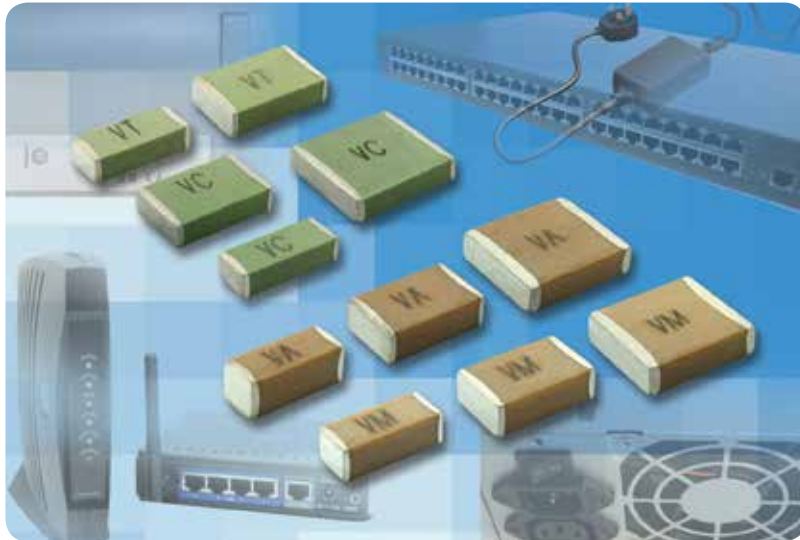




MULTILAYER CERAMIC CHIP CAPACITORS

VJ Safety-Certified Capacitors, C0G (NP0) and X7R

Surface-Mount Multilayer Ceramic Chip Capacitors for Safety-Certified Applications



KEY BENEFITS

- Safety-certified surface-mount (SMD) capacitor
- Approved per IEC 60384-14
- C0G (NP0) and X7R dielectrics in three sizes: 2008, 2012, and 2220
- X1/Y2 and X2 classifications rated for 250 V_{AC}
- Wet build process
- Reliable Noble Metal Electrode (NME) system

APPLICATIONS

- Power supplies
- Facsimile and telephone
- AC equipment and appliances
- Lightning strike and voltage surge protection
- EMI and AC line filtering
- Isolators

RESOURCES

- Datasheets:
VJ Safety Certified Capacitors C0G (NP0) - www.vishay.com/doc?45007
VJ Safety Certified Capacitors X7R - www.vishay.com/doc?45020
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912
- For technical questions contact mlcc@vishay.com



RoHS
COMPLIANT

GREEN
[5-2008]

HALOGEN
FREE
Available

A **WORLD OF**
SOLUTIONS



MULTILAYER CERAMIC CHIP CAPACITORS

VJ Safety-Certified Capacitors, C0G (NP0) and X7R

Surface-Mount Multilayer Ceramic Chip Capacitors for Safety-Certified Applications

ELECTRICAL SPECIFICATIONS for C0G (NP0):

- **Operating temperature:**
- 55 °C to + 125 °C
- **Temperature Coefficient of Capacitance (TCC):**
0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C
- **Dissipation Factor (DF) ⁽¹⁾:**
0.1 % maximum

Note: Electrical characteristics at + 25 °C unless otherwise specified
⁽¹⁾ Test conditions per IEC 60384-14: 1.0 V_{RMS} at 1 MHz

- **Insulating Resistance:**
At + 25 °C 100 000 MΩ or 1000 ΩF whichever is less
At +125 °C 10 000 MΩ or 100 ΩF whichever is less
- **Aging Rate:**
0 % maximum per decade
- **Voltage Proof Test:**
X1/Y2: min 1500 V_{AC}
X2: min 1075 V_{DC}
- **Peak Impulse Voltage:**
X1/Y2: 5000 V
X2: 2500 V

| SELECTION CHART | | | | | | |
|----------------------------|--------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| DIELECTRIC | | C0G (NP0) (X1/Y2) | | | C0G (NP0) (X2) | |
| STYLE | | VJ2008 ⁽¹⁾ | VJ2012 ⁽¹⁾ | VJ2220 ⁽¹⁾ | VJ2008 ⁽¹⁾ | VJ2012 ⁽¹⁾ |
| CASE CODE | | 2008 | 2012 | 2220 | 2008 | 2012 |
| VOLTAGE (V _{AC}) | | 250 | 250 | 250 | 250 | 250 |
| VOLTAGE CODE | | U | U | U | U | U |
| CAP. CODE | CAP. | | | | | |
| 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 | | | | | |

