

Surface Mount Multilayer Ceramic Chip Capacitors for Ultra Small Commodity Applications



FEATURES

- High capacitance in unit size
- High precision dimensional tolerances
- Suitably used in high-accuracy automatic mounting machine
- Dry sheet manufacturing technology
- Base Metal Electrode system (BME)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

APPLICATIONS

- Miniature microwave module
- Portable equipment - mobile phone, PDA

| ELECTRICAL SPECIFICATIONS | | | |
|---|--|---|--|
| Size | 0201 | | |
| Dielectric | COG (NP0) | X7R | X5R |
| Capacitance | 0.5 pF to 120 pF | 100 pF to 10 nF | 100 pF to 1.0 μ F |
| Capacitance Tolerance ⁽²⁾⁽³⁾ | Cap. \leq 5 pF: B (\pm 0.1 pF), C (\pm 0.25 pF) 5 pF < Cap. < 10 pF: C (\pm 0.25 pF), D (\pm 0.5 pF) Cap. \geq 10 pF: F (\pm 1 %), G (2 %), J (5 %) | J (\pm 5 %) K (\pm 10 %) M (\pm 20 %) | J (\pm 5 %) K (\pm 10 %) M (\pm 20 %) |
| Rated Voltage (V_{DC}) | 16 V, 25 V, 50 V | 10 V, 16 V, 25 V, 50 V | 6.3 V, 10 V, 16 V, 25 V, 50 V |
| $\tan \delta/Q$ ⁽¹⁾ | Cap. < 30 pF, $Q \geq 400 + 20 C$ Cap. \geq 30 pF, $Q \geq 1000$ | See Table 1 | |
| Insulation Resistance at U_R | $\geq 10 G\Omega$ | $\geq 10 G\Omega$ or $R \times C \geq 500 \Omega F$, whichever is less | |
| Operating Temperature | -55 °C to +125 °C | | -55 °C to +85 °C |
| Capacitance Change | ± 30 ppm | ± 15 % | |
| Termination | Ni/Sn lead (Pb)-free termination | | |

Notes

- (1) Measured at 30 % to 70 % relative humidity
NP0: apply $1.0 V_{RMS} \pm 0.2 V_{RMS}$, 1.0 MHz ± 10 % at the condition of 25 °C ambient temperature
X7R, X5R: apply $1.0 V_{RMS} \pm 0.2 V_{RMS}$, 1.0 kHz ± 10 % (224 / 6.3 V - 224 / 10 V - 105 / 10 V - 225 / 6.3 V: $0.5 V_{RMS} \pm 0.2 V_{RMS}$, 1.0 kHz ± 10 %) at the condition of 25 °C ambient temperature
- (2) Preconditioning for X7R / X5R MLCC: perform a heat treatment at 150 °C ± 10 °C for 1 h, then leave in ambient condition for 24 h ± 2 h before measurement
- (3) Tolerances restriction see "Selection Chart"

Table 1

X7R / X5R:

| RATED VOLTAGE | D.F. \leq | EXCEPTION OF D.F. \leq | |
|---------------|-------------|--------------------------|---------------------------|
| 50 V | 3 % | - | - |
| 16 V / 25 V | 3.5 % | 5 % | 0201 \geq 0.01 μ F |
| | | 10 % | 0201 \geq 0.1 μ F |
| 10 V | 5 % | 10 % | 0201 \geq 0.012 μ F |
| | | 15 % | 0201 \geq 0.1 μ F |
| 6.3 V | 10 % | 15 % | 0201 \geq 0.1 μ F |

| QUICK REFERENCE DATA | | | | |
|----------------------|------|---------------------|-------------|-------------|
| DIELECTRIC | CASE | MAXIMUM VOLTAGE (V) | CAPACITANCE | |
| | | | MINIMUM | MAXIMUM |
| C0G (NP0) | 0201 | 50 | 0.5 pF | 120 pF |
| X5R | 0201 | 50 | 100 pF | 1.0 μ F |
| X7R | 0201 | 50 | 100 pF | 10 nF |

Note

- Detail ratings see "Selection Chart" table

| ORDERING INFORMATION | | | | | | | |
|----------------------|-------------------------------------|---|---|-----------------------------------|---|--------------------------|----------------------------------|
| VJ0201 | A | 100 | J | X | X | C | W1BC |
| SIZE CODE | DIELECTRIC | CAPACITANCE | TOLERANCE ⁽¹⁾ | TERMINATION | RATED VOLTAGE | PACKAGING | PROCESS CODE FOR BASIC COMMODITY |
| 0201 | A = C0G (NP0) G = X5R Y = X7R | Two significant digits followed by the number of zeros. R is in place of decimal point: 0R5 = 0.5 pF 1R0 = 1.0 pF 100 = 10 pF | B = \pm 0.10 pF C = \pm 0.25 pF D = \pm 0.5 pF F = \pm 1 % G = \pm 2 % J = \pm 5 % K = \pm 10 % M = \pm 20 % | X = Ni barrier 100 % matte tin | Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V | C = 7" reel / paper tape | |

