

Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications



FEATURES

- Available from 0402 to 1210 body sizes
- Ultra stable C0G (NP0) dielectric
- High capacitance in X5R, X7R
- Ni-barrier with 100 % tin terminations
- Dry sheet technology process
- Base Metal Electrode system (BME)
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing
- Mobile applications

ELECTRICAL SPECIFICATIONS

Operating Temperature:

C0G (NP0): -55 °C to +125 °C
 X5R: -55 °C to +85 °C
 X7R: -55 °C to +125 °C

Capacitance Range:

C0G (NP0): 0.5 pF to 39 nF
 X5R: 47 nF to 100 µF
 X7R: 100 pF to 10 µF

Voltage Range:

C0G (NP0): 10 V_{DC} to 630 V_{DC}
 X5R: 6.3 V_{DC} to 50 V_{DC}
 X7R: 10 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):

C0G (NP0): 0 ppm/°C ± 30 ppm/°C from -55 °C to +125 °C
 X5R: ± 15 % from -55 °C to +85 °C without voltage applied
 X7R: ± 15 % from -55 °C to +125 °C without voltage applied

Insulation Resistance (IR) at U_R:

≥ 10 GΩ or R x C ≥ 500 Ω x F whichever is less

Test Conditions for Capacitance Tolerance:

preconditioning for X5R, X7R 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

Test Conditions for Capacitance and DF Measurement:

measured at conditions of 30 % to 70 % related humidity.

C0G (NP0): Apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 MHz ± 10 % for caps ≤ 1000 pF, at +25 °C ambient temperature
 Apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 % for caps > 1000 pF, at +25 °C ambient temperature

X5R / X7R: Caps ≤ 10 µF apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 %, at +25 °C ambient temperature⁽¹⁾
 Caps > 10 µF apply 0.5 V_{RMS} ± 0.2 V_{RMS}, 120 Hz ± 20 %, at +25 °C ambient temperature

Note

- ⁽¹⁾ Test conditions: 0.5 V_{RMS} ± 0.2 V_{RMS}, 1 kHz ± 10 %
 X7R: 0603: ≥ 2.2 µF / 10 V
 0805: 10 µF (6.3 V and 10 V)
 X5R: 0402: ≥ 4.7 µF / 6.3 V and ≥ 2.2 µF / 10 V
 0603: 10 µF (6.3 V and 10 V)

Aging Rate:

C0G (NP0): 0 % per decade
 X5R: 6.3 V_{DC} / 10 V_{DC}: 3 % maximum per decade
 16 V_{DC} / 25 V_{DC}: 2 % maximum per decade
 X7R: ≤ 10 V_{DC}: 1.5 % maximum per decade
 ≥ 16 V_{DC}: 1 % maximum per decade

Dielectric Strength Test:

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

≤ 100 V_{DC}-rated: 250 % of rated voltage
 500 V_{DC}-rated: 200 % of rated voltage
 630 V_{DC}-rated: 150 % of rated voltage



Dissipation Factor (DF):

C0G (NP0): Cap. < 30 pF: Q ≥ 400 + 20C
 Cap. ≥ 30 pF: Q ≥ 1000

X5R, X7R:

| RATED VOLTAGE | D.F. ≤ | EXCEPTION OF D.F. ≤ | |
|---------------|--------|---------------------|---|
| | | | |
| ≥ 100 V | 2.5 % | 3 % | 1206 ≥ 0.47 μF |
| | | 5 % | 0603 ≥ 0.068 μF; 0805 > 0.1 μF; 1206 > 1 μF |
| | | 10 % | 1210 ≥ 4.7 μF |
| ≥ 50 V | 2.5 % | 3 % | 0603 ≥ 0.047 μF; 0805 ≥ 0.18 μF; 1206 ≥ 0.47 μF |
| | | 5 % | 1210 ≥ 4.7 μF |
| | | 10 % | 0402 ≥ 0.1 μF; 0603 ≥ 1 μF; 0805 ≥ 1 μF; 1206 ≥ 2.2 μF; 1210 ≥ 10 μF |
| 25 V | 3.5 % | 5 % | 0805 ≥ 1 μF; 1210 ≥ 10 μF |
| | | 7 % | 0603 ≥ 0.33 μF; 1206 ≥ 4.7 μF |
| | | 10 % | 0402 ≥ 0.10 μF; 0603 ≥ 0.47 μF; 0805 ≥ 2.2 μF; 1206 ≥ 6.8 μF; 1210 ≥ 22 μF |
| 16 V | 3.5 % | 5 % | 0402 ≥ 0.033 μF; 0603 ≥ 0.15 μF; 0805 ≥ 0.68 μF; 1206 ≥ 2.2 μF; 1210 ≥ 4.7 μF |
| | | 10 % | 0402 ≥ 0.22 μF; 0603 ≥ 0.68 μF; 0805 ≥ 2.2 μF; 1206 ≥ 4.7 μF; 1210 ≥ 22 μF |
| 10 V | 5 % | 10 % | 0402 ≥ 0.33 μF; 0402/X7R ≥ 0.22 μF 0603 ≥ 0.33 μF; 0805 ≥ 2.2 μF; 1206 ≥ 2.2 μF; 1210 ≥ 22 μF |
| | | 15 % | 0402 ≥ 1 μF |
| 6.3 V | 10 % | 15 % | 0402 ≥ 1 μF; 0603 ≥ 10 μF; 0805 ≥ 4.7 μF; 1206 ≥ 47 μF; 1210 ≥ 100 μF |
| | | 20 % | 0402 ≥ 2.2 μF |
| 4 V | 15 % | - | - |

