# 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

Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

## 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 220 µF

X7R: 100 pF to 47 µF

**Voltage Range:**

C0G (NP0): 10 $V_{DC}$ to 100 $V_{DC}$

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 $V_{DC}$: 250 % of rated voltage



For technical questions, contact: mlcc@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

**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 |
| ≥ 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 | 3.3 nF |
| | 0805 | 100 | 0.5 pF | 12 nF |
| | 1206 | 100 | 1.5 pF | 39 nF |
| X5R | 0402 | 50 | 47 nF | 10 µF |
| | 0603 | 50 | 220 nF | 22 µF |
| | 0805 | 50 | 1.5 µF | 47 µF |
| | 1206 | 50 | 1.5 µF | 100 µF |
| | 1210 | 50 | 1.5 µF | 220 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 | 22 µF |
| | 1210 | 100 | 1.0 nF | 47 µF |

**Note**

- Detail ratings see “Selection Chart”


For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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<br>0603<br>0805<br>1206<br>1210 | A = C0G (NP0)<br>G = X5R<br>Y = X7R | Two significant digits followed by the number of zeros:<br>1R0 = 1.0 pF<br>101 = 100 pF<br>102 = 1000 pF<br>152 = 1500 pF<br>103 = 10 000 pF<br>104 = 100 000 pF | **C0G (NP0) (2)**<br>Cap. < 10 pF:<br>B = ± 0.10 pF<br>C = ± 0.25 pF<br>D = ± 0.50 pF<br><br>Cap. ≥ 10 pF:<br>F = ± 1 %<br>G = ± 2 %<br>J = ± 5 %<br>K = ± 10 %<br><br>**X5R / X7R (2)(3)**<br>J = ± 5 %<br>K = ± 10 %<br>M = ± 20 % | X = Ni barrier 100 % matte tin | S = 4 V<br>Y = 6.3 V<br>Q = 10 V<br>J = 16 V<br>X = 25 V<br>A = 50 V<br>B = 100 V | C = 7" reel / paper tape<br>P = 13" reel / paper tape<br>T = 7" reel / plastic tape<br>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”

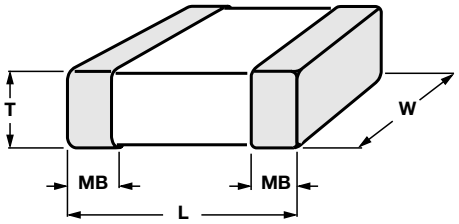
(3) No 5 % tolerance for X5R



For technical questions, contact: mlcc@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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


For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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 | 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. | | | | | | | | | | | | | | | | | | | | |
| 0R5 | 0.5 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | | | |
| 1R0 | 1.0 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | | | |
| 1R2 | 1.2 pF | N | N | N | N | N | S | S | S | S | S | A | A | A | A | A | | | | | |
| 1R5 | 1.5 pF | N | N | N | N | N | S | S | S | S | S | 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 | B | B | B | B | B |
| 2R2 | 2.2 pF | N | N | N | N | N | S | S | S | S | S | 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 | B | B | B | B | B |
| 3R3 | 3.3 pF | N | N | N | N | N | S | S | S | S | S | 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 | B | B | B | B | B |
| 4R7 | 4.7 pF | N | N | N | N | N | S | S | S | S | S | 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 | B | B | B | B | B |
| 6R8 | 6.8 pF | N | N | N | N | N | S | S | S | S | S | 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 | B | B | B | B | B |
| 100 | 10 pF | N | N | N | N | N | S | S | S | S | S | 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 |

**Notes**

- Letters indicate product thickness, see packaging quantities

(1) Only in 5 % (code “J”) tolerance

(2) Contact mlcc@vishay.com for availability



For technical questions, contact: mlcc@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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 | 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. | | | | | | | | | | | | | | | | | | | | |
| 821 | 820 pF | N | N | N | N | | S | S | S | S | S | B | B | B | B | B | B | B | B | B | B |
| 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 | | | | | | | | | | | 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

(2) Contact mlcc@vishay.com for availability



For technical questions, contact: mlcc@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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 | | | | | | | | 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 | E (2)(3) | | 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 | N (3) | E (3) | E (3) | | X | X | X' | X' | X' (2)(3) | I | I | I | I | I (3) |
| 335 | 3.3 µF | | | | | | | | | | | I | I | I | I | |
| 475 | 4.7 µF | E (1) | E (1)(3) | E (1)(3) | | | X | X | X' | X' (2)(3) | | I | I | I | I | I (3) |
| 106 | 10 µF | E (1)(3) | E (1)(3) | | | | X' | X' (1) | X' (3) | X' (1)(3) | | I | I | I | I | I (3) |
| 226 | 22 µF | | | | | | X' (1) | X' (1)(3) | | | | I (3) | I (1)(3) | I (1)(3) | I (1)(3) | |
| 476 | 47 µF | | | | | | | | | | | I (1)(3) | I (1)(3) | | | |
| 686 | 68 µF | | | | | | | | | | | | | | | |
| 107 | 100 µF | | | | | | | | | | | | | | | |

**Notes**

- Letters indicate product thickness, see packaging quantities

(1) Not in 10 % (code “K”) tolerance
(2) Not in 20 % (code “M”) tolerance
(3) Contact mlcc@vishay.com for availability

## 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 | 4 V | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| VOLTAGE CODE | | Y | Q | J | X | A | S | 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 (3) | P (2)(3) | | | M | M | M | M | |
| 476 | 47 µF | P (3) | P (3) | | | | | M | M | M (3) | | |
| 107 | 100 µF | P (1)(3) | | | | | | M (1) | M (1)(3) | | | |
| 227 | 220 µF | | | | | | M (1)(3) | | | | | |