Note

- ⁽¹⁾ Detail tolerance see under "Electrical Specifications" table

| DIMENSIONS in inches (millimeters) | | | | |
|------------------------------------|--|--|---------------------------------|---|
| | | | | |
| SIZE CODE | L | W | T MAX. | MB |
| 0201 ⁽¹⁾ (0603) | 0.024 \pm 0.0012 (0.60 \pm 0.03) | 0.012 \pm 0.0012 (0.30 \pm 0.03) | 0.013 (0.33) | 0.006 \pm 0.002 (0.15 \pm 0.05) |
| | 0.024 \pm 0.002 ⁽²⁾ (0.60 \pm 0.05) | 0.012 \pm 0.002 ⁽²⁾ (0.30 \pm 0.05) | 0.014 ⁽²⁾ (0.35) | |
| | 0.024 \pm 0.0035 ⁽³⁾ (0.60 \pm 0.09) | 0.012 \pm 0.0035 ⁽³⁾ (0.30 \pm 0.09) | 0.0153 ⁽³⁾ (0.39) | 0.006 + 0.004 / - 0.002 ⁽³⁾ (0.15 + 0.1 / - 0.05) |

Notes

- ⁽¹⁾ Reflow soldering only
⁽²⁾ For capacitance values 0.1 μ F < cap. < 0.68 μ F
⁽³⁾ For capacitance values \geq 0.68 μ F



| SELECTION CHART | | | | | | | | | | | | | |
|-------------------------|----------|-----------|------|------------------|------------------|------------------|------------------|------|------|------|------|------|------|
| DIELECTRIC | | C0G (NP0) | | | | X5R | | | | X7R | | | |
| STYLE | | VJ0201 | | | | | | | | | | | |
| SIZE CODE | | 0201 | | | | | | | | | | | |
| VOLTAGE V _{DC} | | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | 10 V | 16 V | 25 V | 50 V |
| VOLTAGE CODE | | J | X | A | Y | Q | J | X | A | Q | J | X | A |
| CAP. CODE | CAP. | | | | | | | | | | | | |
| 0R5 | 0.5 pF | | L | L | | | | | | | | | |
| 1R0 | 1.0 pF | | L | L | | | | | | | | | |
| 1R2 | 1.2 pF | | L | L | | | | | | | | | |
| 1R5 | 1.5 pF | | L | L | | | | | | | | | |
| 1R8 | 1.8 pF | | L | L | | | | | | | | | |
| 2R2 | 2.2 pF | | L | L | | | | | | | | | |
| 2R7 | 2.7 pF | | L | L | | | | | | | | | |
| 3R3 | 3.3 pF | | L | L | | | | | | | | | |
| 3R9 | 3.9 pF | | L | L | | | | | | | | | |
| 4R7 | 4.7 pF | | L | L | | | | | | | | | |
| 5R6 | 5.6 pF | | L | L | | | | | | | | | |
| 6R8 | 6.8 pF | | L | L | | | | | | | | | |
| 8R2 | 8.2 pF | | L | L | | | | | | | | | |
| 100 | 10 pF | | L | L | | | | | | | | | |
| 120 | 12 pF | | L | L | | | | | | | | | |
| 150 | 15 pF | | L | L | | | | | | | | | |
| 180 | 18 pF | | L | L | | | | | | | | | |
| 220 | 22 pF | | L | L | | | | | | | | | |
| 270 | 27 pF | | L | L | | | | | | | | | |
| 330 | 33 pF | | L | L | | | | | | | | | |
| 390 | 39 pF | | L | L | | | | | | | | | |
| 470 | 47 pF | | L | L | | | | | | | | | |
| 560 | 56 pF | L | L | L | | | | | | | | | |
| 680 | 68 pF | L | L | L | | | | | | | | | |
| 820 | 82 pF | L | L | L | | | | | | | | | |
| 101 | 100 pF | L | L | L | | | | L | | L | L | L | L |
| 121 | 120 pF | L | L | L | | | | L | | L | L | L | L |
| 151 | 150 pF | | | | | | | L | | L | L | L | L |
| 181 | 180 pF | | | | | | | L | | L | L | L | L |
| 221 | 220 pF | | | | | | | L | | L | L | L | L |
| 271 | 270 pF | | | | | | | L | | L | L | L | L |
| 331 | 330 pF | | | | | | | L | | L | L | L | L |
| 391 | 390 pF | | | | | | | L | | L | L | L | L |
| 471 | 470 pF | | | | | | | L | | L | L | L | L |
| 561 | 560 pF | | | | | | | L | | L | L | L | L |
| 681 | 680 pF | | | | | | | L | | L | L | L | L |
| 821 | 820 pF | | | | | | | L | | L | L | L | L |
| 102 | 1000 pF | | | | | | L | | L | L | L | L | L |
| 152 | 1500 pF | | | | | L | L | | L | L | | | |
| 222 | 2200 pF | | | | | L | L | | L | L | | | |
| 332 | 3300 pF | | | | | L | L | | L | L | | | |
| 472 | 4700 pF | | | | | L | L | | L | L | | | |
| 682 | 6800 pF | | | | | L | L | | L | L | | | |
| 103 | 0.010 µF | | | | | L | L ⁽³⁾ | | L | L | | | |
| 153 | 0.015 µF | | | L | | | | | | | | | |
| 223 | 0.022 µF | | | L | | | | | | | | | |
| 333 | 0.033 µF | | | L | | | | | | | | | |
| 473 | 0.047 µF | | | L | | | | | | | | | |
| 683 | 0.068 µF | | | L | | | | | | | | | |
| 104 | 0.10 µF | | | L | L | L ⁽³⁾ | L ⁽³⁾ | | | | | | |
| 224 | 0.22 µF | | | L ⁽³⁾ | L ⁽³⁾ | | | | | | | | |
| 474 | 0.47 µF | | | L ⁽³⁾ | | | | | | | | | |
| 105 | 1.0 µF | | | L ⁽³⁾ | L ⁽¹⁾ | | | | | | | | |

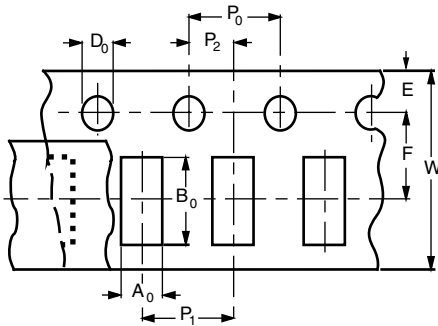
Notes

- Letters indicate product thickness, see "Packaging quantities"
- (1) Only in 20 % (code "M") tolerance
- (2) Only in 10 % (code "K") tolerance
- (3) Not in 5 % (code "J") tolerance



| PACKAGING QUANTITIES | | | |
|--------------------------|-------------------|-------------|--------------|
| SIZE CODE (inch / mm) | THICKNESS (mm) | PAPER TAPE | |
| | | 7" REEL (C) | 13" REEL (P) |
| 0201 (0603) | 0.39 | 15K | - |

PAPER TAPE SPECIFICATIONS

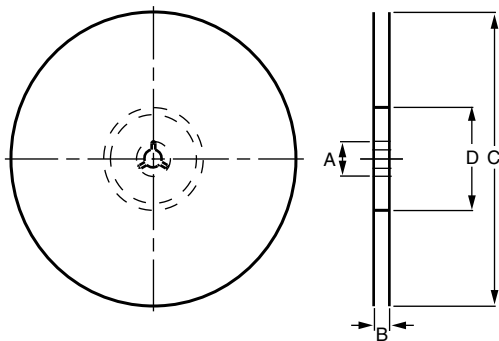


DIMENSIONS OF PAPER TAPE

in millimeters

| SYMBOL | PRODUCT SIZE CODE |
|----------------|-------------------|
| | 0201 |
| A ₀ | 0.38 ± 0.05 |
| B ₀ | 0.68 ± 0.05 |
| W | 8.00 ± 0.10 |
| E | 1.75 ± 0.05 |
| F | 3.50 ± 0.05 |
| D ₀ | 1.55 ± 0.05 |
| P ₀ | 4.00 ± 0.10 |
| P ₁ | 2.00 ± 0.05 |
| P ₂ | 2.00 ± 0.05 |

REEL SPECIFICATION

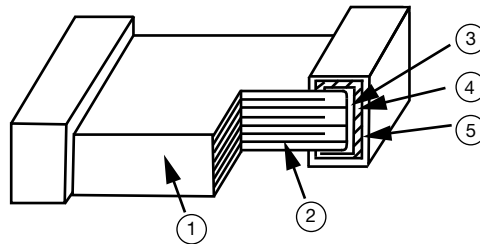


REEL DIMENSIONS AND TAPE WIDTH

in millimeters

| SYMBOL | 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 |

| CONSTRUCTION | | | |
|--------------|------------------|--------------------------|--------------------------|
| NO. | NAME | COG (NP0) | X5R, X7R |
| 1 | Ceramic material | CaZrO ₃ based | BaTiO ₃ based |
| 2 | Inner electrode | Ni | |
| 3 | Termination | Inner layer | Cu |
| 4 | | Middle layer | Ni |
| 5 | | Outer layer | Sn (matt) |



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % relative humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. 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.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.



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