| QUICK REFERENCE DATA | | | | |
|----------------------|------|---------------------|-------------|---------|
| DIELECTRIC | CASE | MAXIMUM VOLTAGE (V) | CAPACITANCE | |
| | | | MINIMUM | MAXIMUM |
| C0G (NP0) | 0402 | 100 | 0.5 pF | 1.0 nF |
| | 0603 | 100 | 0.5 pF | 10 nF |
| | 0805 | 630 | 0.5 pF | 18 nF |
| | 1206 | 100 | 1.5 pF | 39 nF |
| X5R | 0402 | 50 | 47 nF | 4.7 μF |
| | 0603 | 50 | 220 nF | 22 μF |
| | 0805 | 50 | 1.5 μF | 10 μF |
| | 1206 | 50 | 1.5 μF | 47 μF |
| | 1210 | 50 | 1.5 μF | 100 μF |
| X7R | 0402 | 50 | 100 pF | 1.0 μF |
| | 0603 | 100 | 100 pF | 2.2 μF |
| | 0805 | 100 | 100 pF | 10 μF |
| | 1206 | 100 | 150 pF | 10 μF |
| | 1210 | 100 | 1.0 nF | 10 μF |

Note

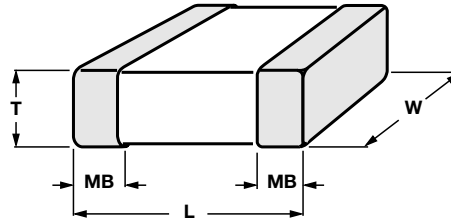
- Detail ratings see "Selection Chart"



| ORDERING INFORMATION | | | | | | | |
|--------------------------------------|-------------------------------------|--|--|-----------------------------------|---|--|----------------------------------|
| VJ0402 | Y | 101 | J | X | Q | C | W1BC |
| SIZE CODE | DIELECTRIC | CAPACITANCE | TOLERANCE | TERMINATION | VOLTAGE ⁽¹⁾ | PACKAGING | PROCESS CODE FOR BASIC COMMODITY |
| 0402 0603 0805 1206 1210 | A = C0G (NP0) G = X5R Y = X7R | Two significant digits followed by the number of zeros: 1R0 = 1.0 pF 101 = 100 pF 102 = 1000 pF 152 = 1500 pF 103 = 10 000 pF 104 = 100 000 pF | C0G (NP0) ⁽²⁾ Cap. < 10 pF: B = ± 0.10 pF C = ± 0.25 pF D = ± 0.50 pF Cap. ≥ 10 pF: F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % X5R / X7R ⁽²⁾⁽³⁾ J = ± 5 % K = ± 10 % M = ± 20 % | X = Ni barrier 100 % matte tin | S = 4 V Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V E = 500 V L = 630 V | C = 7" reel / paper tape P = 13" reel / paper tape T = 7" reel / plastic tape R = 13" reel / plastic tape | |

Notes

- Detail rating see "Selection Chart"
- ⁽¹⁾ DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com
- ⁽²⁾ Not all values, see "Selection Chart"
- ⁽³⁾ No 5 % tolerance for X5R

DIMENSIONS in inches (millimeters)


