



VISHAY INTERTECHNOLOGY, INC.

INTERACTIVE

data book

SURFACE MOUNT MULTILAYER CERAMIC CHIP CAPACITORS

VISHAY

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Notes:

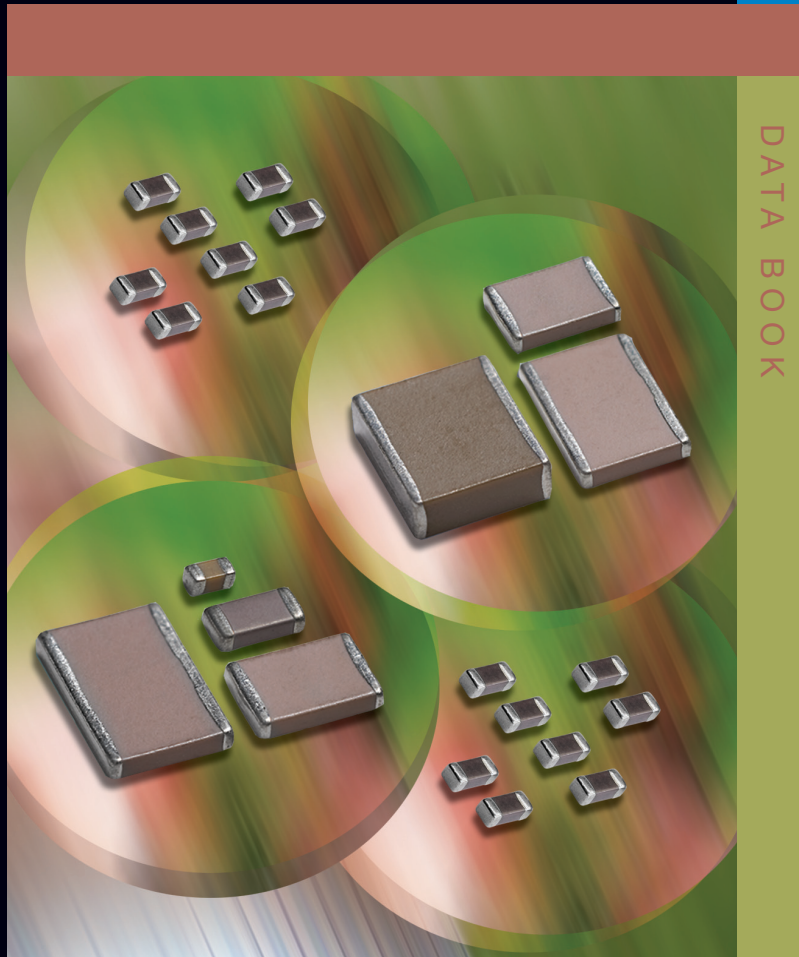
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One of the World's Largest Manufacturers of
Discrete Semiconductors and Passive Components



VISHAY INTERTECHNOLOGY, INC.



SURFACE MOUNT MULTILAYER CERAMIC CHIP CAPACITORS

SEMICONDUCTORS

RECTIFIERS

- Schottky (single, dual)
- Standard, Fast and Ultra-Fast Recovery (single, dual)
- Bridge
- Superrectifier®
- Sinterglass Avalanche Diodes

HIGH-POWER DIODES AND THYRISTORS

- High-Power Fast-Recovery Diodes
- Phase-Control Thyristors
- Fast Thyristors

SMALL-SIGNAL DIODES

- Schottky and Switching (single, dual)
- Tuner/Capacitance (single, dual)
- Bandswitching
- PIN

ZENER AND SUPPRESSOR DIODES

- Zener (single, dual)
- TVS (TRANZORB®, Automotive, ESD, Arrays)

FETs

- Low-Voltage TrenchFET® Power MOSFETs
- High-Voltage TrenchFET® Power MOSFETs
- High-Voltage Planar MOSFETs
- JFETs

OPTOELECTRONICS

- IR Emitters and Detectors, and IR Receiver Modules
- Optocouplers and Solid-State Relays
- Optical Sensors
- LEDs and 7-Segment Displays
- Infrared Data Transceiver Modules
- Custom Products

ICs

- Power ICs
- Analog Switches

MODULES

- Power Modules (contain power diodes, thyristors, MOSFETs, IGBTs)

PASSIVE COMPONENTS

RESISTIVE PRODUCTS

- Film Resistors
 - Metal Film Resistors
 - Thin Film Resistors
 - Thick Film Resistors
 - Metal Oxide Film Resistors
 - Carbon Film Resistors
- Wirewound Resistors
- Power Metal Strip® Resistors
- Chip Fuses
- Variable Resistors
 - Cermet Variable Resistors
 - Wirewound Variable Resistors
 - Conductive Plastic Variable Resistors
- Networks/Arrays
- Non-Linear Resistors
 - NTC Thermistors
 - PTC Thermistors
 - Varistors

MAGNETICS

- Inductors
- Transformers

CAPACITORS

- Tantalum Capacitors
 - Molded Chip Tantalum Capacitors
 - Coated Chip Tantalum Capacitors
 - Solid Through-Hole Tantalum Capacitors
 - Wet Tantalum Capacitors
- Ceramic Capacitors
 - Multilayer Chip Capacitors
 - Disc Capacitors
- Film Capacitors
- Power Capacitors
- Heavy-Current Capacitors
- Aluminum Capacitors

Vishay

Surface Mount Multilayer Ceramic Chip Capacitors

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Part Numbering/Ordering Information

PART NUMBERING/ORDERING INFORMATION (7)								
VJ0805	Y	102	K	X	A	A	C	2L
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	TOLERANCE CODE (1)	TERMINATION	DC VOLTAGE RATING	MARKING OPTION (2)	PACKAGING	PROCESS CODE
0201	A = COG (NP0)	Expressed in picofarad (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Example: 0R3 = 0.3 pF 4R7 = 4.7 pF 102 = 1000 pF 473 = 47 000 pF	V = ± 0.05 pF B = ± 0.10 pF C = ± 0.25 pF D = ± 0.50 pF F = ± 1 % G = ± 2 % H = ± 3 % J = ± 5 % K = ± 10 % M = ± 20 % Z = -20 %/+80 %	X = Ni barrier 100 % tin plate matte finish F, E = AgPd (6) L = Ni barrier tin/lead plate min. 4 % lead B = Polymer 100 % tin plate matte finish N = Non-magnetic	S = 4 V	A = Unmarked M = Marking vendor ID + 2 character cap. code (size 0805/1206) B = Marking for automotive VJ...31 vendor ID + date code (size 0805/1206)	T = 7" reel/ plastic tape C = 7" reel/ paper tape O = 7" reel/ flamed paper tape used for AgPd termination 0402/0603/0805 E = 7" reel/ plastic tape only used automotive VJ...31/VJ...34 R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape I = 11 1/4"/13" reel/ flamed paper tape used for AgPd termination 0402/0603/0805 M = 11 1/4"/13" reel/plastic tape only used Automotive VJ...31/VJ...34	00, 54, 3L, 3P, A2 = Standard (3)(4) 31, 34 = Automotive 4X, 5H = Open mode 5Z = HV Arc Guard® 2L, 2M, 68, 5G = High-Rel. W1BC = Basic commodity
0402	Y = X7R							
0603	G = X5R							
06C4 (5)	H = X8R							
0805	Q = High Q							
1206	V = Y5V							
1210	L = Ultra High Q Low ESR							
1808								
1812								
1825								
2220								
2225								
3640								

Notes

- (1) COG (NP0)/High Q: B, C, D < 10 pF; F, G, J, K ≥ 10 pF
Ultra High Q: V, B, C, D ≤ 5 pF; B, C, D > 5 pF < 10 pF; F, G, J ≥ 10 pF
X5R: K, M
X7R/X8R: J, K, M
Y5V: M, Z
For details, see individual datasheets
- (2) Marking is not available in process code W1BC
Marking is not available for termination code "F" = AgPd termination
- (3) Phasing out of "3L" and "3P"
- (4) Phasing out of "A2" temporarily used to identify manufacturing plant
- (5) Chip array size 0612 including 4 capacitors
- (6) Termination code "E" for conductive epoxy assembly, contact mlcc@vishay.com for availability
- (7) For details of ratings, see individual datasheet

Multilayer Ceramic Chip Capacitors



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Part Numbering/Ordering Information

PART NUMBERING/ORDERING INFORMATION MILITARY PRODUCTS (1)								
CDR31	BX	103	A	K	Z	P	A	T
MILITARY STYLE	DIELECTRIC	CAPACITANCE	DC VOLTAGE RATING	TOLERANCE CODE	TERMINATION	FAILURE RATE	MARKING OPTION	PACKAGING
CDR01 CDR02 CDR03 CDR04 CDR06 CDR31 CDR32 CDR33 CDR34	BP BX	Expressed in picofarad (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Example: 4R7 = 4.7 pF 102 = 1000 pF	A = 50 V B = 100 V	C = ± 0.25 pF D = ± 0.50 pF F = ± 1 % J = ± 5 % K = ± 10 % M = ± 20 %	M = Silver palladium Y = Ni barrier 100 % tin plate matte finish W = Ni barrier 100 % tin plate matte finish Z = Ni barrier 100 % tin/lead plate min. 4 % U = Hot solder dipped min. 4 % lead	M = 1.0 % P = 0.1 % R = 0.01 % S = 0.001 % Consult factory for failure rate status	A = Unmarked	T = 7" reel/plastic tape J = 7" reel/(low qty.) C = 7" reel/paper tape R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape B = Bulk

PART NUMBERING/ORDERING INFORMATION DSCC PRODUCTS (1)							
03028-	BX	102	A	K	Z	C	J
DSCC STYLE	DIELECTRIC	CAPACITANCE	DC VOLTAGE RATING	TOLERANCE CODE	TERMINATION	GROUP TESTING	PACKAGING
03028- 03029- 05006- 05007-	BP BX BR	Expressed in picofarad (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Example: 4R7 = 4.7 pF 102 = 1000 pF	X = 10 V Y = 16 V Z = 25 V A = 50 V B = 100 V C = 200 V	C = ± 0.25 pF D = ± 0.50 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 %	M = Silver palladium Z = Ni barrier tin/lead plate min. 4 % lead U = Hot solder dipped min. 4 % lead	C = Full group C L = 2000 h life test only M = 1000 h life test only H = Low voltage humidity test only - = Group A test only	T = 7" reel/plastic tape J = 7" reel/(low qty.) C = 7" reel/paper tape O = 7" reel/flamed paper tape R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape I = 11 1/4"/13" reel/flamed paper tape B = bulk

PART NUMBERING/ORDERING INFORMATION DSCC PRODUCTS (1)(2)						
05001-	4R7	A	C	Z	C	J
DSCC STYLE	CAPACITANCE	DC VOLTAGE RATING	TOLERANCE CODE	TERMINATION	GROUP TESTING	PACKAGING
05001- 05002- 05003-	Expressed in picofarad (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Example: 4R7 = 4.7 pF	A = 50 V B = 100 V C = 200 V K = 250 V	B = ± 0.10 pF C = ± 0.25 pF D = ± 0.50 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 %	M = Silver palladium Z = Ni barrier tin/lead plate min. 4 % lead	C = Full group C L = 2000 h life test only M = 1000 h life test only H = Low voltage humidity test only - = Group A test only	T = 7" reel/plastic tape J = 7" reel/(low qty.) C = 7" reel/paper tape O = 7" reel/flamed paper tape R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape I = 11 1/4"/13" reel/flamed paper tape B = Bulk

Notes

(1) For details of ratings, see individual datasheet

(2) Contact mlcc@vishay.com for availability



MLCCs for Basic Commodity Applications (BME/NME Technology)

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Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications



FEATURES

- Ultra stable class 1 dielectric
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations
- Dry sheet manufacturing technology
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C, 30 % to 70 % related humidity, unless otherwise specified

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

Capacitance Range: 0.5 pF to 39 nF

Voltage Range: 10 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):

0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C

Dissipation Factor (DF):

Cap. < 30 pF: Q ≥ 400 + 20C

Cap. ≥ 30 pF: Q ≥ 1000

Test Conditions for Capacitance and DF Measurement:

