

Surface Mount Multilayer Ceramic Chip Capacitors for Commercial Applications



FEATURES

- C0G (NP0) and X7R dielectrics offered
- C0G (NP0) is an ultra-stable dielectric offering a very low Temperature Coefficient of Capacitance (TCC)
- C0G (NP0) offers low dissipation
- Excellent aging characteristics
- Ideal for decoupling and filtering (X7R)
- Ideal for surge suppression and high voltage applications
- Wide range of case sizes, voltage ratings and capacitance values
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)
Available

APPLICATIONS

- Timing and tuning circuits
- Sensor and scanner applications
- Decoupling and filtering
- Surge suppression

ELECTRICAL SPECIFICATIONS

COG (NP0) DIELECTRIC

GENERAL SPECIFICATION

Note

Electrical characteristics at +25 °C unless otherwise specified

Operating Temperature: -55 °C to +150 °C
(above +125 °C changed characteristics)

Capacitance Range: 1 pF to 56 nF

Voltage Range: 25 V_{DC} to 1000 V_{DC}

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

Dissipation Factor (DF):

0.1 % maximum at 1.0 V_{RMS} and
1 MHz for values ≤ 1000 pF
0.1 % maximum at 1.0 V_{RMS} and
1 kHz for values > 1000 pF

Insulating Resistance:

at +25 °C 100 000 MΩ min. or 1000 ΩF whichever is less
at +125 °C 10 000 MΩ min. or 100 ΩF whichever is less

Aging Rate: 0 % maximum per decade

Dielectric Strength Test:

performed per method 103 of EIA 198-2-E.

Applied test voltages

| | |
|----------------------------------------------------|------------------------|
| ≤ 200 V _{DC} -rated: | 250 % of rated voltage |
| 500 V _{DC} -rated: | 200 % of rated voltage |
| 630 V _{DC} , 1000 V _{DC} -rated: | 150 % of rated voltage |

X7R DIELECTRIC

GENERAL SPECIFICATION

Note

Electrical characteristics at +25 °C unless otherwise specified

Operating Temperature: -55 °C to +150 °C
(above +125 °C changed characteristics)

Capacitance Range: 120 pF to 6.8 μF

Voltage Range: 16 V_{DC} to 1000 V_{DC}

Temperature Coefficient of Capacitance (TCC):
± 15 % from -55 °C to +125 °C, with 0 V_{DC} applied

Dissipation Factor (DF):

16 V / 25 V ratings: 3.5 % maximum at 1.0 V_{RMS} and 1 kHz
> 25 V ratings: 2.5 % maximum at 1.0 V_{RMS} and 1 kHz

Insulating Resistance:

at +25 °C 100 000 MΩ min. or 1000 ΩF whichever is less
at +125 °C 10 000 MΩ min. or 100 ΩF whichever is less

Aging Rate: 1 % maximum per decade

Dielectric Strength Test:

performed per method 103 of EIA 198-2-E.

Applied test voltages

| | |
|----------------------------------------------------|-----------------------------|
| ≤ 250 V _{DC} -rated: | 250 % of rated voltage |
| 500 V _{DC} -rated: | min. 150 % of rated voltage |
| 630 V _{DC} , 1000 V _{DC} -rated: | min. 120 % of rated voltage |



| QUICK REFERENCE DATA | | | | |
|----------------------|------|---------------------|-------------|---------|
| DIELECTRIC | CASE | MAXIMUM VOLTAGE (V) | CAPACITANCE | |
| | | | MINIMUM | MAXIMUM |
| COG (NP0) | 0402 | 100 | 1.0 pF | 220 pF |
| | 0603 | 250 | 1.0 pF | 1.0 nF |
| | 0805 | 500 | 1.0 pF | 4.7 nF |
| | 1206 | 630 | 1.0 pF | 10 nF |
| | 1210 | 630 | 56 pF | 12 nF |
| | 1808 | 1000 | 27 pF | 10 nF |
| | 1812 | 1000 | 39 pF | 22 nF |
| | 1825 | 500 | 100 pF | 39 nF |
| | 2220 | 1000 | 270 pF | 47 nF |
| | 2225 | 1000 | 270 pF | 56 nF |
| X7R | 0402 | 100 | 120 pF | 47 nF |
| | 0603 | 200 | 330 pF | 150 nF |
| | 0805 | 250 | 330 pF | 470 nF |
| | 1206 | 630 | 330 pF | 1.0 μF |
| | 1210 | 630 | 390 pF | 1.0 μF |
| | 1808 | 1000 | 470 pF | 270 nF |
| | 1812 | 1000 | 1.0 nF | 1.0 μF |
| | 1825 | 1000 | 10 nF | 2.7 μF |
| | 2220 | 500 | 15 nF | 2.2 μF |
| | 2225 | 1000 | 33 nF | 4.7 μF |
| | 3640 | 500 | 27 nF | 6.8 μF |

Note

- Detail ratings see “Selection Chart”



| ORDERING INFORMATION | | | | | | | | |
|--------------------------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| VJ0805 ⁽¹⁾ | Y | 102 | K | X | A | A | T | ### ⁽³⁾⁽⁶⁾ |
| CASE CODE | DIELECTRIC | CAPACITANCE NOMINAL CODE | CAPACITANCE TOLERANCE | TERMINATION | DC VOLTAGE RATING ⁽²⁾ | MARKING | PACKAGING | PROCESS CODE |
| 0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640 | A = COG (NP0) Y = X7R | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 1R8 = 1.8 pF 102 = 1000 pF | B = ± 0.10 pF C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note COG (NP0): B, C, D < 10 pF F, G, J, K ≥ 10 pF X7R: J, K, M | X = Ni barrier 100 % tin plated matte finish F, E = AgPd ⁽⁴⁾ B = polymer 100 % tin plated matte finish ⁽⁵⁾ | J = 16 V X = 25 V A = 50 V B = 100 V C = 200 V P = 250 V E = 500 V L = 630 V G = 1000 V | A = unmarked M = marked Note Marking is only available for 0805 and 1206 with termination code "X" / "B" | C = 7" reel / paper tape T = 7" reel / plastic tape P = 11 1/4" / 13" reel / paper tape R = 11 1/4" / 13" reel / plastic tape O = 7" reel / flamed paper tape I = 11 1/4" / 13" reel / flamed paper tape Note "I" and "O" are used for "F", "E" termination size 0402 / 0603 / 0805 | |