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

| ORDERING INFORMATION | | | | | | | | |
|----------------------|---------------|--|-------------------------|------------------------------------|-------------------------|--|---|----------------------------|
| VJ2008 | A | 101 | K | X | U | S | T | ### ⁽¹⁾ |
| CASE CODE | DIELECTRIC | CAPACITANCE NOMINAL CODE | CAPACITANCE TOLERANCE | TERMINATION | AC VOLTAGE RATING | MARKING | PACKAGING | PROCESS CODE |
| 2008 2012 2220 | A = C0G (NP0) | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 101 = 100 pF | J = ± 5 % K = ± 10 % | X = Ni barrier 100 % tin plated | U = 250 V _{AC} | S = marked (see Part Marking table below) | T = 7" reel/plastic tape R = 11 1/4"/13" reel/plastic tape | X1 = X1 / Y2 X2 = X2 |

Notes:
⁽¹⁾ Process code must be added to control products and requirements
 ° Detail ratings see "Selection Chart"



MULTILAYER CERAMIC CHIP CAPACITORS

VJ Safety-Certified Capacitors, C0G (NP0) and X7R

Surface-Mount Multilayer Ceramic Chip Capacitors for Safety-Certified Applications

ELECTRICAL SPECIFICATIONS for X7R:

- **Operating temperature:**
- 55 °C to + 125 °C
- **Temperature Coefficient of Capacitance (TCC):**
± 15 % from - 55 °C to + 125 °C, with 0 V_{DC} applied
- **Dissipation Factor (DF) ⁽¹⁾:**
C < 100 pF: 8 % maximum
C ≥ 100 pF: 2.5 % maximum

- **Insulating Resistance:**
At + 25 °C 100 000 MΩ or 1000 ΩF whichever is less
At + 125 °C 10 000 MΩ or 100 ΩF whichever is less
- **Aging Rate:**
1 % maximum per decade
- **Voltage Proof Test:**
X1/Y2: min 1500 V_{AC}
X2: min 1075 V_{DC}
- **Peak Impulse Voltage:**
X1/Y2: 5000 V
X2: 2500 V

Note: Electrical characteristics at + 25 °C unless otherwise specified

⁽¹⁾ Test conditions per IEC 60384-14: 1.0 V_{RMS} and capacitance:

C < 100 pF at 1 MHz and C ≥ 100 pF at 1 kHz

| SELECTION CHART | | | | | | |
|----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| DIELECTRIC | | X7R (X1 / Y2) | | | X7R (X2) | |
| STYLE | VJ2008 ⁽¹⁾ | VJ2012 ⁽¹⁾ | VJ2220 ⁽¹⁾ | VJ2008 ⁽¹⁾ | VJ2012 ⁽¹⁾ | VJ2220 ⁽¹⁾ |
| CASE CODE | 2008 | 2012 | 2220 | 2008 | 2012 | 2220 |
| VOLTAGE (V _{AC}) | 250 | 250 | 250 | 250 | 250 | 250 |
| VOLTAGE CODE | U | U | U | U | U | U |
| CAP. CODE | CAP. | | | | | |
| 100 | 10 pF | | | | | |
| 220 | 22 pF | | | | | |
| 330 | 33 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 | | | | | • |

Notes

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

• RoHS-compliant

| ORDERING INFORMATION | | | | | | | | |
|----------------------|------------|---|--------------------------|------------------------------------|-------------------------|---|---|-------------------------|
| VJ2008 | Y | 102 | K | X | U | S | T | ### ⁽¹⁾ |
| CASE CODE | DIELECTRIC | CAPACITANCE NOMINAL CODE | CAPACITANCE TOLERANCE | TERMINATION | AC VOLTAGE RATING | MARKING | PACKAGING | PROCESS CODE |
| 2008 2012 2220 | Y = X7R | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 102 = 1000 pF | K = ± 10 % M = ± 20 % | X = Ni barrier 100 % tin plated | U = 250 V _{AC} | S = marked (see Part Marking table below) | T = 7" reel / plastic tape R = 11 1/4" / 13" reel / plastic tape | X1 = X1 / Y2 X2 = X2 |