| SIZE CODE | THICKNESS SYMBOL | SOLDERING METHOD (1) | L | W | T | MB |
|----------------|------------------|----------------------|---|---|---|---|
| 0402 (1005) | N | R | 0.040 ± 0.002 (1.00 ± 0.05) | 0.020 ± 0.002 (0.50 ± 0.05) | 0.020 ± 0.002 (0.50 ± 0.05) | 0.010 + 0.002 / - 0.004 (0.25 + 0.05 / - 0.10) |
| | E | R | 0.040 ± 0.008 (1.00 ± 0.20) | 0.020 ± 0.008 (0.50 ± 0.20) | 0.020 ± 0.008 (0.50 ± 0.20) | |
| 0603 (1608) | S | R / W | 0.063 ± 0.004 (1.60 ± 0.10) | 0.030 ± 0.004 (0.80 ± 0.10) | 0.030 ± 0.0028 (0.80 ± 0.07) | 0.016 ± 0.006 (0.40 ± 0.15) |
| | X | R / W | 0.063 + 0.006 / - 0.004 (1.60 + 0.15 / - 0.10) | 0.030 + 0.006 / - 0.004 (0.80 + 0.15 / - 0.10) | 0.030 + 0.006 / - 0.004 (0.80 + 0.15 / - 0.10) | |
| | X' | R / W | 0.063 ± 0.008 (1.60 ± 0.20) | 0.030 ± 0.008 (0.80 ± 0.20) | 0.030 ± 0.008 (0.80 ± 0.20) | |
| 0805 (2012) | A | R / W | 0.080 ± 0.006 (2.00 ± 0.15) | 0.050 ± 0.004 (1.25 ± 0.10) | 0.024 ± 0.004 (0.60 ± 0.10) | 0.020 ± 0.008 (0.50 ± 0.20) |
| | B | R / W | | | 0.030 ± 0.004 (0.80 ± 0.10) | |
| | D | R | 0.049 ± 0.004 (1.25 ± 0.10) | | | |
| | T | R / W | 0.080 ± 0.008 (2.00 ± 0.20) | 0.050 ± 0.008 (1.25 ± 0.20) | 0.033 ± 0.004 (0.85 ± 0.10) | |
| | I | R | 0.049 ± 0.008 (1.25 ± 0.20) | | | |
| 1206 (3216) | B | R / W | 0.126 ± 0.006 (3.20 ± 0.15) | 0.063 ± 0.006 (1.60 ± 0.15) | 0.030 ± 0.004 (0.80 ± 0.10) | 0.024 ± 0.008 (0.60 ± 0.20) |
| | C | R | | | 0.037 ± 0.004 (0.95 ± 0.10) | |
| | D | R | | | 0.049 ± 0.004 (1.25 ± 0.10) | |
| | J | R | 0.126 ± 0.008 (3.20 ± 0.20) | 0.045 ± 0.006 (1.15 ± 0.15) | | |
| | G | R | 0.063 ± 0.008 (1.60 ± 0.20) | 0.063 ± 0.008 (1.60 ± 0.20) | | |
| | P | R | 0.126 + 0.012 / - 0.004 (3.20 + 0.30 / - 0.10) | 0.063 + 0.012 / - 0.004 (1.60 + 0.30 / - 0.10) | 0.063 + 0.012 / - 0.004 (1.60 + 0.30 / - 0.10) | |
| 1210 (3225) | C | R | 0.126 ± 0.012 (3.20 ± 0.30) | 0.098 ± 0.008 (2.50 ± 0.20) | 0.037 ± 0.004 (0.95 ± 0.10) | 0.030 ± 0.010 (0.75 ± 0.25) |
| | D | R | | | 0.049 ± 0.004 (1.25 ± 0.10) | |
| | G | R | 0.126 ± 0.016 (3.20 ± 0.40) | 0.098 ± 0.012 (2.50 ± 0.30) | 0.063 ± 0.008 (1.60 ± 0.20) | |
| | K | R | | | 0.078 ± 0.008 (2.00 ± 0.20) | |
| | M | R | | | 0.098 ± 0.012 (2.50 ± 0.30) | |

Note

(1) "R" = Reflow soldering process; "W" = Wave soldering process



| SELECTION CHART | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--------|-----------|----|----|----|-----|--------|----|----|----|-----|--------|----|----|----|-----|-----|--------|----|----|----|----|-----|
| DIELECTRIC | | C0G (NP0) | | | | | | | | | | | | | | | | | | | | | |
| STYLE | | VJ0402 | | | | | VJ0603 | | | | | VJ0805 | | | | | | VJ1206 | | | | | |
| SIZE CODE | | 0402 | | | | | 0603 | | | | | 0805 | | | | | | 1206 | | | | | |
| VOLTAGE (V _{DC}) | | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 | 500 | 630 | 10 | 16 | 25 | 50 | 100 |
| VOLTAGE CODE | | Q | J | X | A | B | Q | J | X | A | B | Q | J | X | A | B | E | L | Q | J | X | A | B |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | | | | | | | | |
| 0R5 | 0.5 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | | | | | | |
| 1R0 | 1.0 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | | | | | | |
| 1R2 | 1.2 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | | | | | | |
| 1R5 | 1.5 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 1R8 | 1.8 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 2R2 | 2.2 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 2R7 | 2.7 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 3R3 | 3.3 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 3R9 | 3.9 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 4R7 | 4.7 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 5R6 | 5.6 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 6R8 | 6.8 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 8R2 | 8.2 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 100 | 10 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | A | A | B | B | B | B | B |
| 120 | 12 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 150 | 15 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 180 | 18 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 220 | 22 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 270 | 27 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 330 | 33 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 390 | 39 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 470 | 47 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 560 | 56 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 680 | 68 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 820 | 82 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 101 | 100 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 121 | 120 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 151 | 150 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 181 | 180 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 221 | 220 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 271 | 270 pF | N | N | N | N | | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 331 | 330 pF | N | N | N | N | | S | S | S | S | S | A | A | A | A | A | | | B | B | B | B | B |
| 391 | 390 pF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | | | B | B | B | B | B |
| 471 | 470 pF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | | | B | B | B | B | B |
| 561 | 560 pF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | | | B | B | B | B | B |
| 681 | 680 pF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | | | B | B | B | B | B |
| 821 | 820 pF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | | | B | B | B | B | B |