**Notes**

- Letters indicate product thickness, see packaging quantities

(1) Not in 10 % (code “K”) tolerance
(2) Not in 20 % (code “M”) tolerance
(3) Contact mlcc@vishay.com for availability


For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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 (2)(4) | | | 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) | X (2)(4) | | 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 | I (2)(4) | |
| 335 | 3.3 µF | | | | | | | | | | | | | | | | |
| 475 | 4.7 µF | | | | | | | | | | | | I (1) | I (1) | I (1) | | |
| 685 | 6.8 µF | | | | | | | | | | | | | | | | |
| 106 | 10 µF | | | | | | | | | | | | I (1) | I (3)(4) | | | |
| 156 | 15 µF | | | | | | | | | | | | | | | | |
| 226 | 22 µF | | | | | | | | | | | | | | | | |
| 336 | 33 µF | | | | | | | | | | | | | | | | |
| 476 | 47 µF | | | | | | | | | | | | | | | | |
| 686 | 68 µF | | | | | | | | | | | | | | | | |

**Notes**

- Letters indicate product thickness, see packaging quantities

(1) Not in 5 % (code "J") tolerance
(2) Only in 10 % (code "K") tolerance
(3) Only in 20 % (code "M") tolerance
(4) Contact mlcc@vishay.com for availability


For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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) | |
| 685 | 6.8 µF | | | | | | | | | | | |
| 106 | 10 µF | P | P (1) | P (1) | | | | K | K | K (1) | M (1) | |
| 156 | 15 µF | | | | | | | | | | | |
| 226 | 22 µF | P (1)(4) | P (3)(4) | | | | | M (2)(4) | M (1)(4) | M (1)(4) | | |
| 336 | 33 µF | | | | | | | | | | | |
| 476 | 47 µF | | | | | | M (2)(4) | M (1)(4) | | | | |
| 686 | 68 µF | | | | | | | | | | | |
| 107 | 100 µF | | | | | | | | | | | |

**Notes**
- Letters indicate product thickness, see packaging quantities

(1) Not in 5 % (code “J”) tolerance
(2) Only in 10 % (code “K”) tolerance
(3) Only in 20 % (code “M”) tolerance
(4) Contact mlcc@vishay.com for availability

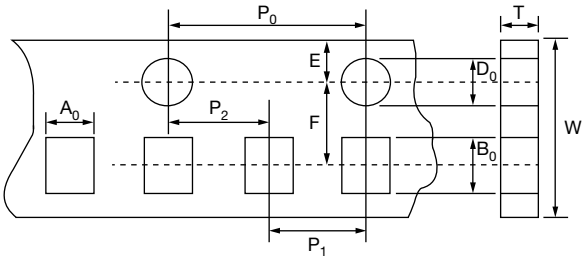

For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## PACKAGING QUANTITIES

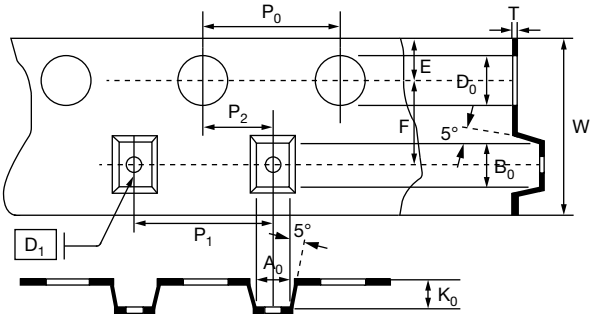
| SIZE CODE (inch / mm) | MAX. THICKNESS (mm) | THICKNESS SYMBOL | PAPER TAPE | | PLASTIC TAPE | |
|---|---|---|---|---|---|---|
| | | | 7" REEL (C) | 13" REEL (P) | 7" REEL (T) | 13" REEL (R) |
| 0402 (1002) | 0.55 | N | 10K | 50K | | |
| | 0.70 | E | 10K | | | |
| 0603 (1608) | 0.87 | S | 4K | 15K | | |
| | 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 | |


For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## 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

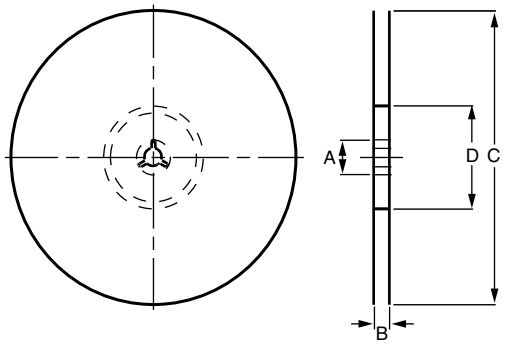
| SIZE CODE | 0805 | 1206 | | 1210 | | |
|---|---|---|---|---|---|---|
| THICKNESS | D, I | C, J, D | G, P | C, D | G, K | M |
| $A_0$ | < 1.57 | < 1.85 | < 1.95 | < 2.97 | < 2.97 | < 2.97 |
| $B_0$ | < 2.40 | < 3.46 | < 3.67 | < 3.73 | < 3.73 | < 3.73 |
| T | 0.23 ± 0.05 | 0.23 ± 0.05 | 0.23 ± 0.05 | 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 |



For technical questions, contact: mlcc@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

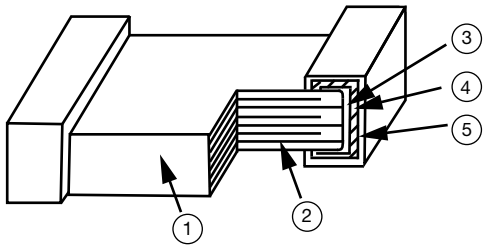
## REEL SPECIFICATION




| 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 | | C0G (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.


For technical questions, contact: mlcc@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

# Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

*© 2024 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED*