

Surface Mount Multilayer Ceramic Chip Capacitors for Non-Magnetic Applications (Epoxy Bonding)



FEATURES

- Manufactured with non-magnetic materials
- Safety screened for magnetic properties
- C0G (NP0) and X7R / X5R dielectrics
- Wide range of case sizes, voltage ratings, and capacitance values
- Suitable for conductive epoxy bonding
- Wet built process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Magnetic Resonance Imaging (MRI)
- Medical test and diagnostic equipment
- Hi-rel medical systems
- Hi-rel aviation systems
- Laboratory analysis systems
- Navigation and electronic test equipment
- Audio amplifiers

ELECTRICAL SPECIFICATIONS

NON-MAGNETIC C0G (NP0)

GENERAL SPECIFICATION

Note

Electrical characteristics at +25 °C unless otherwise specified

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

Capacitance Range: 1.0 pF to 39 nF

Voltage Range: 10 V_{DC} to 3000 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: 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
1500 V _{DC} to 3000 V _{DC} -rated:	120 % of rated voltage

NON-MAGNETIC X7R / X5R

GENERAL SPECIFICATION

Note

Electrical characteristics at +25 °C unless otherwise specified

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

Capacitance Range: 100 pF to 6.8 μF

Voltage Range: 6.3 V_{DC} to 3000 V_{DC}

Temperature Coefficient of Capacitance (TCC):

X5R: ± 15 % from -55 °C to +85 °C, with 0 V_{DC} applied
X7R: ± 15 % from -55 °C to +125 °C, with 0 V_{DC} applied

Dissipation Factor (DF):

≤ 6.3 V, 10 V ratings: 5 % maximum at 1.0 V_{RMS} and 1 kHz
16 V, 25 V ratings: 3.5 % maximum at 1.0 V_{RMS} and 1 kHz
≥ 50 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

≤ 200 V _{DC} -rated:	250 % of rated voltage
500 V _{DC} -rated:	min. 150 % of rated voltage
630 V _{DC} , 1000 V _{DC} -rated:	150 % of rated voltage
1500 V _{DC} , 3000 V _{DC} -rated:	120 % of rated voltage



QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0402	100	1.0 pF	180 pF
	0603	200	1.0 pF	1.5 nF
	0805	500	1.0 pF	3.3 nF
	1206	600	1.0 pF	10 nF
	1210	500	1.0 pF	12 nF
	1808	3000	10 pF	10 nF
	1812	3000	27 pF	22 nF
	1825	1000	15 pF	33 nF
	2220	1000	100 pF	33 nF
	2225	1000	120 pF	39 nF
X5R	0402	16	27 nF	47 nF
	0603	6.3	120 nF	150 nF
X7R	0402	100	100 pF	22 nF
	0603	100	270 pF	100 nF
	0805	200	390 pF	390 nF
	1206	500	680 pF	1.0 μF
	1210	500	1.0 nF	1.0 μF
	1808	3000	220 pF	270 nF
	1812	3000	270 pF	1.0 μF
	1825	1000	10 nF	2.7 μF
	2220	3000	1.0 nF	2.2 μF
	2225	2000	5.6 nF	4.7 μF
	3640	500	15 nF	6.8 μF

Note

- Detail ratings see "Selection Chart"

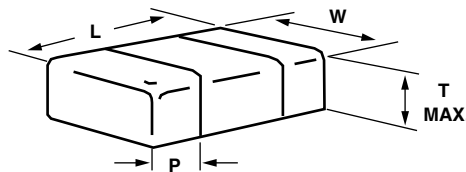


ORDERING INFORMATION							
VJ0603	Y	102	K	N	A	A	O
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING
0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640	A = C0G Y = X7R G = X5R ⁽²⁾	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples 102 = 1000 pF 1R0 = 1.0 pF	C0G(NP0): < 10 pF C = ± 0.25 pF D = 0.5 pF ≥ 10 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % X5R / X7R: J = ± 5 % K = ± 10 % M = ± 20 %	N = non-magnetic	Q = 10 V J = 16 V X = 25 V A = 50 V K = 75 V B = 100 V C = 200 V E = 500 V L = 630 V G = 1000 V R = 1500 V F = 2000 V H = 3000 V	A = unmarked	T = 7" reel / plastic tape R = 11 1/4" / 13" reel / plastic tape O = 7" reel / flamed paper tape I = 11 1/4" / 13" reel / flamed paper tape J = 7" reel (low quantity)

Notes

- (1) DC voltage rating should not be exceeded in application
- (2) Selected values for X5R, see dielectric selection chart

DIMENSIONS in inches (millimeters)



