

## Surface Mount Multilayer Ceramic Chip Capacitors for Commercial Applications



### FEATURES

- C0G (NP0) and X7R/X5R 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?999912](http://www.vishay.com/doc?999912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

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

### ELECTRICAL SPECIFICATIONS

#### C0G (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<sub>DC</sub> to 1000 V<sub>DC</sub>

**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<sub>RMS</sub> and  
1 MHz for values ≤ 1000 pF  
0.1 % maximum at 1.0 V<sub>RMS</sub> 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 <sub>DC</sub> -rated:	250 % of rated voltage
500 V <sub>DC</sub> -rated:	200 % of rated voltage
630 V <sub>DC</sub> , 1000 V <sub>DC</sub> -rated:	150 % of rated voltage

#### X5R, X7R DIELECTRIC

##### GENERAL SPECIFICATION

###### Note

Electrical characteristics at + 25 °C unless otherwise specified

**Operating Temperature:** - 55 °C to + 150 °C  
(X5R above + 85 °C changed characteristics)  
(X7R above + 125 °C changed characteristics)

**Capacitance Range:** 120 pF to 6.8 μF

**Voltage Range:** 10 V<sub>DC</sub> to 1000 V<sub>DC</sub>

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

X5R: ± 15 % from - 55 °C to + 85 °C, with 0 V<sub>DC</sub> applied  
X7R: ± 15 % from - 55 °C to + 125 °C, with 0 V<sub>DC</sub> applied

###### Dissipation Factor (DF):

10 V ratings: 5 % maximum at 1.0 V<sub>RMS</sub> and 1 kHz  
16 V/25 V ratings: 3.5 % maximum at 1.0 V<sub>RMS</sub> and 1 kHz  
> 25 V ratings: 2.5 % maximum at 1.0 V<sub>RMS</sub> 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 <sub>DC</sub> -rated:	250 % of rated voltage
500 V <sub>DC</sub> -rated:	min. 150 % of rated voltage
630 V <sub>DC</sub> , 1000 V <sub>DC</sub> -rated:	150 % of rated voltage



QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0402	100	1.0 pF	220 pF
	0603	200	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	22 nF
	1808	1000	18 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
X5R	0805	10	560 nF	1.0 μF
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 <sup>(3)</sup>	Y	102	K	X	A	A	T	### <sup>(2)</sup>
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING <sup>(1)</sup>	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640	A = C0G (NP0) Y = X7R G = X5R <sup>(4)</sup>	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. <b>Examples</b> 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 % <b>Note:</b> C0G (NP0): B, C, D < 10 pF F, G, J, K ≥ 10 pF X7R/X5R: J, K, M	X = Ni barrier 100 % tin plated matte finish F, E = AgPd B = Polymer 100 % tin plated matte finish <sup>(5)</sup>	Q = 10 V 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 <b>Note:</b> Marking is only available for 0805 and 1206 with termination code "X"	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 <b>Note:</b> "I" and "O" are used for "F", "E" termination size 0402/0603/0805	

Notes

- (1) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: [mlcc@vishay.com](mailto:mlcc@vishay.com)
- (2) Process code may be added with up to three digits, used to control non-standard products and/or special requirements
- (3) Case size designator may be replaced by four digit drawing number used to control non-standard products and/or special requirements
- (4) Selected values for X5R, see selection chart
- (5) Selected values available, contact [mlcc@vishay.com](mailto:mlcc@vishay.com) for list of released ratings
- (6) Termination code "E" is for conductive epoxy assembly



**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)	0.036 (0.92)	0.012 (0.30)	0.018 (0.46)
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)	0.028 (0.71)
1206	VJ1206	0.126 ± 0.008 (3.20 ± 0.20)	0.063 ± 0.008 (1.60 ± 0.20)	0.067 (1.70)	0.010 (0.25)	0.028 (0.71)
1210	VJ1210	0.126 ± 0.008 (3.20 ± 0.20)	0.098 ± 0.008 (2.50 ± 0.20)	0.067 (1.70)	0.010 (0.25)	0.028 (0.71)
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)	0.030 (0.76)
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)	0.030 (0.76)
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)	0.030 (0.76)
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)	0.030 (0.76)
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)	0.030 (0.76)
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)	0.030 (0.76)

**Note**

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



SELECTION CHART																					
DIELECTRIC		COG (NPO)																			
STYLE		VJ0402			VJ0603			VJ0805				VJ1206 <sup>(1)</sup>					VJ1210 <sup>(1)</sup>				
CASE CODE		0402			0603			0805				1206					1210				
VOLTAGE (V <sub>DC</sub> )		25	50	100	50	100	200	50	100	200	500	50	100	200	500	630	50	100	200	500	630
VOLTAGE CODE		X	A	B	A	B	C	A	B	C	E	A	B	C	E	L	A	B	C	E	L
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