Note

- Letters indicate product thickness, see packaging quantities



| SELECTION CHART | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--------|-----------|----|----|----|-----|--------|----|------------------|----|-----|------------------|------------------|------------------|------------------|-----|--------|----|------------------|------------------|-----|
| DIELECTRIC | | COG (NP0) | | | | | | | | | | | | | | | | | | | |
| STYLE | | VJ0402 | | | | | VJ0603 | | | | | VJ0805 | | | | | VJ1206 | | | | |
| SIZE CODE | | 0402 | | | | | 0603 | | | | | 0805 | | | | | 1206 | | | | |
| VOLTAGE (V _{DC}) | | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 | 10 | 16 | 25 | 50 | 100 |
| VOLTAGE CODE | | Q | J | X | A | B | Q | J | X | A | B | Q | J | X | A | B | Q | J | X | A | B |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | | | | | | |
| 102 | 1.0 nF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | B | B | B | B | B |
| 122 | 1.2 nF | | | | | | X | X | X | X | X | B | B | B | B | B | B | B | B | B | B |
| 152 | 1.5 nF | | | | | | X | X | X | X | X | B | B | B | B | B | B | B | B | B | B |
| 182 | 1.8 nF | | | | | | X | X | X | X | | B | B | B | B | B | B | B | B | B | B |
| 222 | 2.2 nF | | | | | | X | X | X | X | | B | B | B | B | B | B | B | B | B | B |
| 272 | 2.7 nF | | | | | | X | X | X | X | | D | D | D | D | D | B | B | B | B | B |
| 332 | 3.3 nF | | | | | | X | X | X | X | | D | D | D | D | D | B | B | B | B | B |
| 392 | 3.9 nF | | | | | | | | | | | D | D | D | D | D | B | B | B | B | B |
| 472 | 4.7 nF | | | | | | | | | | | D | D | D | D | D | B | B | B | B | B |
| 562 | 5.6 nF | | | | | | | | | | | D | D | D | D | | B | B | B | B | B |
| 682 | 6.8 nF | | | | | | | | | | | D | D | D | D | | C | C | C | C | C |
| 822 | 8.2 nF | | | | | | | | | | | D | D | D | D | | D | D | D | D | D |
| 103 | 10 nF | | | | | | | | X ⁽¹⁾ | | | D | D | D | D | | D | D | D | D | D |
| 123 | 12 nF | | | | | | | | | | | T ⁽¹⁾ | T ⁽¹⁾ | T ⁽¹⁾ | T ⁽¹⁾ | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 153 | 15 nF | | | | | | | | | | | | | T ⁽¹⁾ | T ⁽¹⁾ | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 183 | 18 nF | | | | | | | | | | | | | T ⁽¹⁾ | T ⁽¹⁾ | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 223 | 22 nF | | | | | | | | | | | | | | | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 273 | 27 nF | | | | | | | | | | | | | | | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 333 | 33 nF | | | | | | | | | | | | | | | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 393 | 39 nF | | | | | | | | | | | | | | | | P | P | P ⁽¹⁾ | P ⁽¹⁾ | |
| 473 | 47 nF | | | | | | | | | | | | | | | | | | | | |
| 563 | 56 nF | | | | | | | | | | | | | | | | | | | | |
| 683 | 68 nF | | | | | | | | | | | | | | | | | | | | |
| 823 | 82 nF | | | | | | | | | | | | | | | | | | | | |
| 104 | 100 nF | | | | | | | | | | | | | | | | | | | | |

Notes

- Letters indicate product thickness, see packaging quantities
- (1) Only in 5 % (code "J") tolerance



| SELECTION CHART | | | | | | | | | | | | | | | | |
|----------------------------|--------|------------------|------|------|------|------|-------------------|-------------------|------|------|------------------|--------|------|------|------|------|
| DIELECTRIC | | X5R | | | | | | | | | | | | | | |
| STYLE | | VJ0402 | | | | | VJ0603 | | | | | VJ0805 | | | | |
| SIZE CODE | | 0402 | | | | | 0603 | | | | | 0805 | | | | |
| VOLTAGE (V _{DC}) | | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| VOLTAGE CODE | | Y | Q | J | X | A | Y | Q | J | X | A | Y | Q | J | X | A |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | |
| 473 | 47 nF | | | N | | | | | | | | | | | | |
| 563 | 56 nF | | N | | | | | | | | | | | | | |
| 683 | 68 nF | | N | N | | | | | | | | | | | | |
| 823 | 82 nF | N | N | N | | | | | | | | | | | | |
| 104 | 100 nF | N | N | N | N | N | | | | | | | | | | |
| 124 | 120 nF | | | | | | | | | | | | | | | |
| 154 | 150 nF | | N | | N | | | | | | | | | | | |
| 184 | 180 nF | | | | | | | | | | | | | | | |
| 224 | 220 nF | N | N | N | N | N | | | X | X | | | | | | |
| 274 | 270 nF | | | | | | | X | X | | | | | | | |
| 334 | 330 nF | N | N | | | | | X | X | X | | | | | | |
| 394 | 390 nF | | | | | | | X | X | | | | | | | |
| 474 | 470 nF | N | N | E | E | | | X | X | X | X ⁽²⁾ | | | | | |
| 564 | 560 nF | | | | | | | | | | | | | | | |
| 684 | 680 nF | N | N | | | | | X | X | X | | | | | | |
| 824 | 820 nF | | | | | | X | X | X | | | | | | | |
| 105 | 1.0 µF | N | N | N | N | | X | X | X | X | X | | | | | |
| 155 | 1.5 µF | | | | | | X | | | | | I | I | I | I | |
| 225 | 2.2 µF | N | | | | | X | X | X' | X' | | I | I | I | I | |
| 335 | 3.3 µF | | | | | | | | | | | I | I | I | I | |
| 475 | 4.7 µF | E ⁽¹⁾ | | | | | X | X | X' | | | I | I | I | I | |
| 106 | 10 µF | | | | | | X' | X' ⁽¹⁾ | | | | I | I | I | I | |
| 226 | 22 µF | | | | | | X' ⁽¹⁾ | | | | | | | | | |