CASE CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATIONS (P)	
					MINIMUM	MAXIMUM
0402	VJ0402	0.040 + 0.006 / - 0.004 (1.00 + 0.15 / - 0.10)	0.020 ± 0.004 (0.50 ± 0.10)	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 (0.92)	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 ± 0.010 (3.20 ± 0.25)	0.063 ± 0.010 (1.60 ± 0.25)	0.067 (1.70)	0.010 (0.25)	0.028 (0.71)
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)	0.028 (0.71)
1808	VJ1808	0.177 ± 0.012 (4.50 ± 0.30)	0.080 ± 0.010 (2.03 ± 0.25)	0.067 (1.70)	0.010 (0.25)	0.030 (0.76)
1812	VJ1812	0.177 ± 0.012 (4.50 ± 0.30)	0.126 ± 0.010 (3.20 ± 0.25)	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 ± 0.008 (5.59 ± 0.20)	0.200 ± 0.010 (5.08 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
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)



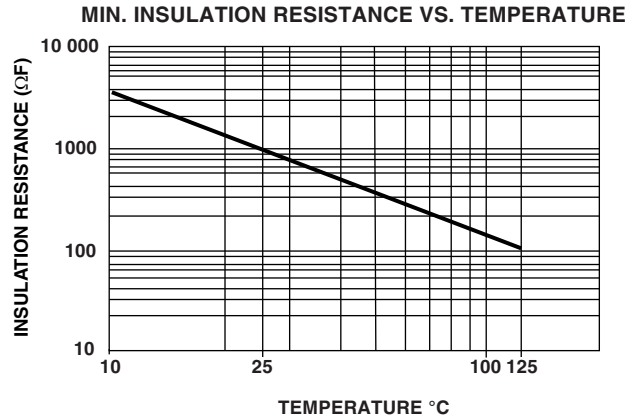
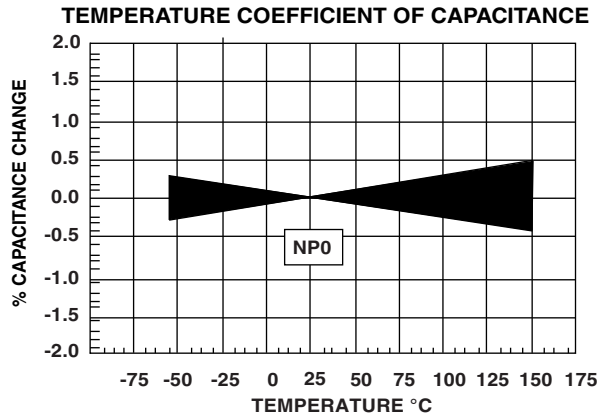
SELECTION CHART													
DIELECTRIC		COG (NPO)											
STYLE		VJ1206						VJ1210					
CASE CODE		1206						1210					
VOLTAGE (V _{DC})		16	25	50	100	200	500	600	25	50	100	200	500
VOLTAGE CODE		J	X	A	B	C	E	N	X	A	B	C	E
CAP. CODE	CAP.												
1R0	1.0 pF	•	•	•	•	•	•	•	•	•	•	•	•
1R2	1.2 pF	•	•	•	•	•	•	•	•	•	•	•	•
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								•	•			

Notes

- RoHS-compliant
- Flamed paper tape • Plastic tape



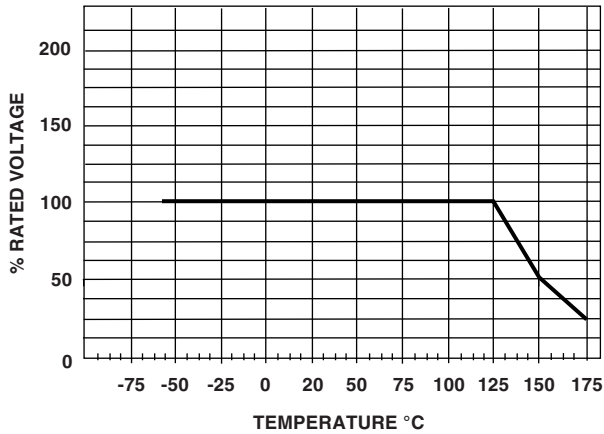
NON-MAGNETIC COG (NP0) DIELECTRIC - TYPICAL PARAMETERS



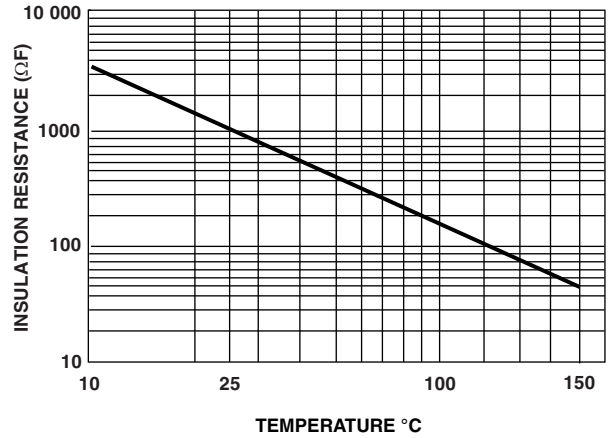


NON-MAGNETIC X7R DIELECTRIC - TYPICAL PARAMETERS

RATED VOLTAGE VS. TEMPERATURE



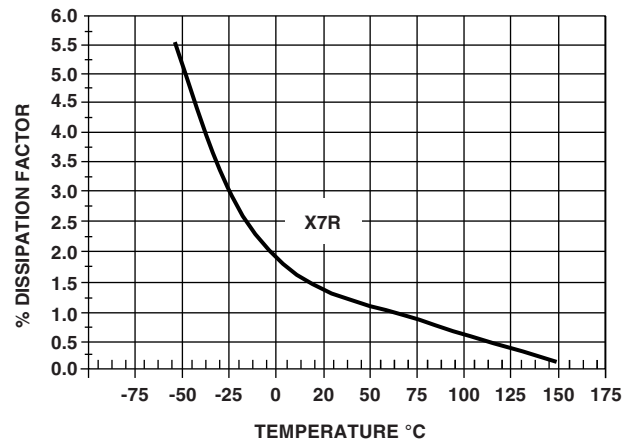
MIN. INSULATION RESISTANCE VS. TEMPERATURE



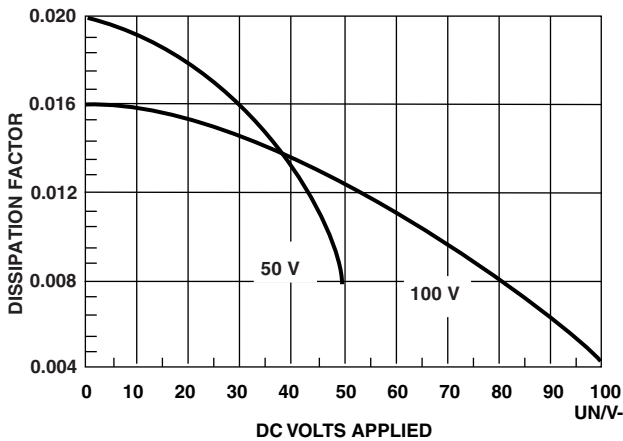
AGING RATE



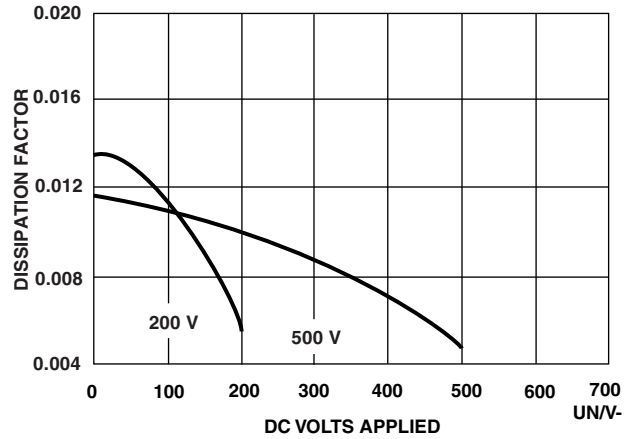
DISSIPATION FACTOR VS. TEMPERATURE



DISSIPATION FACTOR VS. VOLTAGE

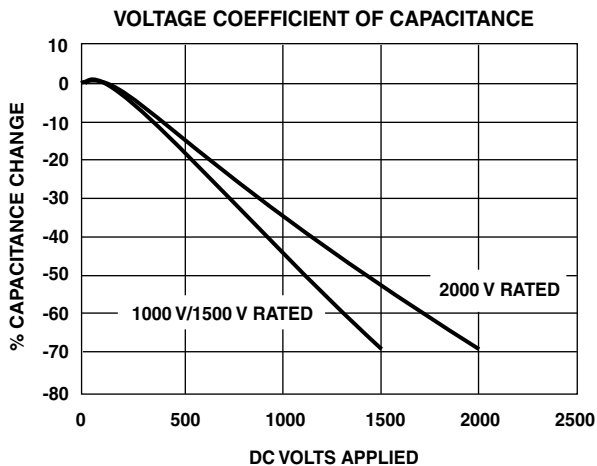
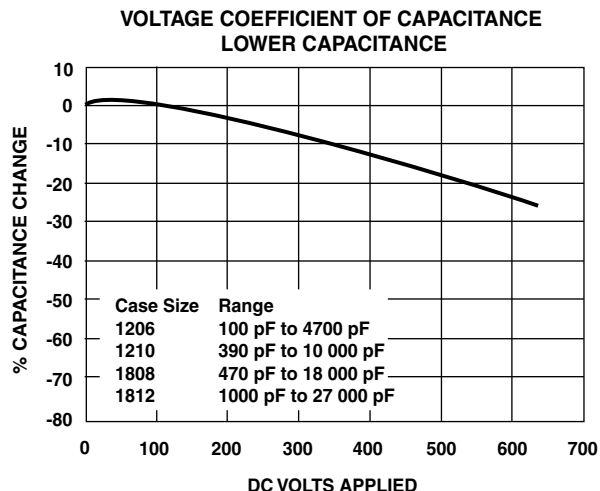
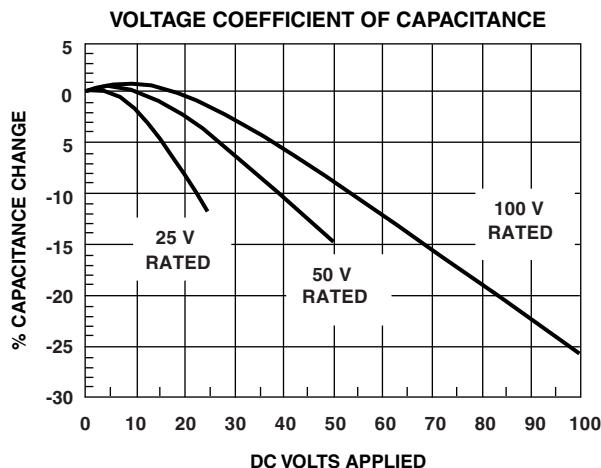
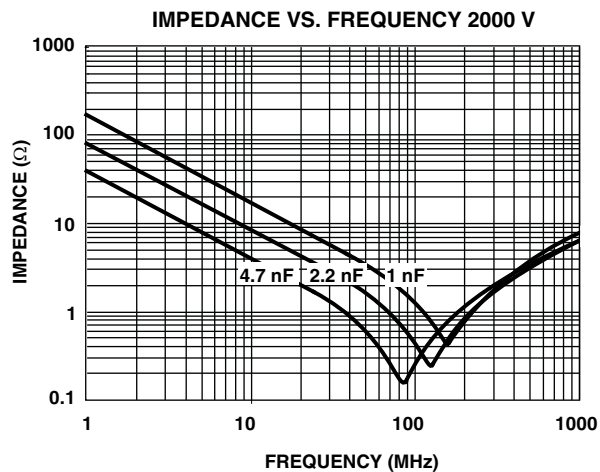
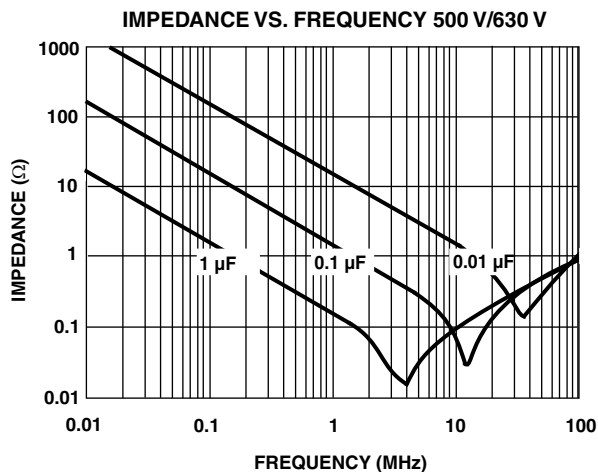


DISSIPATION FACTOR VS. VOLTAGE





NON-MAGNETIC 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 "O"	PLASTIC TAPE PACKAGING CODE "T"	LOW QUANTITY PACKAGING CODE "J"	PAPER TAPE PACKAGING CODE "I"	PLASTIC TAPE PACKAGING CODE "R"
0402	8 mm	5000	n/a	1000	10 000	n/a
0603 (4)	8 mm	4000	4000	1000	10 000	10 000
0805 (4)	8 mm	3000	3000	1000	10 000	10 000
1206 (4)	8 mm	n/a	3000 / 2500	1000	n/a	10 000 / 9000
1210 (4)	8 mm	n/a	3000 / 2500 / 2000	1000	n/a	10 000 / 9000
1808	12 mm	n/a	2000	500	n/a	10 000
1812	12 mm	n/a	1000	500	n/a	4000
1825	12 mm	n/a	1000	500	n/a	4000
2220	12 mm	n/a	1000	500	n/a	4000
2225	12 mm	n/a	500	250	n/a	4000
3640	16 mm	n/a	500	n/a	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 code "O/I" or "T/R" and lower quantities can depend on product thickness

STORAGE AND HANDLING CONDITIONS
<p>(1) Store the components at +5 °C to +40 °C ambient temperature and ≤ 70 % relative 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"> 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 oxidation 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.



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.