Notes

- (1) Case size designator may be replaced by four digit drawing number used to control non-standard products and / or special requirements
- (2) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com
- (3) Process code may be added with up to three digits, used to control non-standard products and / or special requirements
- (4) Termination code "E" is for conductive epoxy assembly
- (5) Polymer termination for size 0603 and larger. Packaging only in plastic tape "T" / "R"
- (6) Variable plastic / paper tape, see ratings in "Selection Charts"

| ENVIRONMENTAL STATUS | | | |
|----------------------|----------------------------------------------|----------------|--------------|
| TERMINATION CODE | TERMINATION DESCRIPTION | RoHS COMPLIANT | VISHAY GREEN |
| X | Ni barrier 100 % tin plated matte finish | Yes | Yes |
| E | AgPd | Yes | Yes |
| B | Polymer layer, 100 % tin plated matte finish | Yes | No |
| F | AgPd | Yes | No |

DIMENSIONS in inches (millimeters)


| CASE CODE | STYLE | LENGTH (L) | WIDTH (W) | MAXIMUM THICKNESS (T) | TERMINATION (P) | |
|-----------|--------|---------------------------------------------------|---------------------------------------------------|-----------------------------|--------------------|-----------------|
| | | | | | MINIMUM | MAXIMUM |
| 0402 | VJ0402 | 0.040 + 0.004 / - 0.002 (1.00 + 0.10 / - 0.05) | 0.020 + 0.004 / - 0.002 (0.50 + 0.10 / - 0.05) | 0.024 (0.60) | 0.004 (0.10) | 0.016 (0.41) |
| 0603 | VJ0603 | 0.063 ± 0.006 (1.60 ± 0.15) | 0.031 ± 0.006 (0.80 ± 0.15) | 0.038 (0.97) | 0.012 (0.30) | 0.022 (0.55) |
| 0805 | VJ0805 | 0.079 ± 0.008 (2.00 ± 0.20) | 0.049 ± 0.008 (1.25 ± 0.20) | 0.057 (1.45) | 0.010 (0.25) | 0.030 (0.76) |
| 1206 | VJ1206 | 0.126 ± 0.010 (3.20 ± 0.25) | 0.063 ± 0.010 (1.60 ± 0.25) | 0.067 (1.70) | 0.010 (0.25) | 0.030 (0.76) |
| 1210 | VJ1210 | 0.126 ± 0.010 (3.20 ± 0.25) | 0.098 ± 0.010 (2.50 ± 0.25) | 0.067 (1.70) | 0.010 (0.25) | 0.030 (0.76) |
| 1808 | VJ1808 | 0.180 ± 0.012 (4.57 ± 0.30) | 0.080 ± 0.010 (2.03 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.035 (0.90) |
| 1812 | VJ1812 | 0.177 ± 0.012 (4.50 ± 0.30) | 0.126 ± 0.008 (3.20 ± 0.20) | 0.086 (2.18) | 0.010 (0.25) | 0.035 (0.90) |
| 1825 | VJ1825 | 0.177 ± 0.012 (4.50 ± 0.30) | 0.252 ± 0.010 (6.40 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.035 (0.90) |
| 2220 | VJ2220 | 0.220 ± 0.010 (5.59 ± 0.25) | 0.200 ± 0.010 (5.08 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.037 (0.95) |
| 2225 | VJ2225 | 0.220 ± 0.010 (5.59 ± 0.25) | 0.250 ± 0.010 (6.35 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.037 (0.95) |
| 3640 | VJ3640 | 0.360 ± 0.015 (9.14 ± 0.38) | 0.400 ± 0.015 (10.20 ± 0.38) | 0.086 (2.18) | 0.010 (0.25) | 0.039 (1.00) |

Note

- Polymer (B-termination) have increased dimensions:
length 0.006"(0.15 mm)