Cap. ≤ 1000 pF 1.0 ± 0.2 V_{RMS}, 1 MHz ± 10 %

Cap. > 1000 pF 1.0 ± 0.2 V_{RMS}, 1 kHz ± 10 %

Aging Rate: 0 % maximum per decade

Insulation Resistance (IR): after 120 s at U_R (DC)
≥ 10 GΩ or R x C ≥ 500 Ω x F whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

≤ 100 V_{DC}: 250 % of rated voltage



VJ...W1BC C0G (NP0) Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

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QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0402	100	0.5 pF	470 pF
	0603	100	0.5 pF	3.3 nF
	0805	100	0.5 pF	12 nF
	1206	100	1.5 pF	39 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	A	101	J	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603 0805 1206	A = C0G (NP0)	Two significant digits followed by the number of zeros: 101 = 100 pF 102 = 1000 pF 152 = 1500 pF 103 = 10 000 pF	Cap. < 10 pF: B = ± 0.10 pF C = ± 0.25 pF D = ± 0.50 pF Cap. ≥ 10 pF: F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 %	X = Ni Barrier	Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V	C = 7" reel/ paper tape P = 13" reel/ paper tape T = 7" reel/ plastic tape R = 13" reel/ plastic tape	

DIMENSIONS in inches (millimeters)				
SIZE CODE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (MB)
0402 (1002)	0.040 ± 0.002 (1.00 ± 0.05)	0.020 ± 0.002 (0.50 ± 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
0603 (1608)	0.063 + 0.006/- 0.004 (1.60 + 0.15/- 0.10)	0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10)	0.038 (0.95)	0.016 ± 0.006 (0.40 ± 0.15)
0805 (2012)	0.080 ± 0.008 (2.00 ± 0.20)	0.050 ± 0.008 (1.25 ± 0.20)	0.057 (1.45)	0.020 ± 0.008 (0.50 ± 0.20)
1206 (3216)	0.126 + 0.012/- 0.008 (3.20 + 0.30/- 0.20)	0.063 + 0.012/- 0.008 (1.60 + 0.30/- 0.20)	0.075 (1.90)	0.024 ± 0.008 (0.60 ± 0.20)

VJ....W1BC C0G (NP0) Dielectric



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Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

SELECTION CHART																					
DIELECTRIC		C0G (NP0)																			
STYLE		VJ0402					VJ0603					VJ0805					VJ1206				
EIA CODE		0402					0603					0805					1206				
VOLTAGE (V _{DC})		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
VOLTAGE CODE		Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B
CAP. CODE	CAP.																				
0R5	0.5 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A					
1R0	1.0 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A					
1R2	1.2 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A					
1R5	1.5 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
1R8	1.8 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
2R2	2.2 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
2R7	2.7 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
3R3	3.3 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
3R9	3.9 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
4R7	4.7 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
5R6	5.6 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
6R8	6.8 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
8R2	8.2 pF	N*	N*	N*	N*	N*	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
100	10 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
120	12 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
150	15 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
180	18 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
220	22 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
270	27 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
330	33 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
390	39 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
470	47 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
560	56 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
680	68 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
820	82 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
101	100 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
121	120 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
151	150 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
181	180 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
221	220 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
271	270 pF	N	N	N	N		S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
331	330 pF	N	N	N	N		S	S	S	S	S	A	A	A	A	A	B	B	B	B	B
391	390 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	B	B	B	B	B
471	470 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	B	B	B	B	B
561	560 pF						S	S	S	S	S	B	B	B	B	B	B	B	B	B	B
681	680 pF						S	S	S	S	S	B	B	B	B	B	B	B	B	B	B
821	820 pF						S	S	S	S	S	B	B	B	B	B	B	B	B	B	B

Notes

- Letters indicate product thickness, see packaging quantities
- “ * ” indicate product with Ag/Ni/Sn termination



VJ...W1BC C0G (NP0) Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

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SELECTION CHART																					
DIELECTRIC		C0G (NP0)																			
STYLE		VJ0402					VJ0603					VJ0805					VJ1206				
EIA CODE		0402					0603					0805					1206				
VOLTAGE (V _{DC})		10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100
VOLTAGE CODE		Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B
CAP. CODE	CAP.																				
102	1.0 nF						S	S	S	S	S	B	B	B	B	B	B	B	B	B	B
122	1.2 nF						X	X	X	X		B	B	B	B	B	B	B	B	B	B
152	1.5 nF						X	X	X	X		B	B	B	B	B	B	B	B	B	B
182	1.8 nF						X	X	X	X		B	B	B	B	B	B	B	B	B	B
222	2.2 nF						X	X	X	X		B	B	B	B	B	B	B	B	B	B
272	2.7 nF						X	X	X	X		D	D	D	D	D	B	B	B	B	B
332	3.3 nF						X	X	X	X		D	D	D	D	D	B	B	B	B	B
392	3.9 nF											D	D	D	D	D	B	B	B	B	B
472	4.7 nF											D	D	D	D		B	B	B	B	B
562	5.6 nF											D*	D*				B	B	B	B	B
682	6.8 nF											D*	D*				C	C	C	C	C
822	8.2 nF											D*	D*				D	D	D	D	D
103	10 nF											D*	D*				D	D	D	D	
123	12 nF											D*	D*				D*	D*			
153	15 nF																D*	D*			
183	18 nF																D*	D*			
223	22 nF																D*	D*			
273	27 nF																D*	D*			
333	33 nF																D*	D*			
393	39 nF																G*	G*			
473	47 nF																				
563	56 nF																				
683	68 nF																				
823	82 nF																				
104	100 nF																				

Notes

- Letters indicate product thickness, see packaging quantities
- “ * ” indicate product with Ag/Ni/Sn termination

PACKAGING QUANTITIES						
SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE		PLASTIC TAPE	
			7" REEL (C)	13" REEL (P)	7" REEL (T)	13" REEL (R)
0402 (1002)	0.55	N	10 000	50 000		
0603 (1608)	0.90	S	4000	15 000		
	0.95	X	4000	15 000		
0805 (2012)	0.75	A	4000	15 000		
	0.95	B	4000	15 000		
	1.40	D			3000	10 000
1206 (3216)	0.95	B	4000	15 000		
	1.05	C			3000	10 000
	1.30	J			3000	10 000
	1.35	D			3000	10 000
	1.80	G			2000	
	1.80	H			2000	8000
	1.90	P			2000	

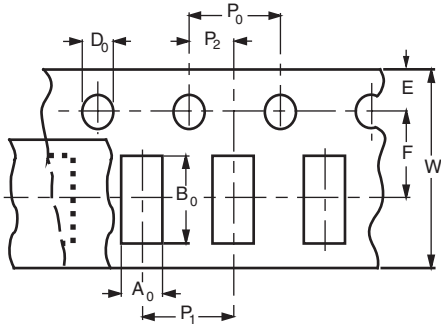
VJ....W1BC C0G (NP0) Dielectric



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

PAPER TAPE SPECIFICATIONS

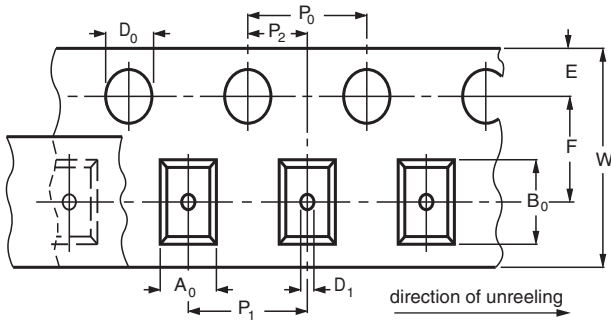


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE			
	0402	0603	0805	1206
A_0	0.62 ± 0.05	1.02 ± 0.05	1.50 ± 0.10	2.00 ± 0.10
B_0	1.12 ± 0.05	1.80 ± 0.05	2.30 ± 0.10	3.50 ± 0.10
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05	1.50 ± 0.05
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	2.00 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

BLISTER TAPE SPECIFICATION

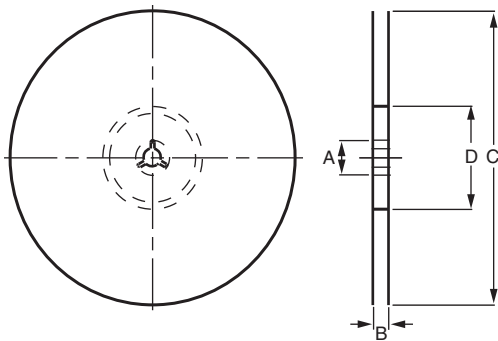


DIMENSIONS OF BLISTER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE	
	0805	1206
A_0	< 1.57	< 2.00
B_0	< 2.45	< 3.70
W	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.10	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05
D_0	1.50 ± 0.05	1.50 ± 0.05
P_0	1.00 ± 0.10	1.00 ± 0.10
P_1	4.00 ± 0.10	4.00 ± 0.10
P_2	4.00 ± 0.10	4.00 ± 0.10
A_0	2.00 ± 0.05	2.00 ± 0.05

REEL SPECIFICATIONS



REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	$\varnothing 180 \text{ mm}; 7''$	$\varnothing 330 \text{ mm}; 13''$
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0



VJ...W1BC C0G (NP0) Dielectric

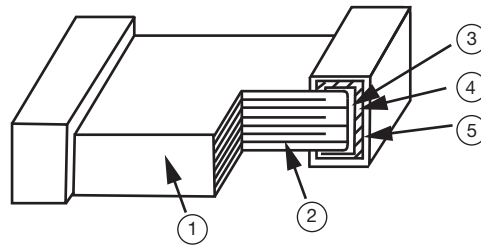
Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

Vishay

CONSTRUCTION			
NO.	NAME	C0G (NP0) ⁽¹⁾	C0G (NP0)
1	Ceramic material	BaTiO ₃ based	
2	Inner electrode	AgPd alloy	Ni
3	Termination	Inner layer	Ag
4		Middle layer	Ni
5		Outer layer	Sn

Note

(1) C0G (NP0) items are with Ag/Ni/Sn terminations, please see selection chart



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications



FEATURES

- Class 2 dielectric
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape and reel
- Ni-barrier with 100 % tin terminations
- Dry sheet technology process
- Base Metal Electrode system (BME)
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Consumer electronics
- Telecommunications
- Mobile application
- Data processing

ELECTRICAL SPECIFICATION

Note

- Electrical characteristics at 25 °C, 30 % to 70 % related humidity, unless otherwise specified

Operating Temperature: - 55 °C to + 85 °C

Capacitance Range: 47 nF to 22 µF

Voltage Range: 6.3 V_{DC} to 25 V_{DC}

Temperature Coefficient of Capacitance (TCC):

± 15 % without voltage applied

Dissipation Factor (DF):

6.3 V: ≤ 10 %

≤ 15 % for 0805 ≥ 4.7 µF

10 V: ≤ 5 %

≤ 10 % for 0402 ≥ 0.33 µF, 0603 ≥ 0.33 µF, 0805 ≥ 2.2 µF,

1206 ≥ 2.2 µF, 1210 ≥ 22 µF

≤ 15 % for 0402 ≥ 1 µF

16 V: ≤ 3.5 %

≤ 5 % for 0402 ≥ 0.033 µF, 0603 ≥ 0.15 µF, 0805 ≥ 0.68 µF,

1206 ≥ 2.2 µF, 1210 ≥ 4.7 µF

≤ 10 % for 0603 ≥ 0.68 µF, 0805 ≥ 2.2 µF, 1206 ≥ 4.7 µF,

1210 ≥ 22 µF

25 V: ≤ 3.5 %

≤ 5 % for 0805 ≥ 1 µF, 1210 ≥ 10 µF

≤ 7 % for 0603 ≥ 0.33 µF, 1206 ≥ 4.7 µF

≤ 10 % for 0402 ≥ 0.10 µF, 0603 ≥ 0.47 µF, 0805 ≥ 2.2 µF,

1206 ≥ 6.8 µF

Test Conditions for Capacitance and DF measurement:

For C ≤ 10 µF apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 %

For C > 10 µF apply 0.5 V_{RMS} ± 0.2 V_{RMS}, 120 Hz ± 20 %

Preconditioning for Capacitance Tolerance Measurement:

Perform a heat treatment at 150 °C ± 10 °C for 1 h, then leave in ambient condition for 24 h ± 2 h before measurement