Notes

- Letters indicate product thickness, see packaging quantities
- (1) Only in 20 % (code "M") tolerance
- (2) Only in 10 % (code "K") tolerance

| SELECTION CHART | | | | | | | | | | | | | | | |
|----------------------------|--------|------------------|------|------|------|------------------|--------|------------------|------|------|------|--|--|--|--|
| DIELECTRIC | | X5R | | | | | | | | | | | | | |
| STYLE | | VJ1206 | | | | | VJ1210 | | | | | | | | |
| SIZE CODE | | 1206 | | | | | 1210 | | | | | | | | |
| VOLTAGE (V _{DC}) | | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | | | | |
| VOLTAGE CODE | | Y | Q | J | X | A | Y | Q | J | X | A | | | | |
| CAP. CODE | CAP. | | | | | | | | | | | | | | |
| 105 | 1.0 µF | | | | | | | | | | | | | | |
| 155 | 1.5 µF | | J | J | | | | K | K | | | | | | |
| 225 | 2.2 µF | | J | J | P | P ⁽²⁾ | | K | K | | | | | | |
| 335 | 3.3 µF | | P | P | P | | | | | | | | | | |
| 475 | 4.7 µF | P | P | P | P | P | | K | K | K | | | | | |
| 685 | 6.8 µF | P | P | | | | | | | | | | | | |
| 106 | 10 µF | P | P | P | P | P | | K | K | K | M | | | | |
| 226 | 22 µF | P | P | P | | | | M | M | M | M | | | | |
| 476 | 47 µF | P ⁽¹⁾ | | | | | | M | M | M | | | | | |
| 107 | 100 µF | | | | | | | M ⁽¹⁾ | | | | | | | |

Notes

- Letters indicate product thickness, see packaging quantities
- (1) Only in 20 % (code "M") tolerance
- (2) Only in 10 % (code "K") tolerance



