



Surface Mount Multilayer Ceramic Chip Capacitors for High Q Commodity Applications



FEATURES

- Ultra stable class 1 dielectric
- High Q and low ESR at high frequency
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations
- Dry sheet manufacturing technology
- Noble Metal Electrode system (NME)
- Compliant to RoHS Directive 2011/65/EU
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Mobile telecommunication
- WLAN
- RF modules
- Tuner

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at 25 °C, 30 % to 70 % related humidity, unless otherwise specified

Operating Temperature: - 55 °C to + 125 °C

Capacitance Range: 0.5 pF to 3300 pF

Voltage Range: 16 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):
± 30 ppm/°C from - 55 °C to + 125 °C

Dissipation Factor:

Cap. < 30 pF: Q ≥ 400 + 20 C

Cap. ≥ 30 pF: Q ≥ 1000

Test Conditions for Capacitance and DF Measurement

Cap. ≤ 1000 pF 1.0 V_{RMS} ± 0.2 V_{RMS}, 1 MHz ± 10 %

Cap. > 1000 pF 1.0 V_{RMS} ± 0.2 V_{RMS}, 1 kHz ± 10 %

Aging Rate: 0 % maximum per decade

Insulation Resistance (IR): after 120 s at U_R (DC)
≥ 10 GΩ or R x C ≥ 500 Ω x F whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

≤ 100 V_{DC}: DWV at 250 % of rated voltage

| QUICK REFERENCE DATA | | | | |
|----------------------|------|---------------------|-------------|---------|
| DIELECTRIC | CASE | MAXIMUM VOLTAGE (V) | CAPACITANCE | |
| | | | MINIMUM | MAXIMUM |
| High Q | 0402 | 50 | 0.5 pF | 470 pF |
| | 0603 | 100 | 0.5 pF | 3.3 nF |

Note

- Detail ratings see selection chart

| ORDERING INFORMATION | | | | | | | |
|----------------------|------------|---|---|---|---|---|----------------------------------|
| VJ0402 | Q | 101 | F | X | J | C | W1BC |
| SIZE CODE | DIELECTRIC | CAPACITANCE | TOLERANCE | TERMINATION | VOLTAGE | PACKAGING | PROCESS CODE FOR BASIC COMMODITY |
| 0402 0603 | Q = High Q | Two significant digits followed by the number of zeros: 1R0 = 1.0 pF 101 = 100 pF | Cap. value ≤ 5 pF B = ± 0.10 pF C = ± 0.25 pF 5 pF > Cap. value < 10 pF C = ± 0.25 pF D = ± 0.50 pF Cap. value ≥ 10 pF F = ± 1 % G = ± 2 % J = ± 5 % | X = Ni barrier 100 % tin termination | J = 16 V X = 25 V A = 50 V B = 100 V | C = 7" reel/ paper P = 13" reel/ paper | |

| DIMENSIONS in inches (millimeters) | | | | | |
|------------------------------------|----------------|---|---|-----------------|---|
| | SIZE CODE | L | W | T MAX. | MB |
| | 0402 (1005) | 0.040 ± 0.002 (1.00 ± 0.05) | 0.020 ± 0.002 (0.50 ± 0.05) | 0.022 (0.55) | 0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10) |
| | 0603 (1608) | 0.063 + 0.006/- 0.004 (1.60 + 0.15/- 0.10) | 0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10) | 0.038 (0.95) | 0.016 ± 0.006 (0.40 ± 0.15) |