| SELECTION CHART | | | | | | | | | | | | | | | |
|----------------------------|--------|-----------------------|-----|-----|-----|------|-----------------------|-----|-----|-----|------|-----------------------|-----|-----|-----|
| DIELECTRIC | | COG (NP0) | | | | | | | | | | | | | |
| STYLE | | VJ1808 ⁽¹⁾ | | | | | VJ1812 ⁽¹⁾ | | | | | VJ1825 ⁽¹⁾ | | | |
| CASE CODE | | 1808 | | | | | 1812 | | | | | 1825 | | | |
| VOLTAGE (V _{DC}) | | 50 | 100 | 200 | 500 | 1000 | 50 | 100 | 200 | 500 | 1000 | 50 | 100 | 200 | 500 |
| VOLTAGE CODE | | A | B | C | E | G | A | B | C | E | G | A | B | C | E |
| CAP. CODE | CAP. | | | | | | | | | | | | | | |
| 1R0 | 1.0 pF | | | | | | | | | | | | | | |
| 1R2 | 1.2 pF | | | | | | | | | | | | | | |
| 1R5 | 1.5 pF | | | | | | | | | | | | | | |
| 1R8 | 1.8 pF | | | | | | | | | | | | | | |
| 2R2 | 2.2 pF | | | | | | | | | | | | | | |
| 2R7 | 2.7 pF | | | | | | | | | | | | | | |
| 3R3 | 3.3 pF | | | | | | | | | | | | | | |
| 3R9 | 3.9 pF | | | | | | | | | | | | | | |
| 4R7 | 4.7 pF | | | | | | | | | | | | | | |
| 5R6 | 5.6 pF | | | | | | | | | | | | | | |
| 6R8 | 6.8 pF | | | | | | | | | | | | | | |
| 8R2 | 8.2 pF | | | | | | | | | | | | | | |
| 100 | 10 pF | | | | | | | | | | | | | | |
| 120 | 12 pF | | | | | | | | | | | | | | |
| 150 | 15 pF | | | | | | | | | | | | | | |
| 180 | 18 pF | | | | | | | | | | | | | | |
| 220 | 22 pF | | | | | | | | | | | | | | |
| 270 | 27 pF | | | • | | • | | | | | | | | | |
| 330 | 33 pF | | | • | | • | | | | | | | | | |
| 390 | 39 pF | | | • | | • | • | • | • | • | • | | | | |
| 470 | 47 pF | | | • | | • | • | • | • | • | • | | | | |
| 560 | 56 pF | | | • | | • | • | • | • | • | • | | | | |
| 680 | 68 pF | | | • | | • | • | • | • | • | • | | | | |
| 820 | 82 pF | | | • | | • | • | • | • | • | • | | | | |
| 101 | 100 pF | | | • | | • | • | • | • | • | • | | | | • |
| 121 | 120 pF | | | • | • | • | • | • | • | • | • | | | | • |
| 151 | 150 pF | | | • | • | • | • | • | • | • | • | | | | • |
| 181 | 180 pF | | | • | • | • | • | • | • | • | • | | | | • |
| 221 | 220 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 271 | 270 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 331 | 330 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 391 | 390 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 471 | 470 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 561 | 560 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 681 | 680 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 821 | 820 pF | • | • | • | • | • | • | • | • | • | • | | | | • |
| 102 | 1.0 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 122 | 1.2 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 152 | 1.5 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 182 | 1.8 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 222 | 2.2 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 272 | 2.7 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 332 | 3.3 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 392 | 3.9 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 472 | 4.7 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 562 | 5.6 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 682 | 6.8 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 822 | 8.2 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 103 | 10 nF | • | | | | | • | • | • | • | • | • | • | • | • |
| 123 | 12 nF | | | | | | • | • | • | • | • | • | • | • | • |
| 153 | 15 nF | | | | | | • | • | | | | • | • | • | • |
| 183 | 18 nF | | | | | | • | | | | | • | • | • | • |
| 223 | 22 nF | | | | | | • | | | | | • | • | • | • |
| 273 | 27 nF | | | | | | | | | | | • | • | • | • |
| 333 | 33 nF | | | | | | | | | | | • | • | | |
| 393 | 39 nF | | | | | | | | | | | • | | | |
| 473 | 47 nF | | | | | | | | | | | | | | |
| 563 | 56 nF | | | | | | | | | | | | | | |

Notes
 • RoHS-compliant
 • Plastic tape
⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034