| SELECTION CHART | | | | | | | | | | | | | | | | | | |
|----------------------------|--------|------------------|------------------|------------------|------|------------------|--------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|--|
| DIELECTRIC | | X7R | | | | | | | | | | | | | | | | |
| STYLE | | VJ0402 | | | | | VJ0603 | | | | | VJ0805 | | | | | | |
| SIZE CODE | | 0402 | | | | | 0603 | | | | | 0805 | | | | | | |
| VOLTAGE (V _{DC}) | | 6.3 V | 10 V | 16 V | 25 V | 50 V | 100 V | 10 V | 16 V | 25 V | 50 V | 100 V | 10 V | 16 V | 25 V | 50 V | 100 V | |
| VOLTAGE CODE | | Y | Q | J | X | A | B | Q | J | X | A | B | Q | J | X | A | B | |
| CAP. CODE | | CAP. | | | | | | | | | | | | | | | | |
| 101 | 100 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 121 | 120 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 151 | 150 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 181 | 180 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 221 | 220 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 271 | 270 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 331 | 330 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 391 | 390 pF | | N | N | N | N | | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | S ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | |
| 471 | 470 pF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 561 | 560 pF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 681 | 680 pF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 821 | 820 pF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 102 | 1.0 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 122 | 1.2 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 152 | 1.5 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 182 | 1.8 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 222 | 2.2 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 272 | 2.7 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 332 | 3.3 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 392 | 3.9 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 472 | 4.7 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 562 | 5.6 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 682 | 6.8 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 822 | 8.2 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 103 | 10 nF | | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | |
| 123 | 12 nF | | N | N | N | | | S | S | S | S | | B | B | B | B | B | |
| 153 | 15 nF | | N | N | N | | | S | S | S | S | | B | B | B | B | B | |
| 183 | 18 nF | | N | N | N | | | S | S | S | S | | B | B | B | B | B | |
| 223 | 22 nF | | N | N | N | N ⁽²⁾ | | S | S | S | S | X ⁽²⁾ | B | B | B | B | B | |
| 273 | 27 nF | | N | N | N | | | S | S | S | S | | B | B | B | B | D | |
| 333 | 33 nF | | N | N | N | N ⁽¹⁾ | | S | S | S | X | | B | B | B | B | D | |
| 393 | 39 nF | | N | N | N | | | S | S | S | X | | B | B | B | B | D | |
| 473 | 47 nF | | N | N | N | N ⁽²⁾ | | S | S | S | X | X ⁽²⁾ | B | B | B | B | D | |
| 563 | 56 nF | | N | N | | | | S | S | S | X | | B | B | B | B | D | |
| 683 | 68 nF | | N | N | | | | S | S | S | X | | B | B | B | B | D | |
| 823 | 82 nF | | N | N | | | | S | S | S | X | | B | B | B | B | D | |
| 104 | 100 nF | | N | N | N | E ⁽²⁾ | | S | S | S | X | X ⁽²⁾ | B | B | B | B/D | D | |
| 124 | 120 nF | | | | | | | S | S | X | | | B | B | B | D | | |
| 154 | 150 nF | | | | | | | S | S | X | | | D | D | D | D | | |
| 184 | 180 nF | | | | | | | S | S | X | | | D | D | D | D | | |
| 224 | 220 nF | | | N ⁽¹⁾ | | | | S | S | X | X ⁽²⁾ | | D | D | D | D | I ⁽²⁾ | |
| 274 | 270 nF | | | | | | | X | X | X | | | D | D | D | | | |
| 334 | 330 nF | | | | | | | X | X | X | | | D | D | D | I | | |
| 394 | 390 nF | | | | | | | X | X | X | | | D | D | D | | | |
| 474 | 470 nF | | N ⁽²⁾ | | | | | X | X | X | X ⁽²⁾ | | D | D | D | I | I ⁽²⁾ | |
| 564 | 560 nF | | | | | | | X | X | | | | D | D | D | | | |
| 684 | 680 nF | | | | | | | X | X | | | | D | D | D | | | |
| 824 | 820 nF | | | | | | | X | X | | | | D | D | D | | | |
| 105 | 1.0 µF | N ⁽¹⁾ | | | | | | X | X | X ⁽¹⁾ | | | D | D | D | I ⁽¹⁾ | | |
| 155 | 1.5 µF | | | | | | | | | | | | I | I ⁽¹⁾ | I ⁽¹⁾ | | | |
| 225 | 2.2 µF | | | | | | | X ⁽¹⁾ | X ⁽¹⁾ | | | | I | I | I | | | |
| 335 | 3.3 µF | | | | | | | | | | | | | | | | | |
| 475 | 4.7 µF | | | | | | | | | | | | I ⁽¹⁾ | I ⁽¹⁾ | I ⁽¹⁾ | | | |
| 685 | 6.8 µF | | | | | | | | | | | | | | | | | |
| 106 | 10 µF | | | | | | | | | | | | I ⁽¹⁾ | | | | | |