Notes:

⁽¹⁾ Process code must be added to control products and requirements

° Detail ratings see "Selection Chart"



MULTILAYER CERAMIC CHIP CAPACITORS

VJ Safety-Certified Capacitors, C0G (NP0) and X7R

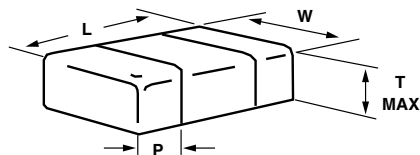
Surface-Mount Multilayer Ceramic Chip Capacitors for Safety-Certified Applications

| APPROVALS | | | |
|--|----------|--------------------|---------------------|
| VDE approval mark (update 2016-06-23): | | | |
| X1 / Y2-capacitor C0G (NP0): | 40036706 | 10 pF to 1000 pF | 250 V _{AC} |
| X2-capacitor C0G (NP0): | 40036706 | 10 pF to 470 pF | 250 V _{AC} |
| VDE approval mark (update 2016-06-24): | | | |
| X1 / Y2-capacitor X7R: | 40037440 | 82 pF to 4700 pF | 250 V _{AC} |
| X2-capacitor X7R: | 40037440 | 82 pF to 12 000 pF | 250 V _{AC} |
| DIN EN 60384-14 (VDE 0565-1-1):2014-04; EN 60384-14:2013-08; IEC 60384-14 (ed.4) | | | |
| CAN / cCSAus approval mark: | | | |
| X1 / Y2-capacitor C0G (NP0): | 70001064 | 10 pF to 1000 pF | 250 V~ |
| X2-capacitor C0G (NP0): | 70001064 | 10 pF to 470 pF | 250 V~ |
| X1 / Y2-capacitor X7R: | 70001064 | 82 pF to 4700 pF | 250 V~ |
| X2-capacitor X7R: | 70001064 | 82 pF to 12 000 pF | 250 V~ |
| CAN / CSA-E60384-14:09 and ANSI / UL 60384-14-2009 | | | |



| PART MARKING | | |
|--------------|---------------------------------------|--|
| MARKING | 1 ST DIGIT MANUFACTURER | 2 ND DIGIT DIELECTRIC AND RATING |
| VC | V = Vishay | C = C0G (NP0), X1/Y2 |
| VT | | T = C0G (NP0), X2 |
| VA | | A = X7R, X1/Y2 |
| VM | | M = X7R, X2 |

DIMENSIONS in inches (millimeters)



| CASE CODE | PART ORDERING NUMBER | LENGTH (L) | WIDTH (W) | MAXIMUM THICKNESS (T) | TERMINATION (P) | |
|-----------|----------------------|--------------------------------|--------------------------------|-----------------------|-----------------|-----------------|
| | | | | | MINIMUM | MAXIMUM |
| 2008 | VJ2008 | 0.200 ± 0.010 (5.08 ± 0.25) | 0.080 ± 0.010 (2.03 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.030 (0.76) |
| 2012 | VJ2012 | 0.200 ± 0.010 (5.08 ± 0.25) | 0.126 ± 0.008 (3.20 ± 0.20) | 0.086 (2.18) | 0.010 (0.25) | 0.030 (0.76) |
| 2220 | VJ2220 | 0.220 ± 0.008 (5.59 ± 0.20) | 0.200 ± 0.010 (5.08 ± 0.25) | 0.086 (2.18) | 0.010 (0.25) | 0.030 (0.76) |

| PACKAGING QUANTITIES ⁽¹⁾ | | | |
|-------------------------------------|-----------|--------------------|---------------------------------|
| CASE CODE | TAPE SIZE | 7" REEL QUANTITIES | 11 1/4" AND 13" REEL QUANTITIES |
| | | PACKAGING CODE "T" | PACKAGING CODE "R" |
| 2008 | 12 mm | 2000 | 10 000 |
| 2012 | 12 mm | 1000 | 4000 |
| 2220 | 12 mm | 1000 | 4000 |

Note

⁽¹⁾ Reference: EIA standard RS481 - "Taping of Surface Mount Components for Automatic Placement"