| SELECTION CHART | | | | | | | | | | | | |
|----------------------------|--------|-----------------------|-----|-----|-----|-----|-----------------------|----|-----|-----|-----|------|
| DIELECTRIC | | COG (NP0) | | | | | | | | | | |
| STYLE | | VJ2220 ⁽¹⁾ | | | | | VJ2225 ⁽¹⁾ | | | | | |
| CASE CODE | | 2220 | | | | | 2225 | | | | | |
| VOLTAGE (V _{DC}) | | 50 | 100 | 200 | 500 | 630 | 1000 | 50 | 100 | 200 | 500 | 1000 |
| VOLTAGE CODE | | A | B | C | E | L | G | A | B | C | E | G |
| CAP. CODE | CAP. | | | | | | | | | | | |
| 1R0 | 1.0 pF | | | | | | | | | | | |
| 1R2 | 1.2 pF | | | | | | | | | | | |
| 1R5 | 1.5 pF | | | | | | | | | | | |
| 1R8 | 1.8 pF | | | | | | | | | | | |
| 2R2 | 2.2 pF | | | | | | | | | | | |
| 2R7 | 2.7 pF | | | | | | | | | | | |
| 3R3 | 3.3 pF | | | | | | | | | | | |
| 3R9 | 3.9 pF | | | | | | | | | | | |
| 4R7 | 4.7 pF | | | | | | | | | | | |
| 5R6 | 5.6 pF | | | | | | | | | | | |
| 6R8 | 6.8 pF | | | | | | | | | | | |
| 8R2 | 8.2 pF | | | | | | | | | | | |
| 100 | 10 pF | | | | | | | | | | | |
| 120 | 12 pF | | | | | | | | | | | |
| 150 | 15 pF | | | | | | | | | | | |
| 180 | 18 pF | | | | | | | | | | | |
| 220 | 22 pF | | | | | | | | | | | |
| 270 | 27 pF | | | | | | | | | | | |
| 330 | 33 pF | | | | | | | | | | | |
| 390 | 39 pF | | | | | | | | | | | |
| 470 | 47 pF | | | | | | | | | | | |
| 560 | 56 pF | | | | | | | | | | | |
| 680 | 68 pF | | | | | | | | | | | |
| 820 | 82 pF | | | | | | | | | | | |
| 101 | 100 pF | | | | | | | | | | | |
| 121 | 120 pF | | | | | | | | | | | |
| 151 | 150 pF | | | | | | | | | | | |
| 181 | 180 pF | | | | | | | | | | | |
| 221 | 220 pF | | | | | | | | | | | |
| 271 | 270 pF | • | • | • | • | • | • | | | | | • |
| 331 | 330 pF | • | • | • | • | • | • | | | | | • |
| 391 | 390 pF | • | • | • | • | • | • | | | | | • |
| 471 | 470 pF | • | • | • | • | • | • | | | | • | • |
| 561 | 560 pF | • | • | • | • | • | • | | | | • | • |
| 681 | 680 pF | • | • | • | • | • | • | | | | • | • |
| 821 | 820 pF | • | • | • | • | • | • | | | | • | • |
| 102 | 1.0 nF | • | • | • | • | • | • | | | • | • | • |
| 122 | 1.2 nF | • | • | • | • | • | • | • | • | • | • | • |
| 152 | 1.5 nF | • | • | • | • | • | • | • | • | • | • | • |
| 182 | 1.8 nF | • | • | • | • | • | • | • | • | • | • | • |
| 222 | 2.2 nF | • | • | • | • | • | • | • | • | • | • | • |
| 272 | 2.7 nF | • | • | • | • | • | • | • | • | • | • | • |
| 332 | 3.3 nF | • | • | • | • | • | • | • | • | • | • | • |
| 392 | 3.9 nF | • | • | • | • | • | • | • | • | • | • | • |
| 472 | 4.7 nF | • | • | • | • | • | • | • | • | • | • | • |
| 562 | 5.6 nF | • | • | • | • | • | • | • | • | • | • | • |
| 682 | 6.8 nF | • | • | • | • | • | • | • | • | • | • | • |
| 822 | 8.2 nF | • | • | • | • | • | • | • | • | • | • | • |
| 103 | 10 nF | • | • | • | • | • | • | • | • | • | • | • |
| 123 | 12 nF | • | • | • | • | • | • | • | • | • | • | • |
| 153 | 15 nF | • | • | • | • | • | • | • | • | • | • | • |
| 183 | 18 nF | • | • | • | • | • | • | • | • | • | • | • |
| 223 | 22 nF | • | • | • | • | • | • | • | • | • | • | • |
| 273 | 27 nF | • | • | • | • | • | • | • | • | • | • | • |
| 333 | 33 nF | • | • | • | • | • | • | • | • | • | • | • |
| 393 | 39 nF | • | • | • | • | • | • | • | • | • | • | • |
| 473 | 47 nF | • | • | • | • | • | • | • | • | • | • | • |
| 563 | 56 nF | • | • | • | • | • | • | • | • | • | • | • |

Notes

• RoHS-compliant

• Plastic tape

⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034



| SELECTION CHART | | | | | | | | | | | | | | | | |
|----------------------------|--------|--------|----|----|-----|--------|----|----|-----|-----|--------|----|----|-----|-----|-----|
| DIELECTRIC | | X7R | | | | | | | | | | | | | | |
| STYLE | | VJ0402 | | | | VJ0603 | | | | | VJ0805 | | | | | |
| CASE CODE | | 0402 | | | | 0603 | | | | | 0805 | | | | | |
| VOLTAGE (V _{DC}) | | 16 | 25 | 50 | 100 | 16 | 25 | 50 | 100 | 200 | 16 | 25 | 50 | 100 | 200 | 250 |
| VOLTAGE CODE | | J | X | A | B | J | X | A | B | C | J | X | A | B | C | P |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | |
| 121 | 120 pF | •• | •• | •• | •• | | | | | | | | | | | |
| 151 | 150 pF | •• | •• | •• | •• | | | | | | | | | | | |
| 181 | 180 pF | •• | •• | •• | •• | | | | | | | | | | | |
| 221 | 220 pF | •• | •• | •• | •• | | | | | | | | | | | |
| 271 | 270 pF | •• | •• | •• | •• | | | | | | | | | | | |
| 331 | 330 pF | •• | •• | •• | •• | | | •• | •• | •• | | | | | | •• |
| 391 | 390 pF | •• | •• | •• | •• | •• | •• | •• | •• | •• | | | | | | •• |
| 471 | 470 pF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 561 | 560 pF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 681 | 680 pF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 821 | 820 pF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 102 | 1.0 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 122 | 1.2 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 152 | 1.5 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 182 | 1.8 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 222 | 2.2 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 272 | 2.7 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 332 | 3.3 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 392 | 3.9 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 472 | 4.7 nF | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• | •• |
| 562 | 5.6 nF | •• | •• | •• | | •• | •• | •• | •• | | •• | •• | •• | •• | •• | •• |
| 682 | 6.8 nF | •• | •• | •• | | •• | •• | •• | •• | | •• | •• | •• | •• | •• | •• |
| 822 | 8.2 nF | •• | •• | •• | | •• | •• | •• | •• | | •• | •• | •• | •• | •• | •• |
| 103 | 10 nF | •• | •• | •• | | •• | •• | •• | •• | | •• | •• | •• | •• | •• | • |
| 123 | 12 nF | •• | •• | | | •• | •• | •• | •• | | •• | •• | •• | •• | •• | • |
| 153 | 15 nF | •• | •• | | | •• | •• | •• | •• | | •• | •• | •• | •• | • | • |
| 183 | 18 nF | •• | •• | | | •• | •• | •• | •• | | •• | •• | •• | •• | • | • |
| 223 | 22 nF | •• | | | | •• | •• | •• | •• | | •• | •• | •• | •• | • | • |
| 273 | 27 nF | •• | | | | •• | •• | •• | •• | | •• | •• | •• | •• | • | |
| 333 | 33 nF | •• | | | | •• | •• | •• | •• | | •• | •• | •• | • | | |
| 393 | 39 nF | •• | | | | •• | •• | •• | •• | | •• | •• | •• | • | | |
| 473 | 47 nF | •• | | | | •• | •• | •• | | | •• | •• | •• | • | | |
| 563 | 56 nF | | | | | •• | •• | •• | | | •• | •• | •• | • | | |
| 683 | 68 nF | | | | | •• | •• | •• | | | •• | •• | • | • | | |
| 823 | 82 nF | | | | | •• | •• | •• | | | • | • | • | • | | |
| 104 | 100 nF | | | | | •• | •• | •• | | | • | • | • | • | | |
| 124 | 120 nF | | | | | •• | | | | | • | • | • | | | |
| 154 | 150 nF | | | | | •• | | | | | • | • | • | | | |
| 184 | 180 nF | | | | | | | | | | • | • | | | | |
| 224 | 220 nF | | | | | | | | | | • | • | | | | |
| 274 | 270 nF | | | | | | | | | | • | • | | | | |
| 334 | 330 nF | | | | | | | | | | • | • | | | | |
| 394 | 390 nF | | | | | | | | | | • | | | | | |
| 474 | 470 nF | | | | | | | | | | • | | | | | |
| 564 | 560 nF | | | | | | | | | | | | | | | |
| 684 | 680 nF | | | | | | | | | | | | | | | |
| 824 | 820 nF | | | | | | | | | | | | | | | |
| 105 | 1.0 μF | | | | | | | | | | | | | | | |
| 125 | 1.2 μF | | | | | | | | | | | | | | | |
| 155 | 1.5 μF | | | | | | | | | | | | | | | |
| 185 | 1.8 μF | | | | | | | | | | | | | | | |
| 225 | 2.2 μF | | | | | | | | | | | | | | | |
| 275 | 2.7 μF | | | | | | | | | | | | | | | |
| 335 | 3.3 μF | | | | | | | | | | | | | | | |
| 395 | 3.9 μF | | | | | | | | | | | | | | | |
| 475 | 4.7 μF | | | | | | | | | | | | | | | |
| 565 | 5.6 μF | | | | | | | | | | | | | | | |
| 685 | 6.8 μF | | | | | | | | | | | | | | | |