Notes

• Letters indicate product thickness, see packaging quantities

(1) Not in 5 % (code "J") tolerance

(2) Only in 10 % (code "K") tolerance



| SELECTION CHART | | | | | | | | | | | | |
|----------------------------|--------|------------------|------------------|------------------|------------------|------------------|--------|------|------------------|------------------|------------------|------------------|
| DIELECTRIC | | X7R | | | | | | | | | | |
| STYLE | | VJ1206 | | | | | VJ1210 | | | | | |
| SIZE CODE | | 1206 | | | | | 1210 | | | | | |
| VOLTAGE (V _{DC}) | | 10 V | 16 V | 25 V | 50 V | 100 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | 100 V |
| VOLTAGE CODE | | Q | J | X | A | B | Y | Q | J | X | A | B |
| CAP. CODE | CAP. | | | | | | | | | | | |
| 101 | 100 pF | | | | | | | | | | | |
| 121 | 120 pF | | | | | | | | | | | |
| 151 | 150 pF | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | | | | | | |
| 181 | 180 pF | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | | | | | | |
| 221 | 220 pF | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | | | | | | |
| 271 | 270 pF | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | | | | | | |
| 331 | 330 pF | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | | | | | | |
| 391 | 390 pF | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | B ⁽¹⁾ | | | | | | |
| 471 | 470 pF | B | B | B | B | B | | | | | | |
| 561 | 560 pF | B | B | B | B | B | | | | | | |
| 681 | 680 pF | B | B | B | B | B | | | | | | |
| 821 | 820 pF | B | B | B | B | B | | | | | | |
| 102 | 1.0 nF | B | B | B | B | B | | C | C | C | C | C |
| 122 | 1.2 nF | B | B | B | B | B | | C | C | C | C | C |
| 152 | 1.5 nF | B | B | B | B | B | | C | C | C | C | C |
| 182 | 1.8 nF | B | B | B | B | B | | C | C | C | C | C |
| 222 | 2.2 nF | B | B | B | B | B | | C | C | C | C | C |
| 272 | 2.7 nF | B | B | B | B | B | | C | C | C | C | C |
| 332 | 3.3 nF | B | B | B | B | B | | C | C | C | C | C |
| 392 | 3.9 nF | B | B | B | B | B | | C | C | C | C | C |
| 472 | 4.7 nF | B | B | B | B | B | | C | C | C | C | C |
| 562 | 5.6 nF | B | B | B | B | B | | C | C | C | C | C |
| 682 | 6.8 nF | B | B | B | B | B | | C | C | C | C | C |
| 822 | 8.2 nF | B | B | B | B | B | | C | C | C | C | C |
| 103 | 10 nF | B | B | B | B | B | | C | C | C | C | C |
| 123 | 12 nF | B | B | B | B | B | | C | C | C | C | C |
| 153 | 15 nF | B | B | B | B | B | | C | C | C | C | C |
| 183 | 18 nF | B | B | B | B | B | | C | C | C | C | C |
| 223 | 22 nF | B | B | B | B | B | | C | C | C | C | C |
| 273 | 27 nF | B | B | B | B | B | | C | C | C | C | C |
| 333 | 33 nF | B | B | B | B | B | | C | C | C | C | C |
| 393 | 39 nF | B | B | B | B | B | | C | C | C | C | C |
| 473 | 47 nF | B | B | B | B | B | | C | C | C | C | C |
| 563 | 56 nF | B | B | B | B | B | | C | C | C | C | C |
| 683 | 68 nF | B | B | B | B | B | | C | C | C | C | C |
| 823 | 82 nF | B | B | B | B | D | | C | C | C | C | C |
| 104 | 100 nF | B | B | B | B | D | | C | C | C | C | C |
| 124 | 120 nF | B | B | B | B | D | | C | C | C | C | C |
| 154 | 150 nF | C | C | C | C | G | | C | C | C | C | D |
| 184 | 180 nF | C | C | C | C | G | | C | C | C | C | D |
| 224 | 220 nF | C | C | C | C | G | | C | C | C | C | D |
| 274 | 270 nF | C | C | C | D | G | | C | C | C | C | G |
| 334 | 330 nF | C | C | C | D | G | | C | C | C | D | G |
| 394 | 390 nF | C | C | J | P | G | | C | C | C | D | M |
| 474 | 470 nF | J | J | J | P | G | | C | C | C | D | M |
| 564 | 560 nF | J | J | J | P | P | | D | D | D | D | M |
| 684 | 680 nF | J | J | J | P | P | | D | D | D | D | K |
| 824 | 820 nF | J | J | J | P | P | | D | D | D | D | K |
| 105 | 1.0 μF | J | J | J | P | P | | D | D | D | D | K |
| 155 | 1.5 μF | J | J | P | | | | | | | | M |
| 225 | 2.2 μF | J | J | P | P ⁽¹⁾ | P ⁽¹⁾ | | | K | G | M ⁽¹⁾ | M |
| 335 | 3.3 μF | P | P | P | | | | | K ⁽²⁾ | G ⁽¹⁾ | | |
| 475 | 4.7 μF | P | P | P | P ⁽¹⁾ | | | K | K | K ⁽¹⁾ | M ⁽¹⁾ | M ⁽²⁾ |
| 685 | 6.8 μF | | | | | | | | | | | |
| 106 | 10 μF | P | P ⁽¹⁾ | P ⁽¹⁾ | | | | K | K | K ⁽¹⁾ | M ⁽¹⁾ | |

