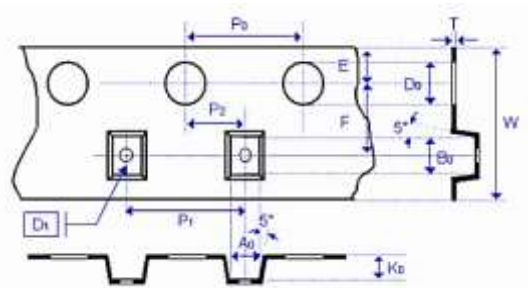
- The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solder ability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- In corrosive atmosphere, solder ability might be degraded, and 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 | 01005 | 0201 | 0402 | 0505 | 0603 | 0805 | 1111 |
|-----------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Thickness | V | L | N | J | S | T | G |
| A0 | 0.25 +/-0.05 | 0.40 +/-0.07 | 0.70 +/-0.2 | <1.90 | 1.05 +/-0.30 | 1.50 +/-0.20 | < 3.05 |
| B0 | 0.45 +/-0.05 | 0.70 +/-0.07 | 1.20 +/-0.2 | <1.90 | 1.80 +/-0.30 | 2.30 +/-0.20 | < 3.80 |
| T | ≤0.50 | ≤0.55 | ≤0.80 | 0.23 ± 0.10 | ≤1.20 | ≤1.20 | 0.23 +/-0.1 |
| K0 | - | - | - | <1.50 | - | - | < 2.50 |
| W | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.20 | 8.00 +/-0.10 | 8.00 +/-0.10 | 8.00 +/-0.20 |
| 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 | 4.00 +/-0.10 |
| 10xP0 | 40.00 +/-0.10 | 40.00 +/-0.10 | 40.00 +/-0.10 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 | 40.00 +/-0.20 |
| P1 | 2.00 +/-0.05 | 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 | 2.00 +/-0.05 |
| D0 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +/-0.05 | 1.55 +1/-0 |
| D1 | - | - | - | 1.00 ± 0.10 | - | - | 1.00 ± 0.10 |
| E | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 1.75 +/-0.05 | 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 | 3.50 +/-0.05 |

REEL DIMENSION (Unit: mm)



| Size Code | 01005, 0201, 0402, 0505, 0603, 0805, 1111 | |
|-----------|---|---------------|
| Reel Size | 7" | 13" |
| C | 13.0+0.5/-0.2 | 13.0+0.5/-0.2 |
| W 1 | 8.4+1.5/0 | 8.4+1.5/-0 |
| A | 178.0±0.10 | 330.0±1.0 |
| N | 60.0+1.0/-0 | 100±1.0 |

IMPORTANT NOTES AND DISCLAIMER

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.
3. All Product parametric performance is indicated in the Electrical Characteristics for the listed herein test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
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