Aging Rate:

6.3 V/10 V: 3 % maximum per decade

16 V/25 V: 2 % maximum per decade

Insulation Resistance (IR):

≥ 10 GΩ or R x C ≥ 500 Ω x F whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

≤ 100 V_{DC}: 250 % of rated voltage



VJ...W1BC X5R Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

Vishay

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
X5R	0402	50	47 nF	1.0 μ F
	0603	50	220 nF	2.2 μ F
	0805	50	2.2 μ F	10 μ F
	1206	50	1.5 μ F	22 μ F
	1210	560	1.5 μ F	10 μ F

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	G	104	K	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603 0805 1206 1210	G = X5R	Two significant digits followed by the number of zeros: 104 = 100 000 pF	K = $\pm 10\%$ M = $\pm 20\%$	X = Ni Barrier	S = 4 V Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V	C = 7" reel/paper P = 13" reel/paper T = 7" reel/blister R = 13" reel/blister	

DIMENSIONS in inches (millimeters)					
	SIZE CODE	L	W	T MAX.	MB
	0402 (1005)	0.040 \pm 0.002 (1.00 \pm 0.05)	0.020 \pm 0.002 (0.50 \pm 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
	0603 (1608)	0.063 + 0.006/- 0.004 (1.60 + 0.15/- 0.10)	0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10)	0.038 (0.95)	0.016 \pm 0.006 (0.40 \pm 0.15)
	0805 (2012)	0.080 \pm 0.008 (2.00 \pm 0.20)	0.050 \pm 0.008 (1.25 \pm 0.20)	0.057 (1.45)	0.020 \pm 0.008 (0.50 \pm 0.20)
	1206 (3216)	0.126 + 0.012/- 0.008 (3.20 + 0.30/- 0.20)	0.063 + 0.012/- 0.008 (1.60 + 0.30/- 0.20)	0.075 (1.90)	0.024 \pm 0.008 (0.60 \pm 0.20)
	1210 (3225)	0.126 \pm 0.016 (3.20 \pm 0.40)	0.098 \pm 0.012 (2.50 \pm 0.30)	0.110 (2.80)	0.060 \pm 0.010 (0.75 \pm 0.25)

VJ....W1BC X5R Dielectric



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Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

SELECTION CHART																		
DIELECTRIC		X5R																
STYLE		VJ0402					VJ0603					VJ0805						
EIA CODE		0402					0603					0805						
VOLTAGE (V _{DC})		4 V	6.3 V	10 V	16 V	25 V	50 V	6.3 V	10 V	16 V	25 V	50 V	4 V	6.3 V	10 V	16 V	25 V	50 V
VOLTAGE CODE		S	Y	Q	J	X	A	Y	Q	J	X	A	S	Y	Q	J	X	A
CAP. CODE	CAP.																	
473	47 nF				N													
563	56 nF			N	N													
683	68 nF			N	N													
823	82 nF		N	N	N													
104	100 nF		N	N	N													
124	120 nF																	
154	150 nF																	
184	180 nF																	
224	220 nF		N						X	X								
274	270 nF							X	X									
334	330 nF		N					X	X	X								
394	309 nF							X	X									
474	470 nF		N				X	X	X	X								
564	560 nF																	
684	680 nF		N				X	X	X	X								
824	820 nF						X	X	X									
105	1.0 μF		N				X	X	X	X								
155	1.5 μF						X											
225	2.2 μF						X							I	I	I	I	
335	3.3 μF													I	I	I	I	
475	4.7 μF													I	I	I	I	
685	6.8 μF																	
106	10 μF													I				
156	15 μF																	
226	22 μF																	
336	33 μF																	
476	47 μF																	
686	68 μF																	
107	100 μF																	

Note

- Letters indicate product thickness, see packaging quantities

SELECTION CHART											
DIELECTRIC		X5R									
STYLE		VJ1206					VJ1210				
EIA CODE		1206					1210				
VOLTAGE (V _{DC})		6.3 V	10 V	16 V	25 V	50 V	6.3 V	10 V	16 V	25 V	50 V
VOLTAGE CODE		Y	Q	J	X	A	Y	Q	J	X	A
CAP. CODE	CAP.										
105	1.0 μF										
155	1.5 μF		J	J				K	K		
225	2.2 μF		J	J	P			K	K		
335	3.3 μF		P	P	P						
475	4.7 μF	P	P	P	P			K	K		
685	6.8 μF	P	P								
106	10 μF	P	P	P	P			K	K		
156	15 μF										
226	22 μF	P									

Note

- Letters indicate product thickness, see packaging quantities



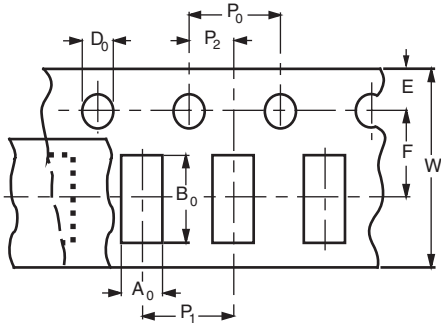
VJ...W1BC X5R Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

Vishay

PACKAGING QUANTITIES						
SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE		PLASTIC TAPE	
			7" REEL (C)	13" REEL (P)	7" REEL (T)	13" REEL (R)
0402 (1002)	0.55	N	10K	50K		
0603 (1608)	0.90	S	4K	15K		
	0.95	X	4K	15K		
0805 (2012)	0.75	A	4K	15K		
	0.95	B	4K	15K		
	1.40	D			3K	10K
	1.45	I			3K	10K
1206 (3216)	0.95	B	4K	15K		
	1.05	C			3K	10K
	1.30	J			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	1.80	H			2K	8K
	1.90	P			2K	
1210 (3225)	1.05	B			2K	10K
	1.05	C			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	2.00	U			2K	4K
	2.20	K			1K	
	2.70	J			1K	4K
	2.80	M			1K	
	2.80	V			1K	4K

PAPER TAPE SPECIFICATION

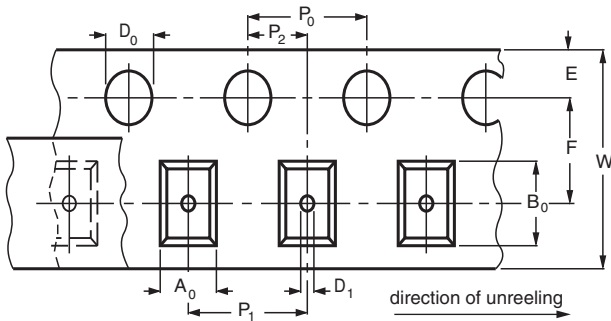


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE			
	0402	0603	0805	1206
A_0	0.62 ± 0.05	1.02 ± 0.05	1.50 ± 0.10	2.00 ± 0.10
B_0	1.12 ± 0.05	1.80 ± 0.05	2.30 ± 0.10	3.50 ± 0.10
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05	1.50 ± 0.05
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	2.00 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

BLISTER TAPE SPECIFICATION

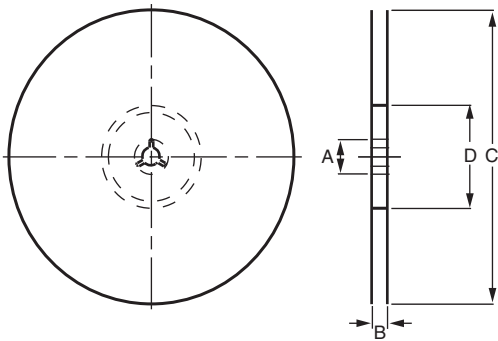


DIMENSIONS OF BLISTER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE		
	0805	1206	1210
A_0	< 1.57	< 2.00	< 2.97
B_0	< 2.45	< 3.70	< 3.73
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.50 ± 0.05	1.50 ± 0.05	1.50 ± 0.05
D_1	1.00 ± 0.10	1.00 ± 0.10	1.00 ± 0.10
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

REEL SPECIFICATIONS



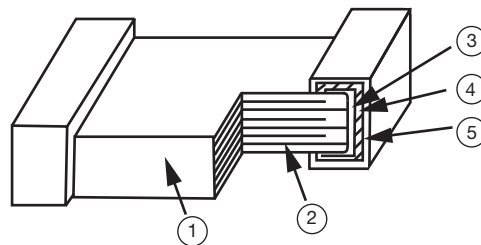
REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	$\varnothing 180 \text{ mm}; 7''$	$\varnothing 330 \text{ mm}; 13''$
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0



CONSTRUCTION			
NO.	NAME	X5R	
1	Ceramic material	BaTiO ₃ based	
2	Inner electrode	Ni	
3	Termination	Inner layer	Cu
4		Middle layer	Ni
5		Outer layer	Sn



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications



FEATURES

- Stable class 2 dielectric
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations
- Dry sheet technology process
- Base Metal Electrode system (BME)
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing

ELECTRICAL SPECIFICATION

Note

- Electrical characteristics at + 25 °C, 30 % to 70 % related humidity, unless otherwise specified

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

Capacitance Range: 100 pF to 10 μ F

Voltage Range: 10 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC)
 ± 15 % without voltage applied

Dissipation Factor (DF):

10 V: ≤ 5 %

≤ 10 % for 0603 ≥ 0.33 μ F; 0805 ≥ 2.2 μ F; 1206 ≥ 2.2 μ F

16 V: ≤ 3.5 %

≤ 5 % for 0402 ≥ 0.033 μ F; 0603 ≥ 0.15 μ F; 0805 ≥ 0.68 μ F;
1206 ≥ 2.2 μ F; 1210 ≥ 4.7 μ F

≤ 10 % for 0603 ≥ 0.68 μ F; 0805 ≥ 2.2 μ F; 1206 ≥ 4.7 μ F

25 V: ≤ 3.5 %

≤ 5 % for 0805 ≥ 1 μ F

≤ 7 % for 0603 ≥ 0.33 μ F; 1206 ≥ 4.7 μ F

≤ 10 % for 0402 ≥ 0.10 μ F; 0603 ≥ 0.47 μ F; 0805 ≥ 2.2 μ F;
1206 ≥ 6.8 μ F

≥ 50 V: ≤ 2.5 %

≤ 3 % for 0603 ≥ 0.047 μ F; 0805 ≥ 0.18 μ F; 1206 ≥ 0.47 μ F

Test Conditions for Capacitance and DF measurement:

For $C \leq 10$ μ F apply $1.0 V_{RMS} \pm 0.2 V_{RMS}$, 1.0 kHz ± 10 %

For $C > 10$ μ F apply $0.5 V_{RMS} \pm 0.2 V_{RMS}$, 120 Hz ± 20 %

Preconditioning for Capacitance Tolerance Measurement:

Perform a heat treatment at 150 °C ± 10 °C for 1 h, then leave in ambient condition for 24 h ± 2 h before measurement

Aging Rate:

≤ 10 V: maximum 1.5 % per decade

≥ 16 V: maximum 1 % per decade

Insulation Resistance (IR):

≥ 10 G Ω or $R \times C \geq 500$ $\Omega \times F$ whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

$\leq 100 V_{DC}$: 250 % of rated voltage



VJ...W1BC X7R Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

Vishay

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
X7R	0402	50	100 pF	100 nF
	0603	100	100 pF	1.0 μF
	0805	100	100 pF	2.2 μF
	1206	100	150 pF	4.7 μF
	1210	100	1.0 nF	10 μF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	Y	101	J	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603 0805 1206 1210	Y = X7R	Two significant digits followed by the number of zeros: 101 = 100 pF 102 = 1000 pF 152 = 1500 pF 103 = 10 000 pF	J = ± 5 % ⁽¹⁾ K = ± 10 % M = ± 20 %	X = Ni Barrier	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V	C = 7" reel/paper P = 13" reel/paper T = 7" reel/blister R = 13" reel/blister	

Note

- ⁽¹⁾ Not all values, see selection chart sizes 0603, 0805, 1206

DIMENSIONS in inches (millimeters)					
	SIZE CODE	L	W	T MAX.	MB
	0402 (1005)	0.040 ± 0.002 (1.00 ± 0.05)	0.020 ± 0.002 (0.50 ± 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
	0603 (1608)	0.063 + 0.006/- 0.004 (1.60 + 0.15/- 0.10)	0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10)	0.038 (0.95)	0.016 ± 0.006 (0.40 ± 0.15)
	0805 (2012)	0.080 ± 0.008 (2.00 ± 0.20)	0.050 ± 0.008 (1.25 ± 0.20)	0.057 (1.45)	0.020 ± 0.008 (0.50 ± 0.20)
	1206 (3216)	0.126 + 0.012/- 0.008 (3.20 + 0.30/- 0.20)	0.063 + 0.012/- 0.008 (1.60 + 0.30/- 0.20)	0.075 (1.90)	0.024 ± 0.008 (0.60 ± 0.20)
	1210 (3225)	0.126 ± 0.016 (3.20 ± 0.40)	0.098 ± 0.012 (2.50 ± 0.30)	0.110 (2.80)	0.060 ± 0.010 (0.75 ± 0.25)

VJ....W1BC X7R Dielectric



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

SELECTION CHART																	
DIELECTRIC		X7R															
STYLE		VJ0402					VJ0603					VJ0805					
EIA CODE		0402					0603					0805					
VOLTAGE (V _{DC})		10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V	
VOLTAGE CODE		Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B	
CAP. CODE	CAP.																
101	100 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
121	120 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
151	150 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
181	180 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
221	220 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
271	270 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
331	330 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
391	390 pF	N	N	N	N		S+	S+	S+	S+	S+	B+	B+	B+	B+	B+	
471	470 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
561	560 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
681	680 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
821	820 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
102	1.0 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
122	1.2 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
152	1.5 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
182	1.8 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
222	2.2 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
272	2.7 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
332	3.3 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
392	3.9 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
472	4.7 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
562	5.6 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
682	6.8 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
822	8.2 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
103	10 nF	N	N	N	N		S	S	S	S	S	B	B	B	B	B	
123	12 nF	N	N	N			S	S	S	S		B	B	B	B	B	
153	15 nF	N	N	N			S	S	S	S		B	B	B	B	B	
183	18 nF	N	N	N			S	S	S	S		B	B	B	B	B	
223	22 nF	N	N	N			S	S	S	S		B	B	B	B	B	
273	27 nF	N	N	N			S	S	S	S		B	B	B	B	D	
333	33 nF	N	N	N			S	S	S	X		B	B	B	B	D	
393	39 nF	N	N	N			S	S	S	X		B	B	B	B	D	
473	47 nF	N	N	N			S	S	S	X		B	B	B	B	D	
563	56 nF	N	N				S	S	S	X		B	B	B	B	D	
683	68 nF	N	N				S	S	S	X		B	B	B	B	D	
823	82 nF	N	N				S	S	S	X		B	B	B	B	D	
104	100 nF	N	N				S	S	S	X		B	B	B	B/D	D	
124	120 nF						S	S	X			B	B	B	D		
154	150 nF						S	S	X			D	D	D	D		
184	180 nF						S	S	X			D	D	D	D		
224	220 nF						S	S	X			D	D	D	D		
274	270 nF						X	X	X			D	D	D			
334	330 nF						X	X	X			D	D	D	I		
394	390 nF						X	X	X			D	D	D			
474	470 nF						X	X	X			D	D	D	I		
564	560 nF						X	X				D	D	D			
684	680 nF						X	X				D	D	D			
824	820 nF						X	X				D	D	D			
105	1.0 μF						X	X				D	D	D			
155	1.5 μF											I					
225	2.2 μF											I	I	I			
335	3.3 μF																
475	4.7 μF																
685	6.8 μF																
106	10 μF																
156	15 μF																
226	22 μF																
336	33 μF																
476	47 μF																
686	68 μF																

Note
 • Letters indicate product thickness, see packaging quantities
 + Not in 5 % (code "J") tolerance



VJ....W1BC X7R Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

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SELECTION CHART											
DIELECTRIC		VJ1206					X7R				
STYLE		1206					VJ1210				
EIA CODE		1206					1210				
VOLTAGE (V _{DC})		10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		Q	J	X	A	B	Q	J	X	A	B
CAP. CODE	CAP.										
101	100 pF										
121	120 pF										
151	150 pF	B +	B +	B +	B +	B +					
181	180 pF	B +	B +	B +	B +	B +					
221	220 pF	B +	B +	B +	B +	B +					
271	270 pF	B +	B +	B +	B +	B +					
331	330 pF	B +	B +	B +	B +	B +					
391	390 pF	B +	B +	B +	B +	B +					
471	470 pF	B	B	B	B	B					
561	560 pF	B	B	B	B	B					
681	680 pF	B	B	B	B	B					
821	820 pF	B	B	B	B	B					
102	1.0 nF	B	B	B	B	B	C	C	C	C	C
122	1.2 nF	B	B	B	B	B	C	C	C	C	C
152	1.5 nF	B	B	B	B	B	C	C	C	C	C
182	1.8 nF	B	B	B	B	B	C	C	C	C	C
222	2.2 nF	B	B	B	B	B	C	C	C	C	C
272	2.7 nF	B	B	B	B	B	C	C	C	C	C
332	3.3 nF	B	B	B	B	B	C	C	C	C	C
392	3.9 nF	B	B	B	B	B	C	C	C	C	C
472	4.7 nF	B	B	B	B	B	C	C	C	C	C
562	5.6 nF	B	B	B	B	B	C	C	C	C	C
682	6.8 nF	B	B	B	B	B	C	C	C	C	C
822	8.2 nF	B	B	B	B	B	C	C	C	C	C
103	10 nF	B	B	B	B	B	C	C	C	C	C
123	12 nF	B	B	B	B	B	C	C	C	C	C
153	15 nF	B	B	B	B	B	C	C	C	C	C
183	18 nF	B	B	B	B	B	C	C	C	C	C
223	22 nF	B	B	B	B	B	C	C	C	C	C
273	27 nF	B	B	B	B	B	C	C	C	C	C
333	33 nF	B	B	B	B	B	C	C	C	C	C
393	39 nF	B	B	B	B	B	C	C	C	C	C
473	47 nF	B	B	B	B	B	C	C	C	C	C
563	56 nF	B	B	B	B	B	C	C	C	C	C
683	68 nF	B	B	B	B	B	C	C	C	C	C
823	82 nF	B	B	B	B	D	C	C	C	C	C
104	100 nF	B	B	B	B	D	C	C	C	C	C
124	120 nF	B	B	B	B	D	C	C	C	C	C
154	150 nF	C	C	C	C	G	C	C	C	C	D
184	180 nF	C	C	C	C	G	C	C	C	C	D
224	220 nF	C	C	C	C	G	C	C	C	C	D
274	270 nF	C	C	C	D		C	C	C	C	G
334	330 nF	C	C	C	D		C	C	C	D	G
394	390 nF	C	C	J	P		C	C	C	D	M
474	470 nF	J	J	J	P		C	C	C	D	M
564	560 nF	J	J	J	P		D	D	D	D	M
684	680 nF	J	J	J	P		D	D	D	D	K
824	820 nF	J	J	J	P		D	D	D	D	K
105	1.0 μF	J	J	J	P		D	D	D	D	K
155	1.5 μF	J	J								
225	2.2 μF	J	J	P				K	G		
335	3.3 μF	P	P	P							
475	4.7 μF	P	P	P			K	K			
685	6.8 μF										
106	10 μF	P					K	K			
156	15 μF										
226	22 μF										
336	33 μF										
476	47 μF										
686	68 μF										
107	100 μF										

Note

- Letters indicate product thickness, see packaging quantities
- + Not in 5 % (code "J") tolerance

VJ....W1BC X7R Dielectric

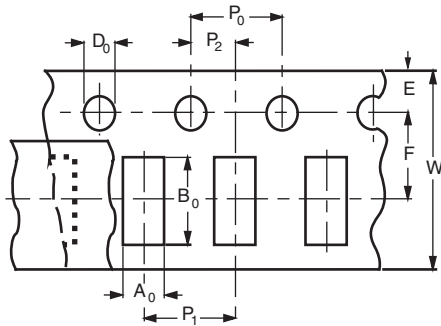


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Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

PACKAGING QUANTITIES						
SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE		PLASTIC TAPE	
			7" REEL (C)	13" REEL (P)	7" REEL (T)	13" REEL (R)
0402 (1002)	0.55	N	10K	50K		
0603 (1608)	0.90	S	4K	15K		
	0.95	X	4K	15K		
0805 (2012)	0.75	A	4K	15K		
	0.95	B	4K	15K		
	1.40	D			3K	10K
	1.45	I			3K	10K
1206 (3216)	0.95	B	4K	15K		
	1.05	C			3K	10K
	1.30	J			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	1.80	H			2K	8K
	1.90	P			2K	
1210 (3225)	1.05	B			2K	10K
	1.05	C			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	2.00	U			2K	4K
	2.20	K			1K	
	2.70	J			1K	4K
	2.80	M			1K	
	2.80	V			1K	4K

PAPER TAPE SPECIFICATION

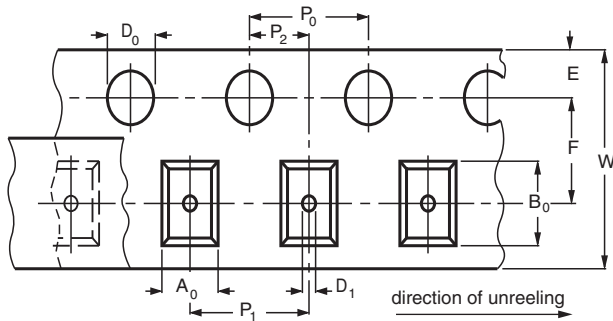


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE			
	0402	0603	0805	1206
A_0	0.62 ± 0.05	1.02 ± 0.05	1.50 ± 0.10	2.00 ± 0.10
B_0	1.12 ± 0.05	1.80 ± 0.05	2.30 ± 0.10	3.50 ± 0.10
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05	1.50 ± 0.05
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	2.00 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

BLISTER TAPE SPECIFICATION

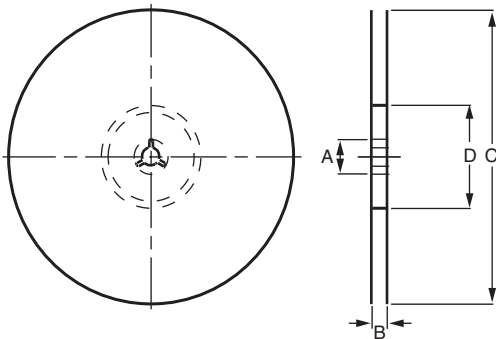


DIMENSIONS OF BLISTER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE		
	0805	1206	1210
A_0	< 1.57	< 2.00	< 2.97
B_0	< 2.45	< 3.70	< 3.73
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.50 ± 0.05	1.50 ± 0.05	1.50 ± 0.05
D_1	1.00 ± 0.10	1.00 ± 0.10	1.00 ± 0.10
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

REEL SPECIFICATIONS

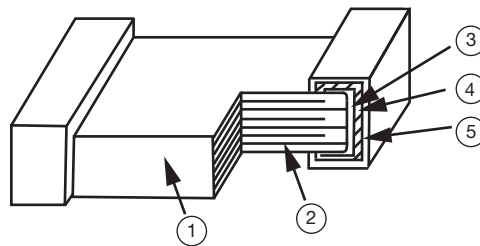


REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	$\varnothing 180 \text{ mm}; 7''$	$\varnothing 330 \text{ mm}; 13''$
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

CONSTRUCTION		
NO.	NAME	X7R
1	Ceramic material	BaTiO ₃ based
2	Inner electrode	Ni
3	Termination	Inner layer
4		Middle layer
5		Outer layer



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications



FEATURES

- Class 3 dielectric
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations
- Dry sheet technology process
- Base Metal Electrode system (BME)
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing
- Mobile applications

ELECTRICAL SPECIFICATION

Note

- Electrical characteristics at 20 °C, 30 % to 70 % related humidity, unless otherwise specified

Operating Temperature: - 25 °C to + 85 °C

Capacitance Range: 10 nF to 100 μ F

Voltage Range: 6.3 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):
+ 30 %/- 80 % without voltage applied

Dissipation Factor (DF):

6.3 V: ≤ 20 %

10 V: ≤ 12.5 %

≤ 20 % for 0402 ≥ 0.47 μ F

16 V: for Cap. < 1 μ F ≤ 7.0 %

≤ 9 % for 0402 ≥ 0.068 μ F; 0603 ≥ 0.68 μ F

≤ 12.5 % for 0402 ≥ 0.22 μ F

16 V: for Cap. ≥ 1 μ F ≤ 9 %

≤ 12.5 % for 0805 ≥ 3.3 μ F; 1206 ≥ 10 μ F; 1210 ≥ 22 μ F

25 V: ≤ 5 %

≤ 7 % for 0402 ≥ 0.047 pF; 0603 ≥ 0.1 μ F; 0805 ≥ 0.33 μ F;

1206 ≥ 1 μ F; 1210 ≥ 4.7 μ F

≤ 9 % for 0402 ≥ 0.068 μ F; 0603 ≥ 0.47 μ F; 1206 ≥ 4.7 μ F

≥ 50 V: ≤ 5.0 %

≤ 7 % for 0603 ≥ 0.1 μ F; 0805 ≥ 0.47 μ F

Test Conditions for Capacitance and DF Measurement:

For $C \leq 10$ μ F apply 1.0 $V_{RMS} \pm 0.2 V_{RMS}$, 1.0 kHz ± 10 %

For $C > 10$ μ F apply 0.5 $V_{RMS} \pm 0.2 V_{RMS}$, 120 Hz ± 20 %

Aging Rate:

6.3 V: 12.5 % maximum per decade

10 V/16 V: 9 % maximum per decade

≥ 25 V: 7 % maximum per decade

Insulation Resistance (IR):

≥ 10 G Ω or $R \times C \geq 500 \Omega \times F$ whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

$\leq 100 V_{DC}$: 250 % of rated voltage

VJ....W1BC Y5V Dielectric



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Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
Y5V	0402	50	10 nF	1.0 μ F
	0603	50	10 nF	2.2 μ F
	0805	100	10 nF	10 μ F
	1206	100	10 nF	22 μ F
	1210	100	10 nF	100 μ F

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	V	101	J	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603 0805 1206 1210	V = Y5V	Two significant digits followed by the number of zeros: 101 = 100 pF 102 = 1000 pF 152 = 1500 pF 103 = 10 000 pF	M = ± 20 % Z = -20 %/ + 80 %	X = Ni Barrier	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V	C = 7" reel/paper P = 13" reel/paper T = 7" reel/blister R = 13" reel/blister	

DIMENSIONS in inches (millimeters)					
	SIZE CODE	L	W	T MAX.	MB
	0402 (1005)	0.040 \pm 0.002 (1.00 \pm 0.05)	0.020 \pm 0.002 (0.50 \pm 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
	0603 (1608)	0.063 + 0.006/- 0.004 (1.60 + 0.15/- 0.10)	0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10)	0.038 (0.95)	0.016 \pm 0.006 (0.40 \pm 0.15)
	0805 (2012)	0.080 \pm 0.008 (2.00 \pm 0.20)	0.050 \pm 0.008 (1.25 \pm 0.20)	0.057 (1.45)	0.020 \pm 0.008 (0.50 \pm 0.20)
	1206 (3216)	0.126 + 0.012/- 0.008 (3.20 + 0.30/- 0.20)	0.063 + 0.012/- 0.008 (1.60 + 0.30/- 0.20)	0.075 (1.90)	0.024 \pm 0.008 (0.60 \pm 0.20)
	1210 (3225)	0.126 \pm 0.016 (3.20 \pm 0.40)	0.098 \pm 0.012 (2.50 \pm 0.30)	0.110 (2.80)	0.060 \pm 0.010 (0.75 \pm 0.25)



VJ...W1BC Y5V Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

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SELECTION CHART																	
DIELECTRIC		Y5V															
STYLE		VJ0402					VJ0603					VJ0805					
EIA CODE		0402					0603					0805					
VOLTAGE (V _{DC})		6.3 V	10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		Y	Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B
CAP. CODE	CAP.																
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		N	N	N	N		S	S	S	S		A	A	A	A	B
123	12 nF		N	N	N	N		S	S	S	S		A	A	A	A	
153	15 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
183	18 nF		N	N	N	N		S	S	S	S		A	A	A	A	
223	22 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
273	27 nF		N	N	N	N		S	S	S	S		A	A	A	A	
333	33 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
393	39 nF		N	N	N			S	S	S	S		A	A	A	A	
473	47 nF		N	N	N			S	S	S	S		A	A	A	A	B
563	56 nF		N	N	N ⁽¹⁾			S	S	S	S		A	A	A	A	
683	68 nF		N	N	N			S	S	S	S		A	A	A	A	B
823	82 nF		N	N				S	S	S	S		A	A	A	A	
104	100 nF		N	N	N			S	S	S	S		A	A	A	A	B
154	150 nF		N					S	S	S	S		A	A	A	A	
224	220 nF	N	N					S	S	S	S		A	A	A	A	
334	330 nF	N	N					S	S	S			B	B	B	B	
474	470 nF	N	N					S	S	X			B	B	B	B	
684	680 nF	N						S	X				B	B	D	D	
105	1.0 μF	N						S	X	X			B	B	D	D	
155	1.5 μF							S					D	D			
225	2.2 μF							S					D	D	I		
335	3.3 μF												D	D			
475	4.7 μF												D	D	I		
685	6.8 μF												I				
106	10 μF												I				
226	22 μF																
336	33 μF																
476	47 μF																
686	68 μF																
107	100 μF																

Notes

- Letters indicate product thickness, please see packaging quantities
- ⁽¹⁾ Not in 20 % (code "M") tolerance

VJ....W1BC Y5V Dielectric



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

SELECTION CHART												
DIELECTRIC		Y5V										
STYLE		VJ1206					VJ1210					
EIA CODE		1206					1210					
VOLTAGE (V _{DC})		10 V	16 V	25 V	50 V	100 V	6.3 V	10 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		Q	J	X	A	B	Y	Q	J	X	A	B
CAP. CODE	CAP.											
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	B	B	B	B	B						C
123	12 nF	B	B	B	B							
153	15 nF	B	B	B	B	B						C
183	18 nF	B	B	B	B							
223	22 nF	B	B	B	B	B						C
273	27 nF	B	B	B	B							
333	33 nF	B	B	B	B	B						C
393	39 nF	B	B	B	B							
473	47 nF	B	B	B	B	B						C
563	56 nF	B	B	B	B							
683	68 nF	B	B	B	B	B						C
823	82 nF	B	B	B	B							
104	100 nF	B	B	B	B	B		C	C	C	C	C
154	150 nF	B	B	B	B	C		C	C	C	C	C
224	220 nF	B	B	B	B	C		C	C	C	C	C
334	330 nF	B	B	B	B			C	C	C	C	C
474	470 nF	B	B	B	B			C	C	C	C	
684	680 nF	B	B	B	B			C	C	C	C	
105	1.0 μF	C	C	C	C			C	C	C	C	
155	1.5 μF	C	C	C				C	C	C		
225	2.2 μF	C	C	C	J ⁽¹⁾			C	C	C	G	
335	3.3 μF	J	J	J				C	C	C		
475	4.7 μF	J	J	J				C	C	D	G	
685	6.8 μF	J	J					C	C	D		
106	10 μF	J	J	P				D	D	G		
226	22 μF	P						K	K			
336	33 μF											
476	47 μF							K	K			
686	68 μF											
107	100 μF							M				

Notes

• Letters indicate product thickness, please see packaging quantities

⁽¹⁾ Not in 20 % (code "M") tolerance



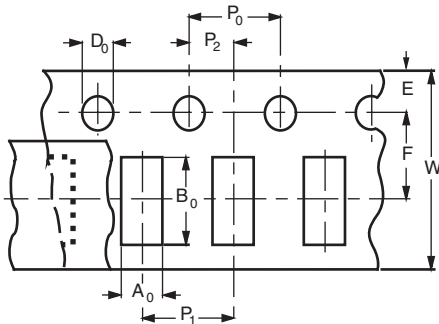
VJ...W1BC Y5V Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for Commodity Applications

Vishay

PACKAGING QUANTITIES						
SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE		PLASTIC TAPE	
			7" REEL (C)	13" REEL (P)	7" REEL (T)	13" REEL (R)
0402 (1002)	0.55	N	10K	50K		
0603 (1608)	0.90	S	4K	15K		
	0.95	X	4K	15K		
0805 (2012)	0.75	A	4K	15K		
	0.95	B	4K	15K		
	1.40	D			3K	10K
	1.45	I			3K	10K
1206 (3216)	0.95	B	4K	15K		
	1.05	C			3K	10K
	1.30	J			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	1.80	H			2K	8K
	1.90	P			2K	
1210 (3225)	1.05	B			2K	10K
	1.05	C			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	2.00	U			2K	4K
	2.20	K			1K	
	2.70	J			1K	4K
	2.80	M			1K	
	2.80	V			1K	4K

PAPER TAPE SPECIFICATION

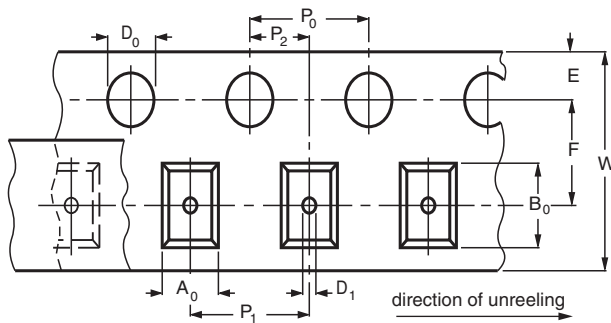


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE			
	0402	0603	0805	1206
A_0	0.62 ± 0.05	1.02 ± 0.05	1.50 ± 0.10	2.00 ± 0.10
B_0	1.12 ± 0.05	1.80 ± 0.05	2.30 ± 0.10	3.50 ± 0.10
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05	1.50 ± 0.05
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	2.00 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

BLISTER TAPE SPECIFICATION

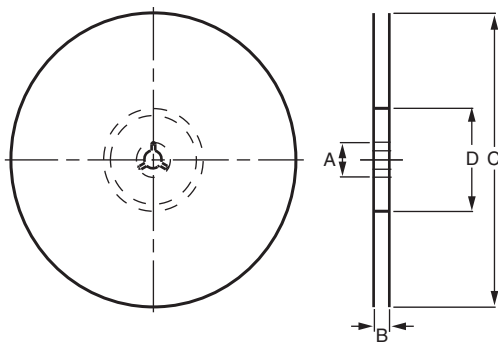


DIMENSIONS OF BLISTER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE		
	0805	1206	1210
A_0	< 1.57	< 2.00	< 2.97
B_0	< 2.45	< 3.70	< 3.73
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.50 ± 0.05	1.50 ± 0.05	1.50 ± 0.05
D_1	1.00 ± 0.10	1.00 ± 0.10	1.00 ± 0.10
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

REEL SPECIFICATIONS

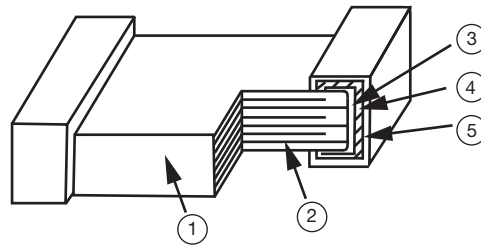


REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	$\varnothing 180 \text{ mm}; 7''$	$\varnothing 330 \text{ mm}; 13''$
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

CONSTRUCTION		
NO.	NAME	Y5V
1	Ceramic material	BaTiO ₃ based
2	Inner electrode	Ni
3	Termination	Inner layer
4		Middle layer
5		Outer layer



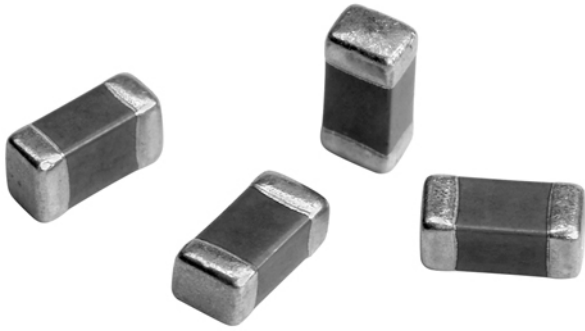
STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors for High Q Commodity Applications



FEATURES

- Ultra stable class 1 dielectric
- High Q and low ESR at high frequency
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations
- Dry sheet manufacturing technology
- Noble Metal Electrode system (NME)
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Mobile telecommunication
- WLAN
- RF modules
- Tuner

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at 25 °C, 30 % to 70 % related humidity, unless otherwise specified

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

Capacitance Range: 0.5 pF to 3300 pF

Voltage Range: 16 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):
± 30 ppm/°C from - 55 °C to + 125 °C

Dissipation Factor:

Cap. < 30 pF: Q ≥ 400 + 20 C

Cap. ≥ 30 pF: Q ≥ 1000

Test Conditions for Capacitance and DF Measurement

Cap. ≤ 1000 pF 1.0 V_{RMS} ± 0.2 V_{RMS}, 1 MHz ± 10 %

Cap. > 1000 pF 1.0 V_{RMS} ± 0.2 V_{RMS}, 1 kHz ± 10 %

Aging Rate: 0 % maximum per decade

Insulation Resistance (IR): after 120 s at U_R (DC)
≥ 10 GΩ or R x C ≥ 500 Ω x F whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

≤ 100 V_{DC}: DWV at 250 % of rated voltage



VJ...W1BC High Q Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for High Q Commodity Applications

Vishay

QUICK REFERENCE DATA

DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
High Q	0402	50	0.5 pF	470 pF
	0603	100	0.5 pF	3.3 nF

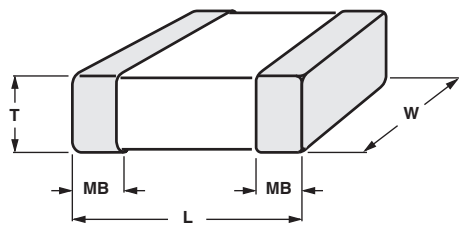
Note

- Detail ratings see selection chart

ORDERING INFORMATION

VJ0402	Q	101	F	X	J	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603	Q = High Q	Two significant digits followed by the number of zeros: 1R0 = 1.0 pF 101 = 100 pF	Cap. value \leq 5 pF B = \pm 0.10 pF C = \pm 0.25 pF 5 pF > Cap. value < 10 pF C = \pm 0.25 pF D = \pm 0.50 pF Cap. value \geq 10 pF F = \pm 1 % G = \pm 2 % J = \pm 5 %	X = Ni barrier 100 % tin termination	J = 16 V X = 25 V A = 50 V B = 100 V	C = 7" reel/paper P = 13" reel/paper	

DIMENSIONS in inches (millimeters)

	SIZE CODE	L	W	T MAX.	MB
	0402 (1005)	0.040 \pm 0.002 (1.00 \pm 0.05)	0.020 \pm 0.002 (0.50 \pm 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
	0603 (1608)	0.063 + 0.006/- 0.004 (1.60 + 0.15/- 0.10)	0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10)	0.038 (0.95)	0.016 \pm 0.006 (0.40 \pm 0.15)

VJ....W1BC High Q Dielectric



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors
for High Q Commodity Applications

SELECTION CHART									
DIELECTRIC		HIGH Q							
STYLE		VJ0402				VJ0603			
EIA CODE		0402				0603			
VOLTAGE (V _{DC})		16 V	25 V	50 V	100 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		J	X	A	B	J	X	A	B
CAP. CODE	CAP.								
0R5	0.5 pF		N	N			S	S	S
1R0	1.0 pF		N	N			S	S	S
1R2	1.2 pF		N	N			S	S	S
1R5	1.5 pF		N	N			S	S	S
1R8	1.8 pF		N	N			S	S	S
2R2	2.2 pF		N	N			S	S	S
2R7	2.7 pF		N	N			S	S	S
3R3	3.3 pF		N	N			S	S	S
3R9	3.9 pF		N	N			S	S	S
4R7	4.7 pF		N	N			S	S	S
5R6	5.6 pF		N	N			S	S	S
6R8	6.8 pF		N	N			S	S	S
8R2	8.2 pF		N	N			S	S	S
100	10 pF		N	N			S	S	S
120	12 pF		N	N			S	S	S
150	15 pF		N	N			S	S	S
180	18 pF		N	N			S	S	S
220	22 pF		N	N			S	S	S
270	27 pF		N	N			S	S	S
330	33 pF		N	N			S	S	S
390	39 pF		N	N			S	S	S
470	47 pF		N	N			S	S	S
560	56 pF		N	N			S	S	S
680	68 pF		N	N			S	S	S
820	82 pF		N	N			S	S	S
101	100 pF		N	N			S	S	S
121	120 pF		N	N			S	S	S
151	150 pF		N	N			S	S	S
181	180 pF		N	N			S	S	S
221	220 pF		N	N			S	S	S
271	270 pF	N	N				S	S	S
331	330 pF	N	N				S	S	S
391	390 pF	N	N				S	S	S
471	470 pF	N	N				S	S	S
561	560 pF						S	S	
681	680 pF						S	S	
821	820 pF						S	S	
102	1000 pF						S	S	
122	1200 pF					X	X		
152	1500 pF					X	X		
182	1800 pF					X	X		
222	2200 pF					X	X		
272	2700 pF					X	X		
332	3300 pF					X	X		
472	4700 pF								
562	5600 pF								
682	6800 pF								
822	8200 pF								
103	10 000 pF								

Note

- Letters indicate product thickness, see packaging quantities



VJ...W1BC High Q Dielectric

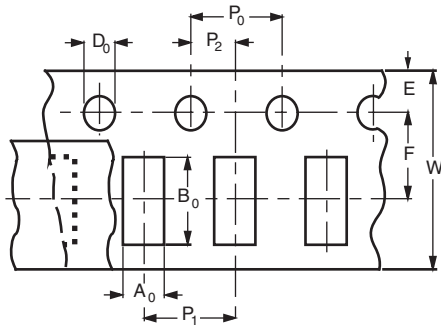
Surface Mount Multilayer Ceramic Chip Capacitors
for High Q Commodity Applications

Vishay

PACKAGING QUANTITIES

SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE	
			7" REEL (C)	13" REEL (P)
0402 (1002)	0.55	N	10K	20K
0603 (1608)	0.95	S, X	4K	15K

PAPER TAPE SPECIFICATION

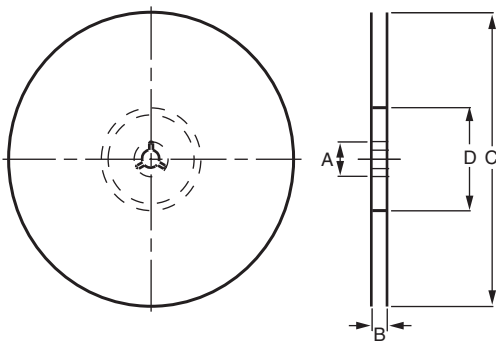


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE	
	0402	0603
A ₀	0.62 ± 0.05	1.02 ± 0.05
B ₀	1.12 ± 0.05	1.80 ± 0.05
W	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05
F	3.50 ± 0.05	3.50 ± 0.05
D ₀	1.55 ± 0.05	1.55 ± 0.05
P ₀	4.00 ± 0.10	4.00 ± 0.10
P ₁	2.00 ± 0.05	4.00 ± 0.10
P ₂	2.00 ± 0.05	2.00 ± 0.05

REEL SPECIFICATIONS



REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	Ø 180 mm; 7"	Ø 330 mm; 13"
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

VJ....W1BC High Q Dielectric

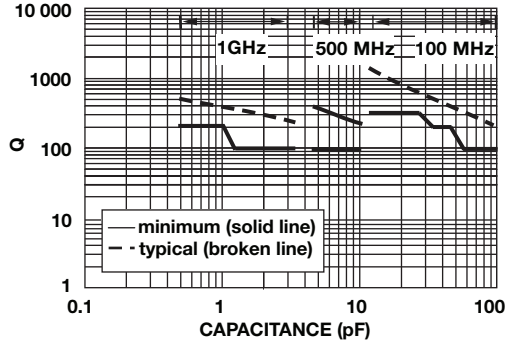


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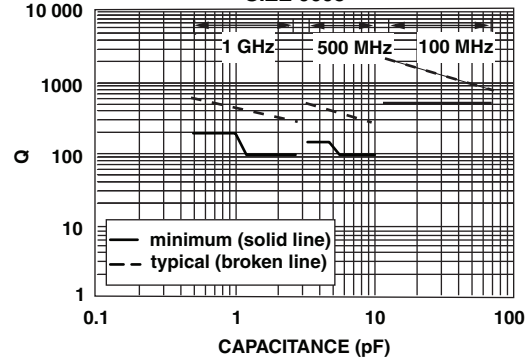
Surface Mount Multilayer Ceramic Chip Capacitors
for High Q Commodity Applications

TYPICAL ELECTRICAL CHARACTERISTICS

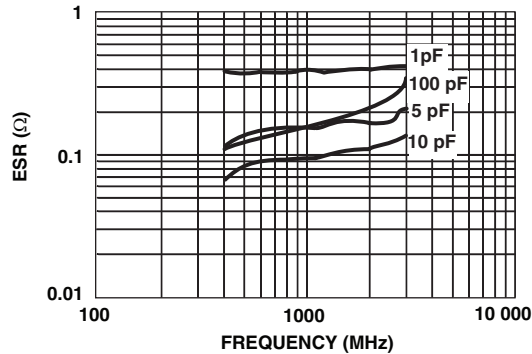
Q VALUE CRITERIA VS. SPECIFIC FREQUENCY
SIZE 0402



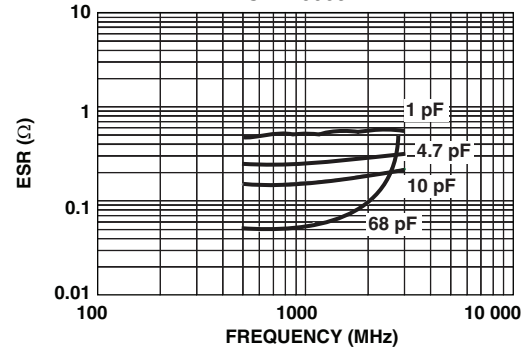
Q VALUE CRITERIA VS. SPECIFIC FREQUENCY
SIZE 0603



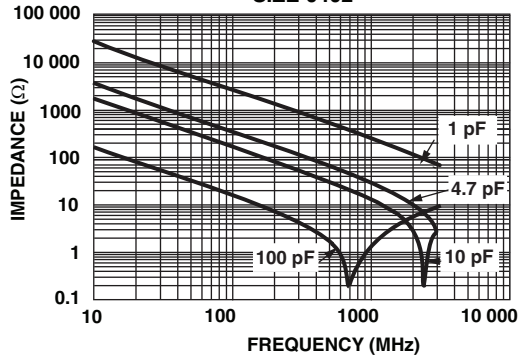
TYPICAL ESR VS. FREQUENCY
SIZE 0402



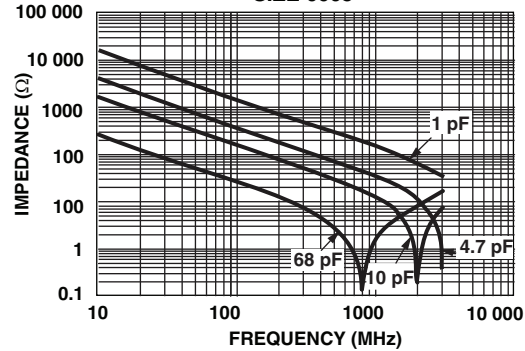
TYPICAL ESR VS. FREQUENCY
SIZE 0603



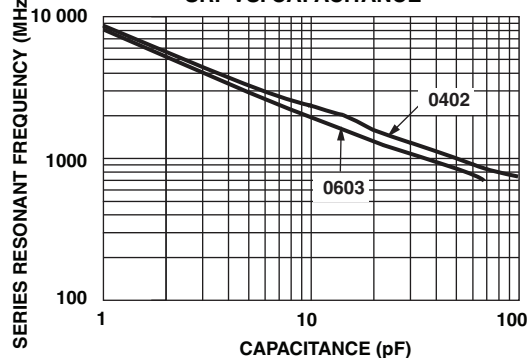
TYPICAL IMPEDANCE VS. FREQUENCY
SIZE 0402