Notes

• Letters indicate product thickness, see packaging quantities

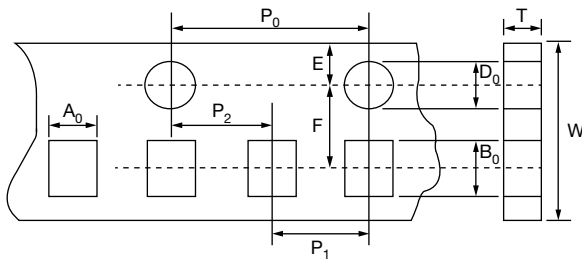
(1) Not in 5 % (code "J") tolerance

(2) Only in 10 % (code "K") tolerance

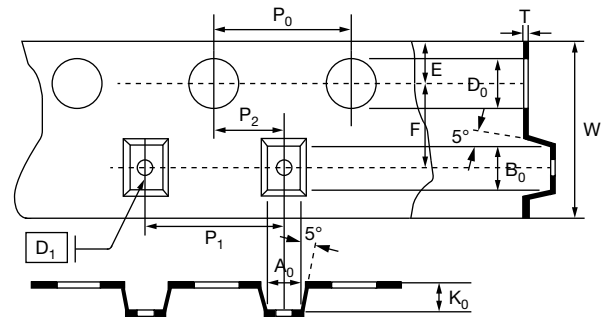


| PACKAGING QUANTITIES | | | | | | |
|--------------------------|------------------------|---------------------|-------------|--------------|--------------|--------------|
| SIZE CODE (inch / mm) | MAX. THICKNESS (mm) | THICKNESS SYMBOL | PAPER TAPE | | PLASTIC TAPE | |
| | | | 7" REEL (C) | 13" REEL (P) | 7" REEL (T) | 13" REEL (R) |
| 0402 (1002) | 0.55 | N | 10K | 50K | | |
| | 0.70 | E | 10K | | | |
| 0603 (1608) | 0.87 | S | 4K | 15K | | |
| | 0.95 | X | 4K | 15K | | |
| | 1.00 | X' | 4K | 15K | | |
| 0805 (2012) | 0.75 | A | 4K | 15K | | |
| | 0.95 | B, T | 4K | 15K | | |
| | 1.40 | D | | | 3K | 10K |
| | 1.45 | I | | | 3K | 10K |
| 1206 (3216) | 0.95 | B | 4K | 15K | | |
| | 1.05 | C | | | 3K | 10K |
| | 1.30 | J | | | 3K | 10K |
| | 1.35 | D | | | 3K | 10K |
| | 1.80 | G | | | 2K | |
| | 1.90 | P | | | 2K | |
| 1210 (3225) | 1.05 | C | | | 3K | 10K |
| | 1.35 | D | | | 3K | 10K |
| | 1.80 | G | | | 2K | |
| | 2.20 | K | | | 1K | |
| | 2.80 | M | | | 1K | |

TAPE AND REEL SPECIFICATION



Dimensions of paper tape

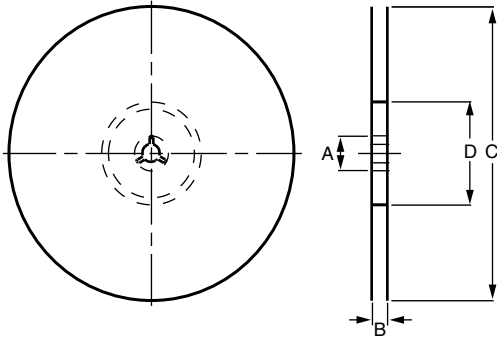


Dimensions of plastic tape

| DIMENSIONS PAPER TAPE in millimeters | | | | | | |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| SIZE CODE | 0402 | | 0603 | 0805 | | 1206 |
| THICKNESS | N | E | S, X, X' | A | B, T | B |
| A ₀ | 0.62 ± 0.05 | 0.70 ± 0.10 | 1.02 ± 0.05 | 1.50 ± 0.10 | 1.50 ± 0.10 | 2.00 ± 0.10 |
| B ₀ | 1.12 ± 0.05 | 1.20 ± 0.10 | 1.80 ± 0.05 | 2.30 ± 0.10 | 2.30 ± 0.10 | 3.50 ± 0.10 |
| T | 0.60 ± 0.05 | 0.70 ± 0.10 | 0.95 ± 0.05 | 0.75 ± 0.05 | 0.95 ± 0.05 | 0.95 ± 0.05 |
| K ₀ | - | - | - | - | - | - |
| W | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 |
| P ₀ | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 |
| 10 x P ₀ | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 |
| P ₁ | 2.00 ± 0.05 | 2.00 ± 0.05 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 |
| P ₂ | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 |
| D ₀ | 1.55 ± 0.05 | 1.55 ± 0.05 | 1.55 ± 0.05 | 1.55 ± 0.05 | 1.55 ± 0.05 | 1.50 ± 0.05 |
| D ₁ | - | - | - | - | - | - |
| E | 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 |

| DIMENSIONS PLASTIC TAPE in millimeters | | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| SIZE CODE | 0805 | 1206 | | 1210 | | |
| THICKNESS | D, I | C, J, D | G, P | C, D | G, K | M |
| A ₀ | < 1.57 | < 1.85 | < 1.95 | < 2.97 | < 2.97 | < 2.97 |
| B ₀ | < 2.40 | < 3.46 | < 3.67 | < 3.73 | < 3.73 | < 3.73 |
| T | 0.23 ± 0.05 | 0.23 ± 0.05 | 0.23 ± 0.05 | 0.23 ± 0.05 | 0.23 ± 0.05 | 0.23 ± 0.05 |
| K ₀ | < 2.50 | < 2.50 | < 2.50 | < 2.50 | < 2.50 | < 3.00 |
| W | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 | 8.00 ± 0.10 |
| P ₀ | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 |
| 10 x P ₀ | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 | 40.0 ± 0.10 |
| P ₁ | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 | 4.00 ± 0.10 |
| P ₂ | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 | 2.00 ± 0.05 |
| D ₀ | 1.50 ± 0.05 | 1.50 ± 0.05 | 1.50 ± 0.05 | 1.50 ± 0.05 | 1.50 ± 0.05 | 1.50 ± 0.05 |
| D ₁ | 1.00 ± 0.10 | 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 |

REEL SPECIFICATION

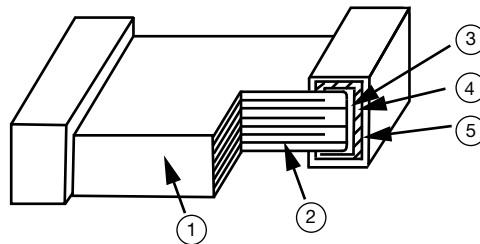


REEL DIMENSIONS in millimeters

| SYMBOL | 7" REEL | 13" REEL |
|--------|-------------|-------------|
| 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. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability.
Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability 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.



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