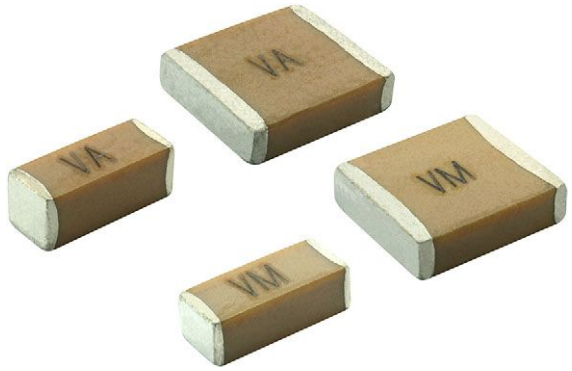
# Surface Mount Multilayer Ceramic Chip Capacitors for Safety Certified Applications




## FEATURES

- Approved IEC 60384-14
- Specialty: safety certified capacitors
- AEC-Q200 qualified available with PPAP
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Flexible termination "W" for improved bending capability performance (1)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE Available

Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

**Note**

(1) "W" flexible termination under qualification

## APPLICATIONS

- Power supplies
- EMI and AC line filtering
- EV charging systems
- AC equipment and appliances
- Lighting strike and voltage surge protection
- Isolators
- Facsimile and telephone

## ELECTRICAL SPECIFICATIONS

**Note**

- Electrical characteristics at +25 °C unless otherwise specified

**Operating Temperature:** -55 °C to +125 °C

**Capacitance Range X1 / Y2 (1):** 100 pF to 4.7 nF

**Capacitance Range X2 (1):** 100 pF to 12 nF

**Voltage Range:** 250 $V_{AC}$

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

**Dissipation Factor (DF) (1):**
2.5 % maximum

**Note**

(1) **Test conditions per IEC 60384-14:**
1.0 $V_{RMS}$ at 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

**Voltage Proof Test:**
X1 / Y2: min. 1500 $V_{AC}$
X2: min. 1075 $V_{DC}$

**Peak Impulse Voltage:**
X1 / Y2: 5000 V
X2: 2500 V

**Voltage Rating DC:**
X1 / Y2: 2000 $V_{DC}$
X2: 1500 $V_{DC}$

**Climatic Category According to EN 60068-1:**
55/125/21

# VJ Safety Certified Capacitors X7R

Vishay Vitramon

## QUICK REFERENCE DATA

| DIELECTRIC | CASE | MAXIMUM VOLTAGE ($V_{AC}$) | CAPACITANCE | |
|---|---|---|---|---|
| | | | MINIMUM | MAXIMUM |
| X7R (X1 / Y2) | 2008 | 250 | 100 pF | 1.0 nF |
| | 2220 | 250 | 270 pF | 4.7 nF |
| X7R (X2) | 2008 | 250 | 100 pF | 2.7 nF |
| | 2220 | 250 | 270 pF | 12 nF |

**Notes**

- Detail ratings see “Selection Chart”
- Size 2008 is compatible with 1808 solderlands and full conform with the IEC-60384-14 requirements for creepage distance

## ORDERING INFORMATION

| VJ2008 | Y | 102 | K | X | U | S | T | ### (2) |
|---|---|---|---|---|---|---|---|---|
| CASE CODE | DIELECTRIC | CAPACITANCE NOMINAL CODE | CAPACITANCE TOLERANCE | TERMINATION | AC VOLTAGE RATING | MARKING | PACKAGING | PROCESS CODE |
| 2008<br>2220 | Y = X7R | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. **Examples:** 102 = 1000 pF | K = ± 10 %<br>M = ± 20 % | X = Ni barrier 100 % matte tin plate finish<br>W = Ni barrier with flexible layer, 100 % matte tin plate finish (1) | U = 250 $V_{AC}$ | S = marked (see Part Marking table below) | T = 7" reel / plastic tape | X1 = X1 / Y2<br>X2 = X2<br>Vishay automotive grade per customer request add “A”:<br>X1A = X1 / Y2<br>X2A = X2 |

**Notes**

- Detail ratings see “Selection Chart”

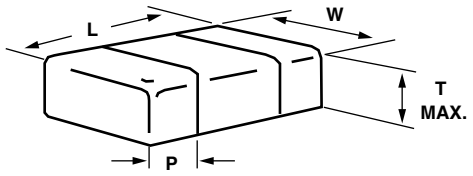
(1) “W” flexible termination under qualification