TYPICAL IMPEDANCE VS. FREQUENCY
SIZE 0603



SRF VS. CAPACITANCE



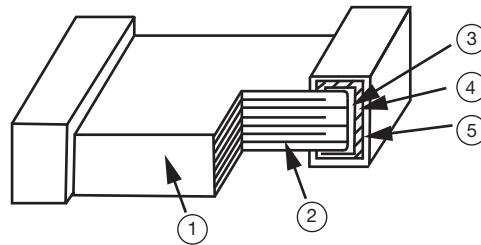


VJ...W1BC High Q Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors
for High Q Commodity Applications

Vishay

CONSTRUCTION			
NO.	NAME	HIGH Q	
1	Ceramic material	BaTiO ₃ based	
2	Inner electrode	AgPd alloy	
3	Termination	Inner layer	Ag
4		Middle layer	Ni
5		Outer layer	Sn



STORAGE AND HANDLING CONDITIONS
<p>(1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.</p> <p>(2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.</p> <p>Cautions:</p> <ul style="list-style-type: none">a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.b. To store products on the shelf and avoid exposure to moisture.c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors for Ultra High Q Commodity Applications



FEATURES

- Ultra stable class 1 dielectric
- Ultra High Q and low ESR at high frequency
- Three standard sizes
- High SRF characteristic
- Ultra low capacitance to 0.1 pF
- High precision capacitance tolerance ± 0.05 pF
- Supplied in tape on reel
- Ni-barrier with 100 % tin terminations
- Dry sheet manufacturing technology
- Base Metal Electrode system (BME)
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Mobile telecommunication
- WLAN
- RF modules
- Tuner

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at 20 °C, 30 % to 70 % related humidity, unless otherwise specified

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

Capacitance Range: 0.1 pF to 47 pF

Voltage Range: 25 V_{DC} to 250 V_{DC}

Temperature Coefficient of Capacitance (TCC):

0 ppm/°C \pm 30 ppm/°C from - 55 °C to + 125 °C

Dissipation Factor:

0201/0402: Q \geq 400 + 20 C

0603: Cap < 30 pF: Q \geq 800 + 20 C

Cap \geq 30 pF: Q \geq 1400

Test Conditions for Capacitance and DF Measurement:

Cap. \leq 1000 pF 1.0 V_{RMS} \pm 0.2 V_{RMS}, 1 MHz \pm 10 %

Cap. > 1000 pF 1.0 V_{RMS} \pm 0.2 V_{RMS}, 1 kHz \pm 10 %

Aging Rate: 0 % maximum per decade

Insulation Resistance (IR): after 120 s at U_R (DC)

\geq 10 G Ω or R x C \geq 500 Ω x F whichever is less

Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA

\leq 100 V_{DC}: DWV at 250 % of rated voltage

250 V_{DC}: DWV at 200 % of rated voltage



VJ....W1BC Ultra High Q/Low ESR

Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra High Q Commodity Applications

Vishay

QUICK REFERENCE DATA

DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
Ultra High Q	0201	25	0.1 pF	18 pF
	0402	50	0.1 pF	22 pF
	0603	250	0.3 pF	470 pF

Note

- Detail ratings see selection chart

ORDERING INFORMATION

VJ0402	L	100	F	X	A	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0201 0402 0603	L = Ultra High Q	Expressed in pF two significant digits followed by the number of zeros: 0R3 = 0.3 pF 1R0 = 1.0 pF 150 = 15 pF	Cap. value \leq 5 pF V = \pm 0.05 pF B = \pm 0.10 pF C = \pm 0.25 pF D = \pm 0.50 pF 5 pF > Cap. value < 10 pF B = \pm 0.10 pF C = \pm 0.25 pF D = \pm 0.50 pF Cap. value \geq 10 pF F = \pm 1 % G = \pm 2 % J = \pm 5 %	X = Ni barrier 100 % tin termination	X = 25 V A = 50 V B = 100 V P = 250 V	C = 7" reel/paper P = 13" reel/paper	

DIMENSIONS in inches [millimeters]

	SIZE CODE	L	W	T MAX.	MB
	0201 (0603)	0.024 \pm 0.0012 (0.60 \pm 0.03)	0.012 \pm 0.0012 (0.30 \pm 0.03)	0.013 (0.33)	0.006 \pm 0.002 (0.15 \pm 0.05)
	0402 (1005)	0.040 \pm 0.002 (1.00 \pm 0.05)	0.020 \pm 0.002 (0.50 \pm 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
	0603 (1608)	0.063 \pm 0.004 (1.60 \pm 0.10)	0.030 \pm 0.004 (0.80 \pm 0.10)	0.035 (0.87)	0.015 \pm 0.006 (0.40 \pm 0.15)

VJ....W1BC Ultra High Q/Low ESR



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra High Q Commodity Applications

SELECTION CHART							
DIELECTRIC		ULTRA HIGH Q					
STYLE		VJ0201	VJ0402	VJ0603			TOLERANCE
EIA CODE		0201	0402	0603			
VOLTAGE V _{DC}		25 V	50 V	50 V	100 V	250 V	
VOLTAGE CODE		X	A	A	B	P	
CAP. CODE	CAP.						
0R1	0.1 pF	L	N				B
0R2	0.2 pF	L	N				V, B
0R3	0.3 pF	L	N	S	S	S	V, B
0R4	0.4 pF	L	N	S	S	S	V, B
0R5	0.5 pF	L	N	S	S	S	V, B, C
0R6	0.6 pF	L	N	S	S	S	V, B, C
0R7	0.7 pF	L	N	S	S	S	V, B, C
0R8	0.8 pF	L	N	S	S	S	V, B, C
0R9	0.9 pF	L	N	S	S	S	V, B, C
1R0	1.0 pF	L	N	S	S	S	V, B, C
1R2	1.2 pF	L	N	S	S	S	V, B, C
1R5	1.5 pF	L	N	S	S	S	V, B, C
1R8	1.8 pF	L	N	S	S	S	V, B, C
2R2	2.2 pF	L	N	S	S	S	V, B, C
2R4	2.4 pF					S	V, B, C
2R7	2.7 pF	L	N	S	S	S	V, B, C
3R3	3.3 pF	L	N	S	S	S	V, B, C
3R9	3.9 pF	L	N	S	S	S	V, B, C
4R7	4.7 pF	L	N	S	S	S	V, B, C
5R6	5.6 pF	L	N	S	S	S	B, C, D
6R8	6.8 pF	L	N	S	S	S	B, C, D
8R2	8.2pF	L	N	S	S	S	B, C, D
100	10 pF	L	N	S	S	S	F, G, J
110	11 pF	L	N	S	S	S	F, G, J
120	12 pF	L	N	S	S	S	F, G, J
130	13 pF	L	N	S	S	S	F, G, J
150	15 pF	L	N	S	S	S	F, G, J
160	16 pF	L	N	S	S	S	F, G, J
180	18 pF	L	N	S	S	S	F, G, J
200	20 pF		N	S	S	S	F, G, J
220	22 pF		N	S	S	S	F, G, J
240	24 pF			S	S	S	F, G, J
270	27 pF			S	S	S	F, G, J
300	30 pF			S	S	S	F, G, J
330	33 pF			S	S	S	F, G, J
360	36 pF			S	S	S	F, G, J
390	39 pF			S	S	S	F, G, J
430	43 pF			S	S	S	F, G, J
470	47 pF			S	S	S	F, G, J

Note

- Letters indicate product thickness, see packaging quantities



VJ....W1BC Ultra High Q/Low ESR

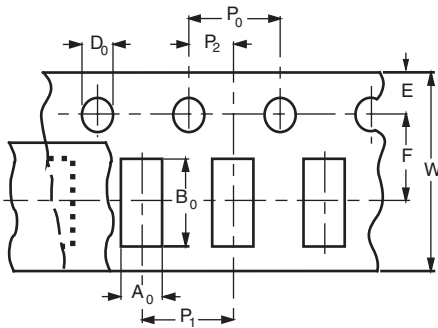
Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra High Q Commodity Applications

Vishay

PACKAGING QUANTITIES

SIZE CODE (inch/mm)	THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE	
			7" REEL (C)	13" REEL (P)
0201 (0603)	0.30 ± 0.03	L	15K	-
0402 (1002)	0.50 ± 0.05	N	10K	50K
0603 (1608)	0.80 ± 0.07	S	4K	10K

PAPER TAPE SPECIFICATION

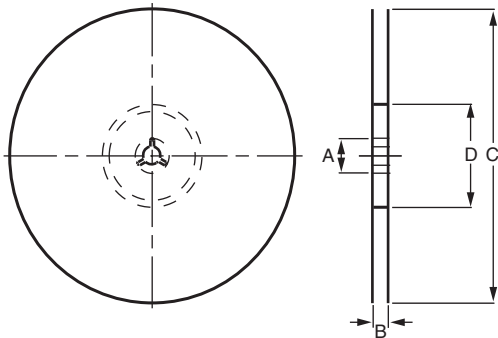


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE		
	0201	0402	0603
A ₀	0.37 ± 0.03	0.62 ± 0.05	1.02 ± 0.05
B ₀	0.67 ± 0.03	1.12 ± 0.05	1.82 ± 0.05
W	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D ₀	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05
P ₀	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P ₁	2.00 ± 0.05	2.00 ± 0.05	4.00 ± 0.10
P ₂	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

REEL SPECIFICATIONS



REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	Ø 180 mm; 7"	Ø 330 mm; 13"
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

VJ....W1BC Ultra High Q/Low ESR

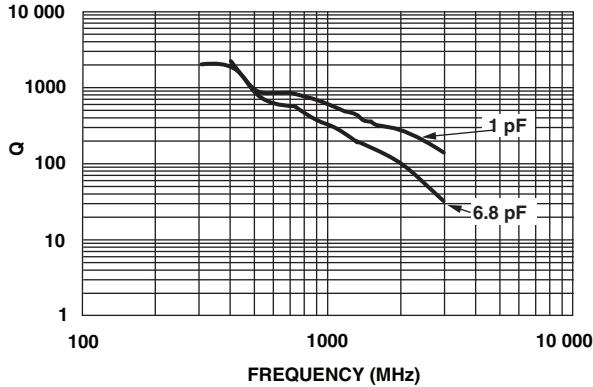


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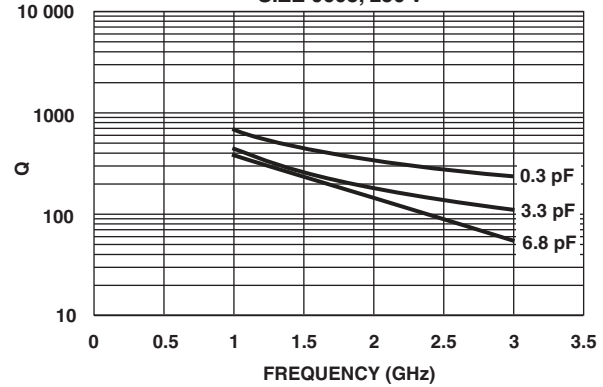
Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra High Q Commodity Applications

ELECTRICAL CHARACTERISTICS

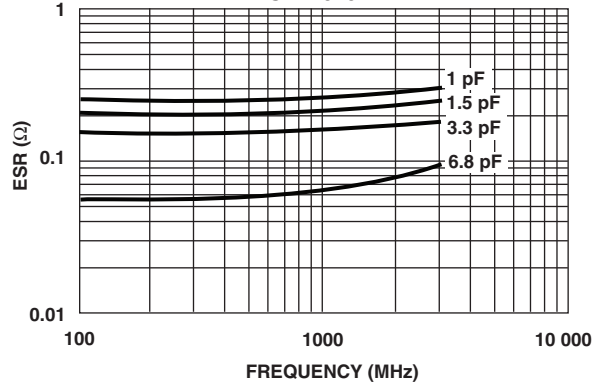
TYPICAL Q VALUE VS. FREQUENCY
SIZE 0402



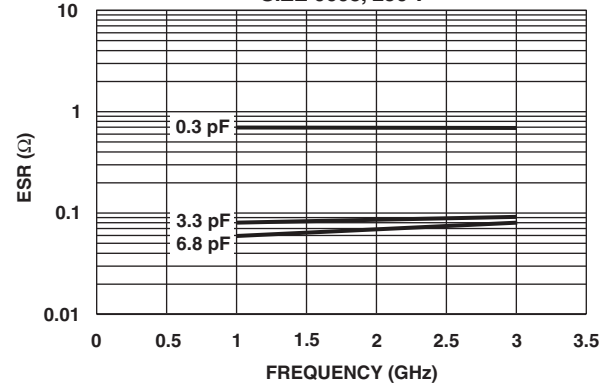
TYPICAL Q VALUE VS. FREQUENCY
SIZE 0603, 250 V