Notes

- RoHS-compliant
- Paper tape • Plastic tape ••• Variable plastic / paper tape



| SELECTION CHART | | | | | | | | | | | | | | | | | |
|----------------------------|--------|-----------------------|----|----|-----|-----|-----|-----|-----------------------|----|----|----|-----|-----|-----|-----|-----|
| DIELECTRIC | | X7R | | | | | | | | | | | | | | | |
| STYLE | | VJ1206 ⁽¹⁾ | | | | | | | VJ1210 ⁽¹⁾ | | | | | | | | |
| CASE CODE | | 1206 | | | | | | | 1210 | | | | | | | | |
| VOLTAGE (V _{DC}) | | 16 | 25 | 50 | 100 | 200 | 250 | 500 | 630 | 16 | 25 | 50 | 100 | 200 | 250 | 500 | 630 |
| VOLTAGE CODE | | J | X | A | B | C | P | E | L | J | X | A | B | C | P | E | L |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | | |
| 121 | 120 pF | | | | | | | | | | | | | | | | |
| 151 | 150 pF | | | | | | | | | | | | | | | | |
| 181 | 180 pF | | | | | | | | | | | | | | | | |
| 221 | 220 pF | | | | | | | | | | | | | | | | |
| 271 | 270 pF | | | | | | | | | | | | | | | | |
| 331 | 330 pF | | | | | | | •• | •• | | | | | | | | |
| 391 | 390 pF | | | | | | | •• | •• | | | | | | | | • |
| 471 | 470 pF | | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 561 | 560 pF | | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 681 | 680 pF | | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 821 | 820 pF | | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 102 | 1.0 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 122 | 1.2 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 152 | 1.5 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 182 | 1.8 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 222 | 2.2 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 272 | 2.7 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | | | | • |
| 332 | 3.3 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | • | | | • |
| 392 | 3.9 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | • | | | • |
| 472 | 4.7 nF | •• | •• | •• | •• | •• | | •• | •• | | | | | • | | | • |
| 562 | 5.6 nF | •• | •• | •• | •• | •• | | • | • | | | | | • | | | • |
| 682 | 6.8 nF | •• | •• | •• | •• | •• | | • | • | | | | | • | | | • |
| 822 | 8.2 nF | •• | •• | •• | •• | •• | | • | • | | | | | • | | | • |
| 103 | 10 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 123 | 12 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 153 | 15 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 183 | 18 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 223 | 22 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 273 | 27 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 333 | 33 nF | •• | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • |
| 393 | 39 nF | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • | • |
| 473 | 47 nF | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • | • |
| 563 | 56 nF | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • | • |
| 683 | 68 nF | •• | •• | •• | •• | • | • | • | • | • | • | • | • | • | • | • | • |
| 823 | 82 nF | •• | •• | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 104 | 100 nF | •• | •• | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 124 | 120 nF | •• | •• | • | • | | | | | • | • | • | • | • | | | |
| 154 | 150 nF | •• | •• | • | • | | | | | • | • | • | • | • | | | |
| 184 | 180 nF | •• | •• | • | • | | | | | • | • | • | • | • | | | |
| 224 | 220 nF | • | • | • | • | | | | | • | • | • | • | | | | |
| 274 | 270 nF | • | • | • | • | | | | | • | • | • | • | | | | |
| 334 | 330 nF | • | • | • | | | | | | • | • | • | • | | | | |
| 394 | 390 nF | • | • | • | | | | | | • | • | • | • | | | | |
| 474 | 470 nF | • | • | • | | | | | | • | • | • | • | | | | |
| 564 | 560 nF | • | • | | | | | | | • | • | • | | | | | |
| 684 | 680 nF | • | • | | | | | | | • | • | • | | | | | |
| 824 | 820 nF | • | • | | | | | | | • | • | • | | | | | |
| 105 | 1.0 μF | • | • | | | | | | | • | • | • | | | | | |
| 125 | 1.2 μF | | | | | | | | | | | | | | | | |
| 155 | 1.5 μF | | | | | | | | | | | | | | | | |
| 185 | 1.8 μF | | | | | | | | | | | | | | | | |
| 225 | 2.2 μF | | | | | | | | | | | | | | | | |
| 275 | 2.7 μF | | | | | | | | | | | | | | | | |
| 335 | 3.3 μF | | | | | | | | | | | | | | | | |
| 395 | 3.9 μF | | | | | | | | | | | | | | | | |
| 475 | 4.7 μF | | | | | | | | | | | | | | | | |
| 565 | 5.6 μF | | | | | | | | | | | | | | | | |
| 685 | 6.8 μF | | | | | | | | | | | | | | | | |