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

- Paper tape
- Plastic tape



SELECTION CHART															
DIELECTRIC		COG (NP0)													
STYLE		VJ1808 <sup>(1)</sup>					VJ1812 <sup>(1)</sup>					VJ1825 <sup>(1)</sup>			
CASE CODE		1808					1812					1825			
VOLTAGE (V <sub>DC</sub> )		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

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

- Plastic tape



SELECTION CHART												
DIELECTRIC		COG (NP0)										
STYLE		VJ2220 <sup>(1)</sup>					VJ2225 <sup>(1)</sup>					
CASE CODE		2220					2225					
VOLTAGE (V <sub>DC</sub> )		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

- <sup>(1)</sup> See soldering recommendations within this data book, or visit [www.vishay.com/doc?45034](http://www.vishay.com/doc?45034)
- Plastic tape



SELECTION CHART																	
DIELECTRIC		X7R/X5R <sup>(1)</sup>															
STYLE		VJ0402				VJ0603					VJ0805						
CASE CODE		0402				0603					0805						
VOLTAGE (V <sub>DC</sub> )		16	25	50	100	16	25	50	100	200	10	16	25	50	100	200	250
VOLTAGE CODE		J	X	A	B	J	X	A	B	C	Q	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

(1) X5R (- 55 °C to + 85 °C TCC: ± 15 %) for all 0805/10 V ratings. All other values X7R.

\*\* Paper tape • Plastic tape



SELECTION CHART																	
DIELECTRIC		X7R															
STYLE		VJ1206 <sup>(1)</sup>							VJ1210 <sup>(1)</sup>								
CASE CODE		1206 <sup>(1)</sup>							1210 <sup>(1)</sup>								
VOLTAGE (V <sub>DC</sub> )		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

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

•• Paper tape • Plastic tape





SELECTION CHART																					
DIELECTRIC		X7R																			
STYLE		VJ1808 <sup>(1)</sup>					VJ1812 <sup>(1)</sup>								VJ1825 <sup>(1)</sup>						
CASE CODE		1808					1812								1825						
VOLTAGE (V <sub>DC</sub> )		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

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

- Plastic tape



SELECTION CHART																	
DIELECTRIC STYLE		X7R															
CASE CODE		VJ2220 <sup>(1)</sup>				VJ2225 <sup>(1)</sup>						VJ3640 <sup>(1)</sup>					
VOLTAGE (V <sub>DC</sub> )		2220				2225						3640					
VOLTAGE CODE		50	100	200	500	25	50	100	200	500	1000	25	50	100	200	500	
CAP. 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

- (1) See soldering recommendations within this data book, or visit [www.vishay.com/doc?45034](http://www.vishay.com/doc?45034)
- Plastic tape



COG (NP0) DIELECTRIC - TYPICAL PARAMETERS





X7R/X5R DIELECTRIC - TYPICAL PARAMETERS

TEMPERATURE COEFFICIENT OF CAPACITANCE



INSULATION RESISTANCE VS. TEMPERATURE



DISSIPATION FACTOR VS. TEMPERATURE



AGING RATE



RATED VOLTAGE VS. TEMPERATURE



VOLTAGE COEFFICIENT OF CAPACITANCE



DISSIPATION FACTOR VS. VOLTAGE



DISSIPATION FACTOR VS. VOLTAGE





<b>STANDARD PACKAGING QUANTITIES (1)(2)(3)</b>					
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)	8 mm	4000	4000	10 000	10 000
0805 (4)	8 mm	3000	3000	10 000	10 000
1206 (4)	8 mm	3000	3000/2500	10 000	10 000/9000
1210 (4)	8 mm	n/a	3000/2500/2000	n/a	10 000/9000
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	4000
2225	12 mm	n/a	1000	n/a	4000
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

<b>STORAGE AND HANDLING CONDITIONS</b>
<p>(1) Store the components at 5 °C to + 40 °C ambient temperature and ≤ 70 % related humidity conditions.</p> <p>(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.</p> <p>Precautions:</p> <ul style="list-style-type: none"> <li>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.</li> <li>b. Store products on the shelf and avoid exposure to moisture or dust.</li> <li>c. Do not expose products to excessive shock, vibration, direct sunlight and so on.</li> </ul>



## RoHS COMPLIANCE UPDATE

---

**The RoHS compliance of the parts in this datasheet is currently under review. For more information, please contact your local Vishay sales representative.**



## 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.

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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**