| SELECTION CHART | | | | | | | | | |
|----------------------------|-----------|--------|------|------|-------|--------|------|------|-------|
| DIELECTRIC | | HIGH Q | | | | | | | |
| STYLE | | VJ0402 | | | | VJ0603 | | | |
| SIZE CODE | | 0402 | | | | 0603 | | | |
| VOLTAGE (V _{DC}) | | 16 V | 25 V | 50 V | 100 V | 16 V | 25 V | 50 V | 100 V |
| VOLTAGE CODE | | J | X | A | B | J | X | A | B |
| CAP. CODE | CAP. | | | | | | | | |
| 0R5 | 0.5 pF | | N | N | | | S | S | S |
| 1R0 | 1.0 pF | | N | N | | | S | S | S |
| 1R2 | 1.2 pF | | N | N | | | S | S | S |
| 1R5 | 1.5 pF | | N | N | | | S | S | S |
| 1R8 | 1.8 pF | | N | N | | | S | S | S |
| 2R2 | 2.2 pF | | N | N | | | S | S | S |
| 2R7 | 2.7 pF | | N | N | | | S | S | S |
| 3R3 | 3.3 pF | | N | N | | | S | S | S |
| 3R9 | 3.9 pF | | N | N | | | S | S | S |
| 4R7 | 4.7 pF | | N | N | | | S | S | S |
| 5R6 | 5.6 pF | | N | N | | | S | S | S |
| 6R8 | 6.8 pF | | N | N | | | S | S | S |
| 8R2 | 8.2 pF | | N | N | | | S | S | S |
| 100 | 10 pF | | N | N | | | S | S | S |
| 120 | 12 pF | | N | N | | | S | S | S |
| 150 | 15 pF | | N | N | | | S | S | S |
| 180 | 18 pF | | N | N | | | S | S | S |
| 220 | 22 pF | | N | N | | | S | S | S |
| 270 | 27 pF | | N | N | | | S | S | S |
| 330 | 33 pF | | N | N | | | S | S | S |
| 390 | 39 pF | | N | N | | | S | S | S |
| 470 | 47 pF | | N | N | | | S | S | S |
| 560 | 56 pF | | N | N | | | S | S | S |
| 680 | 68 pF | | N | N | | | S | S | S |
| 820 | 82 pF | | N | N | | | S | S | S |
| 101 | 100 pF | | N | N | | | S | S | S |
| 121 | 120 pF | | N | N | | | S | S | S |
| 151 | 150 pF | | N | N | | | S | S | S |
| 181 | 180 pF | | N | N | | | S | S | S |
| 221 | 220 pF | | N | N | | | S | S | S |
| 271 | 270 pF | N | N | N | | | S | S | S |
| 331 | 330 pF | N | N | N | | | S | S | S |
| 391 | 390 pF | N | N | N | | | S | S | S |
| 471 | 470 pF | N | N | N | | | S | S | S |
| 561 | 560 pF | | | | | | S | S | S |
| 681 | 680 pF | | | | | | S | S | S |
| 821 | 820 pF | | | | | | S | S | S |
| 102 | 1000 pF | | | | | | S | S | S |
| 122 | 1200 pF | | | | | X | X | X | |
| 152 | 1500 pF | | | | | X | X | X | |
| 182 | 1800 pF | | | | | X | X | X | |
| 222 | 2200 pF | | | | | X | X | X | |
| 272 | 2700 pF | | | | | X | X | X | |
| 332 | 3300 pF | | | | | X | X | X | |
| 472 | 4700 pF | | | | | | | | |
| 562 | 5600 pF | | | | | | | | |
| 682 | 6800 pF | | | | | | | | |
| 822 | 8200 pF | | | | | | | | |
| 103 | 10 000 pF | | | | | | | | |

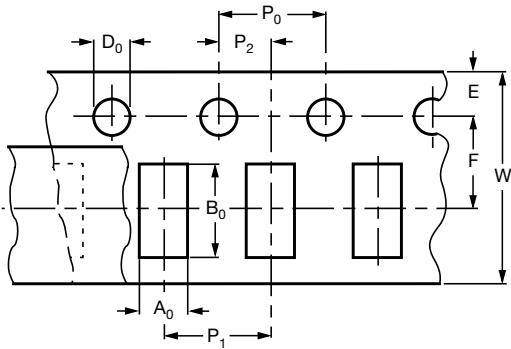
Note

- Letters indicate product thickness, see packaging quantities



| PACKAGING QUANTITIES | | | | |
|------------------------|------------------------|------------------|-------------|--------------|
| SIZE CODE (inch/mm) | MAX. THICKNESS (mm) | THICKNESS SYMBOL | PAPER TAPE | |
| | | | 7" REEL (C) | 13" REEL (P) |
| 0402 (1002) | 0.55 | N | 10K | 20K |
| 0603 (1608) | 0.95 | S, X | 4K | 15K |

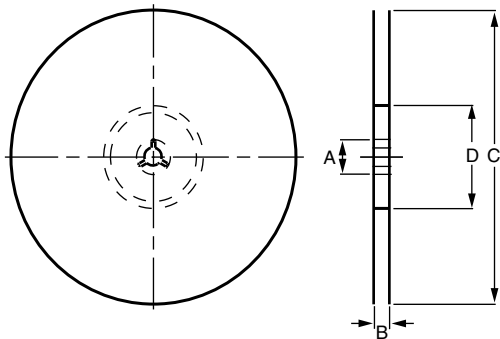
PAPER TAPE SPECIFICATION



DIMENSIONS OF PAPER TAPE
in millimeters

| SYM. | PRODUCT SIZE CODE | |
|----------------|-------------------|-------------|
| | 0402 | 0603 |
| A ₀ | 0.62 ± 0.05 | 1.02 ± 0.05 |
| B ₀ | 1.12 ± 0.05 | 1.80 ± 0.05 |
| W | 8.00 ± 0.10 | 8.00 ± 0.10 |
| E | 1.75 ± 0.05 | 1.75 ± 0.05 |
| F | 3.50 ± 0.05 | 3.50 ± 0.05 |
| D ₀ | 1.55 ± 0.05 | 1.55 ± 0.05 |
| P ₀ | 4.00 ± 0.10 | 4.00 ± 0.10 |
| P ₁ | 2.00 ± 0.05 | 4.00 ± 0.10 |
| P ₂ | 2.00 ± 0.05 | 2.00 ± 0.05 |

REEL SPECIFICATIONS



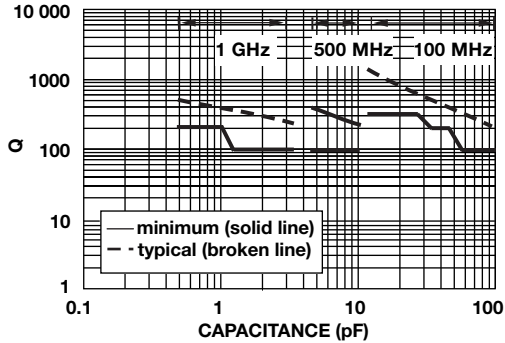
REEL DIMENSIONS AND TAPE WIDTH
in millimeters

| | Ø 180 mm; 7" | Ø 330 mm; 13" |
|---|--------------|---------------|
| A | 13.0 ± 0.5 | 13.0 ± 0.5 |
| B | 9.0 ± 1.0 | 9.0 ± 1.0 |
| C | 178.0 ± 1.0 | 330.0 ± 1.0 |
| D | 60.0 ± 1.0 | 100.0 ± 1.0 |

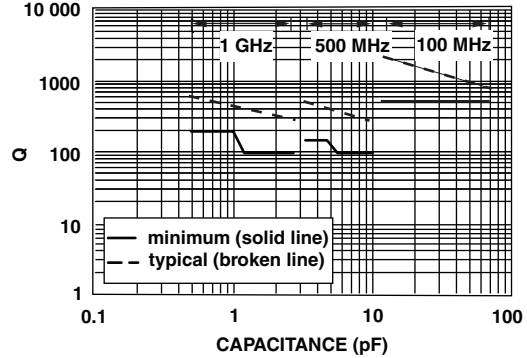


TYPICAL ELECTRICAL CHARACTERISTICS

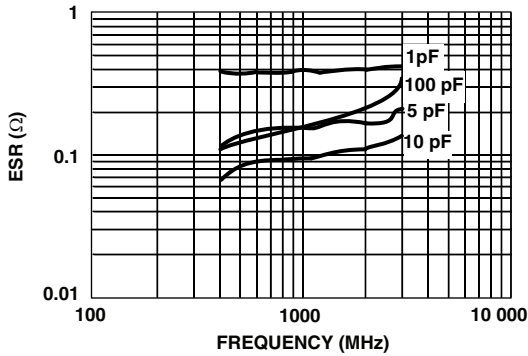
Q VALUE CRITERIA VS. SPECIFIC FREQUENCY
SIZE 0402



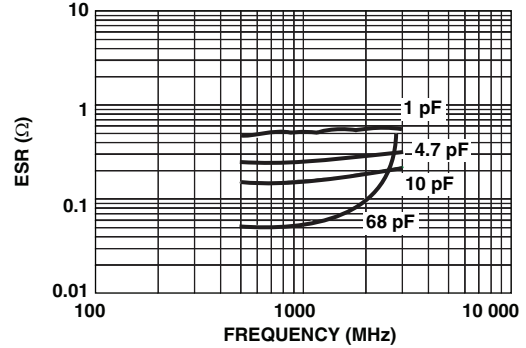
Q VALUE CRITERIA VS. SPECIFIC FREQUENCY
SIZE 0603



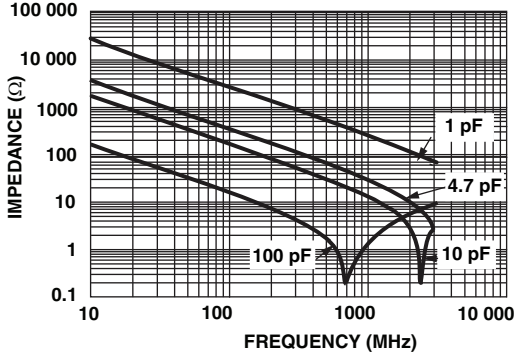
TYPICAL ESR VS. FREQUENCY
SIZE 0402



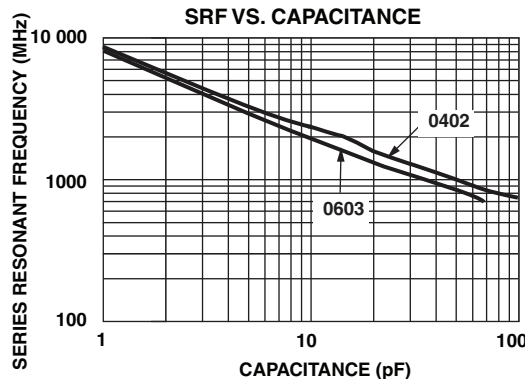
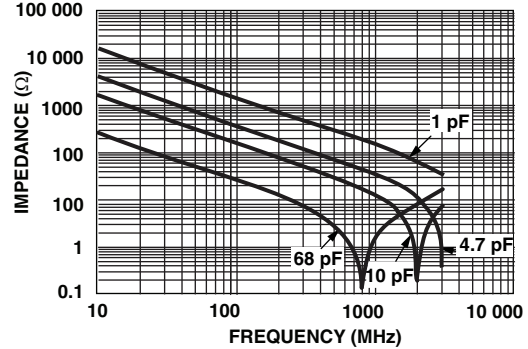
TYPICAL ESR VS. FREQUENCY
SIZE 0603



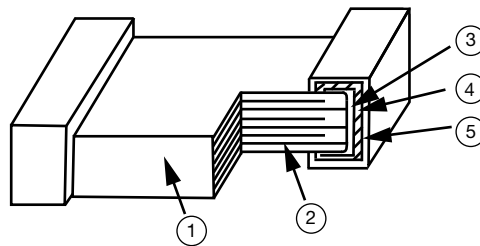
TYPICAL IMPEDANCE VS. FREQUENCY
SIZE 0402



TYPICAL IMPEDANCE VS. FREQUENCY
SIZE 0603



| CONSTRUCTION | | |
|--------------|------------------|--------------------------|
| NO. | NAME | HIGH Q |
| 1 | Ceramic material | BaTiO ₃ based |
| 2 | Inner electrode | AgPd alloy |
| 3 | Termination | Inner layer |
| 4 | | Middle layer |
| 5 | | Outer layer |
| | | Sn (matt) |



| STORAGE AND HANDLING CONDITIONS |
|--|
| <p>(1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.</p> <p>(2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.</p> <p>Cautions:</p> <ol style="list-style-type: none"> Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering. To store products on the shelf and avoid exposure to moisture. Do not expose products to excessive shock, vibration, direct sunlight and so on. |



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