Notes

RoHS-compliant

•• Paper tape • Plastic tape

(1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034



| SELECTION CHART | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--------|-----------------------|-----|-----|-----|------|-----------------------|----|-----|-----|-----|-----|-----|------|-----------------------|----|-----|-----|-----|-----|------|
| DIELECTRIC | | X7R | | | | | | | | | | | | | | | | | | | |
| STYLE | | VJ1808 ⁽¹⁾ | | | | | VJ1812 ⁽¹⁾ | | | | | | | | VJ1825 ⁽¹⁾ | | | | | | |
| CASE CODE | | 1808 | | | | | 1812 | | | | | | | | 1825 | | | | | | |
| VOLTAGE (V _{DC}) | | 50 | 100 | 200 | 500 | 1000 | 25 | 50 | 100 | 200 | 250 | 500 | 630 | 1000 | 25 | 50 | 100 | 200 | 250 | 500 | 1000 |
| VOLTAGE CODE | | A | B | C | E | G | X | A | B | C | P | E | L | G | X | A | B | C | P | E | G |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | | | | | | |
| 121 | 120 pF | | | | | | | | | | | | | | | | | | | | |
| 151 | 150 pF | | | | | | | | | | | | | | | | | | | | |
| 181 | 180 pF | | | | | | | | | | | | | | | | | | | | |
| 221 | 220 pF | | | | | | | | | | | | | | | | | | | | |
| 271 | 270 pF | | | | | | | | | | | | | | | | | | | | |
| 331 | 330 pF | | | | | | | | | | | | | | | | | | | | |
| 391 | 390 pF | | | | | | | | | | | | | | | | | | | | |
| 471 | 470 pF | | | | | | | | | | | | | | | | | | | | |
| 561 | 560 pF | | | | | | | | | | | | | | | | | | | | |
| 681 | 680 pF | | | | | | | | | | | | | | | | | | | | |
| 821 | 820 pF | | | | | | | | | | | | | | | | | | | | |
| 102 | 1.0 nF | | | | | | | | | | | | | | | | | | | | |
| 122 | 1.2 nF | | | | | | | | | | | | | | | | | | | | |
| 152 | 1.5 nF | | | | | | | | | | | | | | | | | | | | |
| 182 | 1.8 nF | | | | | | | | | | | | | | | | | | | | |
| 222 | 2.2 nF | | | | | | | | | | | | | | | | | | | | |
| 272 | 2.7 nF | | | | | | | | | | | | | | | | | | | | |
| 332 | 3.3 nF | | | | | | | | | | | | | | | | | | | | |
| 392 | 3.9 nF | | | | | | | | | | | | | | | | | | | | |
| 472 | 4.7 nF | | | | | | | | | | | | | | | | | | | | |
| 562 | 5.6 nF | | | | | | | | | | | | | | | | | | | | |
| 682 | 6.8 nF | | | | | | | | | | | | | | | | | | | | |
| 822 | 8.2 nF | | | | | | | | | | | | | | | | | | | | |
| 103 | 10 nF | | | | | | | | | | | | | | | | | | | | |
| 123 | 12 nF | | | | | | | | | | | | | | | | | | | | |
| 153 | 15 nF | | | | | | | | | | | | | | | | | | | | |
| 183 | 18 nF | | | | | | | | | | | | | | | | | | | | |
| 223 | 22 nF | | | | | | | | | | | | | | | | | | | | |
| 273 | 27 nF | | | | | | | | | | | | | | | | | | | | |
| 333 | 33 nF | | | | | | | | | | | | | | | | | | | | |
| 393 | 39 nF | | | | | | | | | | | | | | | | | | | | |
| 473 | 47 nF | | | | | | | | | | | | | | | | | | | | |
| 563 | 56 nF | | | | | | | | | | | | | | | | | | | | |
| 683 | 68 nF | | | | | | | | | | | | | | | | | | | | |
| 823 | 82 nF | | | | | | | | | | | | | | | | | | | | |
| 104 | 100 nF | | | | | | | | | | | | | | | | | | | | |
| 124 | 120 nF | | | | | | | | | | | | | | | | | | | | |
| 154 | 150 nF | | | | | | | | | | | | | | | | | | | | |
| 184 | 180 nF | | | | | | | | | | | | | | | | | | | | |
| 224 | 220 nF | | | | | | | | | | | | | | | | | | | | |
| 274 | 270 nF | | | | | | | | | | | | | | | | | | | | |
| 334 | 330 nF | | | | | | | | | | | | | | | | | | | | |
| 394 | 390 nF | | | | | | | | | | | | | | | | | | | | |
| 474 | 470 nF | | | | | | | | | | | | | | | | | | | | |
| 564 | 560 nF | | | | | | | | | | | | | | | | | | | | |
| 684 | 680 nF | | | | | | | | | | | | | | | | | | | | |
| 824 | 820 nF | | | | | | | | | | | | | | | | | | | | |
| 105 | 1.0 µF | | | | | | | | | | | | | | | | | | | | |
| 125 | 1.2 µF | | | | | | | | | | | | | | | | | | | | |
| 155 | 1.5 µF | | | | | | | | | | | | | | | | | | | | |
| 185 | 1.8 µF | | | | | | | | | | | | | | | | | | | | |
| 225 | 2.2 µF | | | | | | | | | | | | | | | | | | | | |
| 275 | 2.7 µF | | | | | | | | | | | | | | | | | | | | |
| 335 | 3.3 µF | | | | | | | | | | | | | | | | | | | | |
| 395 | 3.9 µF | | | | | | | | | | | | | | | | | | | | |
| 475 | 4.7 µF | | | | | | | | | | | | | | | | | | | | |
| 565 | 5.6 µF | | | | | | | | | | | | | | | | | | | | |
| 685 | 6.8 µF | | | | | | | | | | | | | | | | | | | | |

