# VJ Safety Certified Capacitors X7R



# Surface Mount Multilayer Ceramic Chip Capacitors for Safety Certified Applications



www.vishay.com

## **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<sub>AC</sub>

# **Temperature Coefficient of Capacitance (TCC):**

 $\pm$  15 % from -55 °C to +125 °C, with 0 V<sub>DC</sub> applied

## Dissipation Factor (DF) (1):

C < 100 pF: 8 % maximum C ≥ 100 pF: 2.5 % maximum

#### Note

- <sup>(1)</sup> Test conditions per IEC 60384-14: Voltage: 1.0 V<sub>RMS</sub> C < 100 pF at 1 MHz
  - $C \ge 100 \text{ pF}$  at 1 kHz

## **FEATURES**

- Approved IEC 60384-14
- · Specialty: safety certified capacitors
- · AEC-Q200 qualified available with PPAP for size 2008 and 2220
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

#### **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

#### **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<sub>AC</sub> X2: min. 1075 V<sub>DC</sub>

#### **Peak Impulse Voltage:** X1 / Y2: 5000 V

X2: 2500 V

### Voltage Rating DC:

X1 / Y2: 2000 V<sub>DC</sub> X2: 1500 V<sub>DC</sub>

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



FREE GREEN (5-2008)

HALOGEN

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QUICK REFERENCE DATA					
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V <sub>AC</sub> )	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

ORD	ORDERING INFORMATION							
VJ2008	Y	102	К	Х	U	S	т	### (1)(2)
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	AC VOLTAGE RATING	MARKING	PACKAGING	PROCESS CODE
2008 2220	Y = X7R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. <b>Examples:</b> 102 = 1000 pF	K = ± 10 % M = ± 20 %	X = Ni barrier 100 % tin plated	U = 250 V <sub>AC</sub>	S = marked (see Part Marking table below)	plastic tape	X1 = X1 / Y2 X2 = X2 Vishay automotive grade per customer request add "A": X1A = X1 / Y2 X2A = X2

#### Notes

<sup>(1)</sup> Process code must be added to control products and requirements

<sup>(2)</sup> Vishay automotive grade "X1A" and "X2A" only for size 2008 and 2220

• Detail ratings see "Selection Chart"

PART MARKING					
MARKING	1 <sup>ST</sup> DIGIT MANUFACTURER	2 <sup>ND</sup> DIGIT DIELECTRIC AND RATING			
VA	V – Viebev	A = X7R, X1 / Y2			
VM	V = Vishay	M = X7R, X2			

DIMENSIO	DIMENSIONS in inches (millimeters)							
W T MAX.								
CASE   PART ORDERING   LENGTH   WIDTH   THICKNESS						MINATION (P)		
CODE	NUMBER	(L)	(W)	(Т)	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)		
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)		



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DIELECTRIC			K1 / Y2)	X7R (X2)		
STYLE		VJ2008 <sup>(1)</sup>	VJ2220 <sup>(1)</sup>	VJ2008 <sup>(1)</sup>	VJ2220 (1)	
CASE CODE		2008	2220	2008	2220	
VOLTAGE (V <sub>AC</sub> )		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		•	•	٠	
272	2.7 nF		•	•	٠	
332	3.3 nF		•		٠	
392	3.9 nF		•		•	
472	4.7 nF		•		•	
562	5.6 nF				٠	
682	6.8 nF				٠	
822	8.2 nF				•	
103	10 nF				•	
123	12 nF				٠	
153	15 nF					

#### Notes

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

RoHS-compliant

PACKAGING QUANTITIES <sup>(1)</sup>				
		7" REEL QUANTITIES		
CASE CODE	TAPE SIZE	PACKAGING CODE "T"		
2008	12 mm	2000		
2220	12 mm	1000		

Note

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



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APPROVALS					
VDE approval mark (update	e 2016-06-24):				
X1 / Y2-capacitor:	40037440	82 pF to 4700 pF	250 V <sub>AC</sub>		
X2-capacitor:	40037440	82 pF to 12 000 pF	250 V <sub>AC</sub>	$\overline{D^{V}E}$	
DIN EN 60384-14 (VDE 0565-1-1):2014-04; EN 60384-14:2013-08; IEC 60384-14 (ed.4)					
CSA / cCSAus approval ma	ark:				
X1 / Y2-capacitor:	70001064	82 pF to 4700 pF	250 V~		
X2-capacitor:	70001064	82 pF to 12 000 pF	250 V~		
CAN / CSA-E60384-14:09 and ANSI / UL 60384-14-2009					

## **STORAGE AND HANDLING CONDITIONS**

(1) Store the components at 5 °C to 40 °C ambient temperature and  $\leq$  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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