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

## PART MARKING

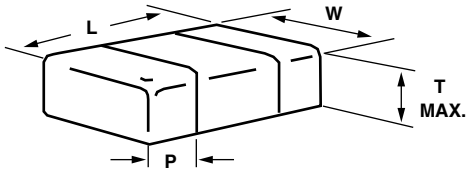
| MARKING | 1ST DIGIT MANUFACTURER | 2ND DIGIT DIELECTRIC AND RATING |
|---|---|---|
| VA | V = Vishay | A = X7R, X1 / Y2 - “X” termination option |
| VM | | M = X7R, X2 - “X” termination option |
| VB | | B = X7R, X1 / Y2 - “W” termination option |
| VN | | N = X7R, X2 - “W” termination option |

## DIMENSIONS FOR "X" TERMINATION OPTION 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<br>(5.08 ± 0.25) | 0.080 ± 0.010<br>(2.03 ± 0.25) | 0.086<br>(2.18) | 0.010<br>(0.25) | 0.030<br>(0.76) |
| 2220 | VJ2220 | 0.220 ± 0.008<br>(5.59 ± 0.20) | 0.200 ± 0.010<br>(5.08 ± 0.25) | 0.086<br>(2.18) | 0.010<br>(0.25) | 0.030<br>(0.76) |

## DIMENSIONS FOR "W" TERMINATION OPTION in inches (millimeters)

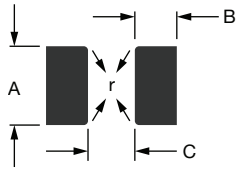



| CASE CODE | PART ORDERING NUMBER | LENGTH (L) | WIDTH (W) | MAXIMUM THICKNESS (T) | TERMINATION (P) | |
|---|---|---|---|---|---|---|
| | | | | | MINIMUM | MAXIMUM |
| 2008 | VJ2008 | 0.200 - 0.010 / + 0.020<br>(5.08 - 0.25 / + 0.50) | 0.080 ± 0.010<br>(2.03 ± 0.25) | 0.086<br>(2.18) | 0.010<br>(0.25) | 0.030<br>(0.76) |
| 2220 | VJ2220 | 0.220 - 0.008 / + 0.018<br>(5.59 - 0.20 / + 0.45) | 0.200 ± 0.010<br>(5.08 ± 0.25) | 0.105<br>(2.65) | 0.010<br>(0.25) | 0.030<br>(0.76) |

**Note**

- "W" flexible termination under qualification

## RECOMMENDED SOLDERING PAD DIMENSIONS in millimeters




| CASE CODE | A | B | C | r (1) |
|---|---|---|---|---|
| 2008 | 2.70 | 1.50 | 3.60 | 0.5 |
| 2220 | 5.80 | 1.50 | 4.20 | 0.5 |

**Note**

(1) Radius optional

| SELECTION CHART | | | | | |
|---|---|---|---|---|---|
| DIELECTRIC | | X7R (X1 / Y2) | | X7R (X2) | |
| STYLE | | VJ2008 (1) | VJ2220 (1) | VJ2008 (1) | VJ2220 (1) |
| CASE CODE | | 2008 | 2220 | 2008 | 2220 |
| VOLTAGE ($V_{AC}$) | | 250 | 250 | 250 | 250 |
| VOLTAGE CODE | | 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 | | | | |

**Note**

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

| PACKAGING QUANTITIES (1) | | |
|---|---|---|
| CASE CODE | TAPE SIZE | 7" REEL QUANTITIES |
| | | PACKAGING CODE "T" |
| 2008 | 12 mm | 2000 |
| 2220 | 12 mm | 1000 |

**Note**

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

| APPROVALS | | | | |
|---|---|---|---|---|
| VDE approval mark (update 2016-06-24): | | | | |
| X1 / Y2-capacitor: | 40037440 | 82 pF to 4700 pF | 250 $V_{AC}$ | |
| X2-capacitor: | 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) | | | | |
| CSA / cCSAus approval mark (update 2020-05-05): | | | | |
| X1 / Y2-capacitor: | 70001064 | 82 pF to 4700 pF | 250 V~ | |
| X2-capacitor: | 70001064 | 82 pF to 12 000 pF | 250 V~ | |
| CAN / CSA-E60384-14:14 and ANSI / UL 60384-14-2017 | | | | |

| GENERAL CERTIFICATES | |
|---|---|
| # Quality management system according to ISO/IATF 16949 | Yes |
| # Quality management system according to ISO 9001 | Yes |
| # Environmental certification according to ISO 14001 | Yes |
| # Health and safety system according to OHSAS 18001 | Yes |

## 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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