Notes

RoHS-compliant

• Plastic tape

⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034



| SELECTION CHART | | | | | | | | | | | | | | | | |
|----------------------------|--------|-----------------------|-----|-----|-----|-----------------------|----|-----|-----|-----|------|-----------------------|----|-----|-----|-----|
| DIELECTRIC | | X7R | | | | | | | | | | | | | | |
| STYLE | | VJ2220 ⁽¹⁾ | | | | VJ2225 ⁽¹⁾ | | | | | | VJ3640 ⁽¹⁾ | | | | |
| CASE CODE | | 2220 | | | | 2225 | | | | | | 3640 | | | | |
| VOLTAGE (V _{DC}) | | 50 | 100 | 200 | 500 | 25 | 50 | 100 | 200 | 500 | 1000 | 25 | 50 | 100 | 200 | 500 |
| VOLTAGE CODE | | A | B | C | E | X | A | B | C | E | G | X | A | B | C | E |
| CAP. CODE | CAP. | | | | | | | | | | | | | | | |
| 121 | 120 pF | | | | | | | | | | | | | | | |
| 151 | 150 pF | | | | | | | | | | | | | | | |
| 181 | 180 pF | | | | | | | | | | | | | | | |
| 221 | 220 pF | | | | | | | | | | | | | | | |
| 271 | 270 pF | | | | | | | | | | | | | | | |
| 331 | 330 pF | | | | | | | | | | | | | | | |
| 391 | 390 pF | | | | | | | | | | | | | | | |
| 471 | 470 pF | | | | | | | | | | | | | | | |
| 561 | 560 pF | | | | | | | | | | | | | | | |
| 681 | 680 pF | | | | | | | | | | | | | | | |
| 821 | 820 pF | | | | | | | | | | | | | | | |
| 102 | 1.0 nF | | | | | | | | | | | | | | | |
| 122 | 1.2 nF | | | | | | | | | | | | | | | |
| 152 | 1.5 nF | | | | | | | | | | | | | | | |
| 182 | 1.8 nF | | | | | | | | | | | | | | | |
| 222 | 2.2 nF | | | | | | | | | | | | | | | |
| 272 | 2.7 nF | | | | | | | | | | | | | | | |
| 332 | 3.3 nF | | | | | | | | | | | | | | | |
| 392 | 3.9 nF | | | | | | | | | | | | | | | |
| 472 | 4.7 nF | | | | | | | | | | | | | | | |
| 562 | 5.6 nF | | | | | | | | | | | | | | | |
| 682 | 6.8 nF | | | | | | | | | | | | | | | |
| 822 | 8.2 nF | | | | | | | | | | | | | | | |
| 103 | 10 nF | | | | | | | | | | | | | | | |
| 123 | 12 nF | | | | | | | | | | | | | | | |
| 153 | 15 nF | | | | • | | | | | | | | | | | |
| 183 | 18 nF | | | | • | | | | | | | | | | | |
| 223 | 22 nF | | | | • | | | | | | | | | | | |
| 273 | 27 nF | | | | • | | | | | | | | | | • | • |
| 333 | 33 nF | | | | • | • | • | • | • | • | • | | | | • | • |
| 393 | 39 nF | | | | • | • | • | • | • | • | • | | | | • | • |
| 473 | 47 nF | | | | • | • | • | • | • | • | • | | | | • | • |
| 563 | 56 nF | | | | • | • | • | • | • | • | • | | | | • | • |
| 683 | 68 nF | | | | • | • | • | • | • | • | • | | | | • | • |
| 823 | 82 nF | | | | • | • | • | • | • | • | • | | | | • | • |
| 104 | 100 nF | | | • | • | • | • | • | • | • | • | | | | • | • |
| 124 | 120 nF | | | • | • | • | • | • | • | • | • | | | | • | • |
| 154 | 150 nF | | | • | • | • | • | • | • | • | • | | | | • | • |
| 184 | 180 nF | | | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 224 | 220 nF | | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 274 | 270 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 334 | 330 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 394 | 390 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 474 | 470 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 564 | 560 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 684 | 680 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 824 | 820 nF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 105 | 1.0 µF | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 125 | 1.2 µF | • | • | | • | • | • | • | • | • | • | • | • | • | • | • |
| 155 | 1.5 µF | • | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 185 | 1.8 µF | • | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 225 | 2.2 µF | • | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 275 | 2.7 µF | | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 335 | 3.3 µF | | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 395 | 3.9 µF | | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 475 | 4.7 µF | | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 565 | 5.6 µF | | | | • | • | • | • | • | • | • | • | • | • | • | • |
| 685 | 6.8 µF | | | | • | • | • | • | • | • | • | • | • | • | • | • |

Notes

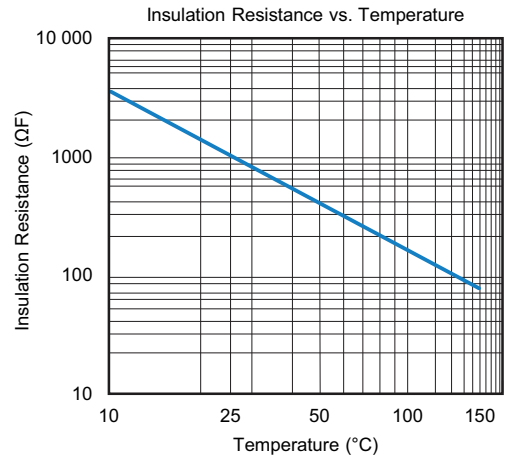
• RoHS-compliant

• Plastic tape

⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034



COG (NP0) DIELECTRIC - TYPICAL PARAMETERS



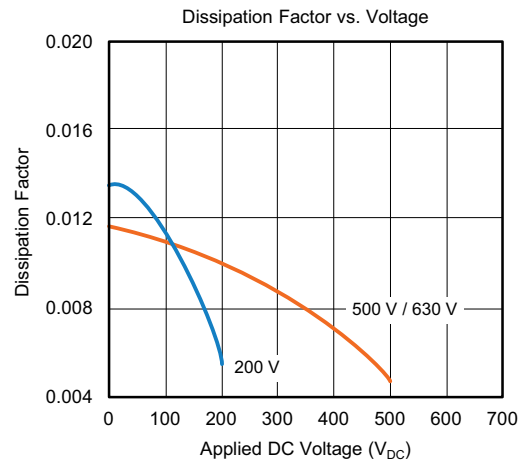
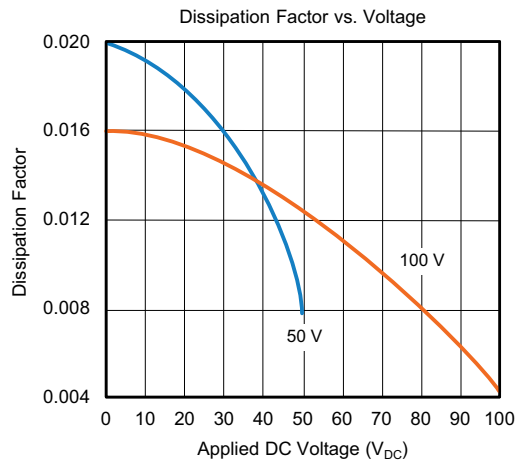


X7R DIELECTRIC - TYPICAL PARAMETERS





X7R DIELECTRIC - TYPICAL PARAMETERS



STANDARD PACKAGING QUANTITIES (1)(2)(3)

| CASE CODE | TAPE SIZE | 7" REEL QUANTITIES | | 11 1/4" AND 13" REEL QUANTITIES | |
|----------------|-----------|-------------------------------------|---------------------------------|-------------------------------------|---------------------------------|
| | | PAPER TAPE PACKAGING CODE "C" / "O" | PLASTIC TAPE PACKAGING CODE "T" | PAPER TAPE PACKAGING CODE "P" / "I" | PLASTIC TAPE PACKAGING CODE "R" |
| 0402 | 8 mm | 5000 | n/a | 10 000 | n/a |
| 0603 (4)(5)(6) | 8 mm | 4000 | 4000 | 10 000 | 10 000 |
| 0805 (4)(5) | 8 mm | 3000 | 3000 | 10 000 | 10 000 |
| 1206 (4)(5) | 8 mm | 3000 | 2500 / 3000 | 10 000 | 9000 / 10 000 |
| 1210 (4) | 8 mm | n/a | 2000 / 2500 / 3000 | n/a | 9000 / 10 000 |
| 1808 | 12 mm | n/a | 2000 | n/a | 10 000 |
| 1812 | 12 mm | n/a | 1000 | n/a | 4000 |
| 1825 | 12 mm | n/a | 1000 | n/a | 4000 |
| 2220 | 12 mm | n/a | 1000 | n/a | n/a |
| 2225 | 12 mm | n/a | 500 | n/a | n/a |
| 3640 | 16 mm | n/a | 500 | n/a | n/a |

Notes

- (1) Vishay Vitramon uses embossed plastic carrier tape
- (2) REFERENCE: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (3) n/a = not available
- (4) Packaging "C" / "P" / "O" / "I" and "T" / "R" or lower quantities can depend from product thickness
- (5) Polymer termination, code "B", only available in plastic tape "T" / "R"
- (6) Variable packaging codes, see ratings in "Selection Charts"

STORAGE AND HANDLING CONDITIONS

- (1) Store the components at 5 °C to 40 °C ambient temperature and ≤ 70 % relative humidity conditions.
- (2) The product is recommended to be used within a time-frame of 2 years after shipment.
Check solderability in case extended shelf life beyond the expiry date is needed.

Precautions:

- a. Do not store products in an environment containing corrosive elements, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. This may cause corrosion or oxidization of the terminations, which can easily lead to poor soldering.
- b. Store products on the shelf and avoid exposure to moisture or dust.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.



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