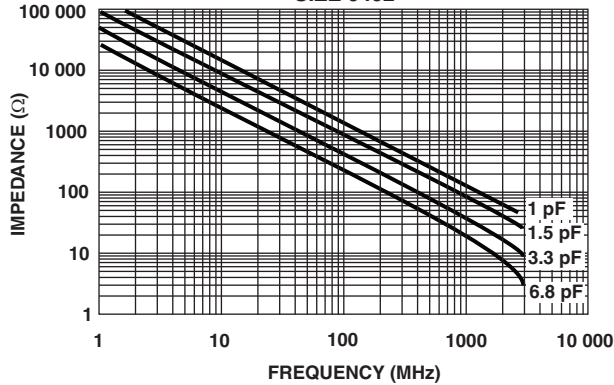
TYPICAL ESR VS. FREQUENCY
SIZE 0402



TYPICAL ESR VS. FREQUENCY
SIZE 0603, 250 V



TYPICAL IMPEDANCE VS. FREQUENCY
SIZE 0402



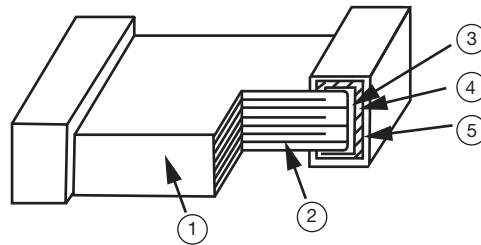


VJ....W1BC Ultra High Q/Low ESR

Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra High Q Commodity Applications

Vishay

CONSTRUCTION			
NO.	NAME	ULTRA HIGH Q	
1	Ceramic material	BaTiO ₃ based	
2	Inner electrode	Cu	
3	Termination	Inner layer	Cu
4		Middle layer	Ni
5		Outer layer	Sn



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- To store products on the shelf and avoid exposure to moisture.
- Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors for Ultra Small Commodity Applications



FEATURES

- High capacitance in unit size
- High precision dimensional tolerances
- Suitably used in high-accuracy automatic mounting machine
- Dry sheet manufacturing technology
- Noble Metal Electrode system (NME) for C0G (NP0)
- Base Metal Electrode system (BME) for X5R, X7R
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Miniature microwave module
- Portable equipment - mobile phone, PDA
- High frequency circuits

ELECTRICAL SPECIFICATIONS			
Size	0201		
Dielectric	C0G (NP0)	X7R	X5R
Capacitance	0.5 pF to 100 pF	100 pF to 10 nF	100 pF to 100 nF
Capacitance Tolerance ⁽²⁾	Cap. ≤ 5 pF: B (± 0.1 pF), C (± 0.25 pF) 5 pF < Cap. < 10 pF: C (± 0.25 pF), D (± 0.5 pF) Cap. ≥ 10 pF: F (± 1 %), G (2 %), J (5 %), K (± 10 %)	J (± 5 %) K (± 10 %) M (± 20 %)	J (± 5 %) K (± 10 %) M (± 20 %)
Rated Voltage (V _{DC})	16 V, 25 V, 50 V	10 V, 16 V, 50 V	6.3 V, 10 V, 16 V, 50 V
tan δ/Q ⁽¹⁾	Cap. < 30 pF, Q ≥ 400 + 20 C Cap. ≥ 30 pF, Q ≥ 1000	10 V ≤ 5 % 16 V: ≤ 3.5 % 50 V: ≤ 3.0 %	6.3 V: ≤ 10 % 10 V: ≤ 5.0 % 16 V: ≤ 3.5 % 50 V: ≤ 3.0 %
Insulation Resistance at U _R	≥ 10 GΩ	≥ 10 GΩ or R x C ≥ 500 ΩF, whichever is less	
Operating Temperature	- 55 °C to + 125 °C		- 55 °C to + 85 °C
Capacitance Change	± 30 ppm	± 15 %	
Termination	Ni/Sn lead (Pb)-free termination		

Notes

⁽¹⁾ Measured at 30 % ~ 70 % related humidity

NP0: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 MHz ± 10 % at the conditions of 25 °C ambient temperature

X7R, X5R: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 % at the conditions of 25 °C ambient temperature

⁽²⁾ Preconditioning for X5R, X7R MLCC: Perform a heat treatment at 150 °C ± 10 °C for 1 h, then leave in ambient condition for 24 h ± 2 h before measurement.



VJ0201....W1BC Ultra Small Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra Small Commodity Applications

Vishay

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0201	50	0.5 pF	100 pF
X7R	0201	50	100 pF	10 nF
X5R	0201	50	100 pF	100 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0201	A	100	J	X	X	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	RATED VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0201	A = C0G (NP0) Y = X7R G = X5R	Two significant digits followed by the number of zeros. R is in place of decimal point: 0R5 = 0.5 pF 1R0 = 1.0 pF 100 = 10 pF	C = ± 0.25 pF D = ± 0.5 pF J = ± 5 % K = ± 10 % M = ± 20 %	X = Ni Barrier	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V	C = 7" reel/paper tape	

DIMENSIONS in inches (millimeters)					
	SIZE CODE	L	W	T MAX.	MB
	0201 (0603)	0.024 ± 0.0012 (0.60 ± 0.03)	0.012 ± 0.0012 (0.30 ± 0.03)	0.013 (0.33)	0.006 ± 0.002 (0.15 ± 0.05)

VJ0201....W1BC Ultra Small Series



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Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra Small Commodity Applications

SELECTION CHART											
DIELECTRIC		C0G (NP0)			X7R			X5R			
STYLE		VJ0201									
EIA CODE		0201									
VOLTAGE V _{DC}		16 V	25 V	50 V	10 V	16 V	50 V	6.3 V	10 V	16 V	50 V
VOLTAGE CODE		J	X	A	Q	J	A	Y	Q	J	A
CAP. CODE	CAP.										
0R5	0.5 pF		L	L							
1R0	1.0 pF		L	L							
1R2	1.2 pF		L	L							
1R5	1.5 pF		L	L							
1R8	1.8 pF		L	L							
2R2	2.2 pF		L	L							
2R7	2.7 pF		L	L							
3R3	3.3 pF		L	L							
3R9	3.9 pF		L	L							
4R7	4.7 pF		L	L							
5R6	5.6 pF		L	L							
6R8	6.8 pF		L	L							
8R2	8.2 pF		L	L							
100	10 pF		L	L							
120	12 pF		L	L							
150	15 pF		L	L							
180	18 pF		L	L							
220	22 pF		L	L							
270	27 pF		L	L							
330	33 pF		L	L							
390	39 pF		L	L							
470	47 pF		L	L							
560	56 pF	L	L								
680	68 pF	L	L								
820	82 pF	L	L								
101	100 pF	L	L			L	L				L
121	120 pF					L	L				L
151	150 pF					L	L				L
181	180 pF					L	L				L
221	220 pF					L	L				L
271	270 pF					L	L				L
331	330 pF					L	L				L
391	390 pF					L	L				L
471	470 pF					L	L				L
561	560 pF					L	L				L
681	680 pF					L	L				L
821	820 pF					L	L				L
102	1000 pF				L	L	L			L	L
152	1500 pF				L	L			L	L	
222	2200 pF				L	L			L	L	
332	3300 pF				L	L			L	L	
472	4700 pF				L	L			L	L	
682	6 800 pF				L				L		
103	0.010 μF				L				L		
153	0.015 μF							L			
223	0.022 μF							L			
333	0.033 μF							L			
473	0.047 μF							L			
683	0.068 μF							L			
104	0.10 μF							L			

Note

- Letters indicate product thickness, see packaging quantities



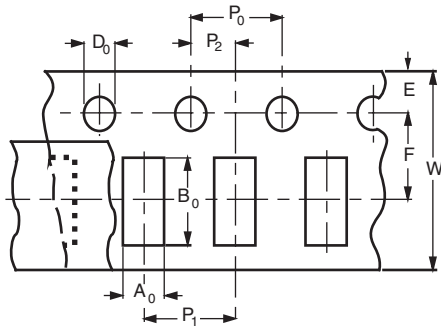
VJ0201....W1BC Ultra Small Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra Small Commodity Applications

Vishay

PACKAGING QUANTITIES			
SIZE CODE (inch/mm)	THICKNESS (mm)	PAPER TAPE	
		7" REEL (C)	13" REEL (P)
0201 (0603)	0.30 ± 0.03	15K	-

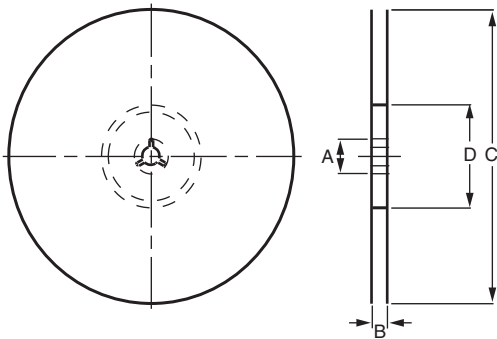
PAPER TAPE SPECIFICATIONS



DIMENSIONS OF PAPER TAPE in millimeters

SYM.	PRODUCT SIZE CODE
	0201
A ₀	0.38 ± 0.05
B ₀	0.68 ± 0.05
W	8.00 ± 0.10
E	1.75 ± 0.05
F	3.50 ± 0.05
D ₀	1.55 ± 0.05
P ₀	4.00 ± 0.10
P ₁	2.00 ± 0.05
P ₂	2.00 ± 0.05

REEL SPECIFICATION



REEL DIMENSIONS AND TAPE WIDTH in millimeters

	Ø 180 mm; 7"	Ø 330 mm; 13"
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

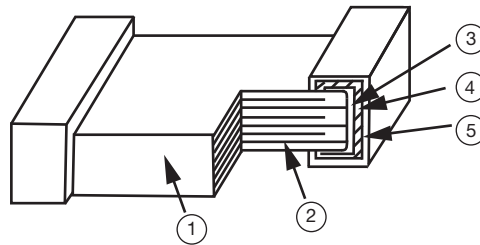
VJ0201....W1BC Ultra Small Series



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Surface Mount Multilayer Ceramic Chip Capacitors
for Ultra Small Commodity Applications

CONSTRUCTION				
NO.	NAME		COG (NP0)	X5R, X7R
1	Ceramic material		BaTiO ₃ based	
2	Inner electrode		AgPd alloy	Ni
3	Termination	Inner layer	Ag	Cu
4		Middle layer	Ni	
5		Outer layer	Sn	



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Ceramic Chip Capacitors Array for Commodity Applications



FEATURES

- High density mounting due to mounting space saving
- Mounting cost saving
- Increased throughput
- Dry sheet manufacturing technology
- Noble Metal Electrode system (NME) for C0G (NP0)
- Base Metal Electrode system (BME) for X7R, Y5V
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- For use as a bypass for digital and analog signal line noise
- Computer motherboards and peripherals
- The common electronic circuits

ELECTRICAL SPECIFICATION			
Size	4 x 0603		
Dielectric	C0G (NP0)	X7R	Y5V
Capacitance ⁽¹⁾	10 pF to 470 pF	180 pF to 100 nF	10 nF to 100 nF
Capacitance Tolerance ⁽²⁾	J (± 5 %), K (± 10 %)	K (± 10 %), M (± 20 %)	Z (- 20 %/+ 80 %)
Rated Voltage (V _{DC})	50 V	16 V, 50 V	50 V
tan δ/Q ⁽¹⁾	Cap. < 30 pF: Q ≥ 400 + 20 C Cap. ≥ 30 pF: Q ≥ 1000	U _R = 50 V: ≤ 2.5 % U _R = 16 V: ≤ 3.5 %	≤ 5 %
Insulation Resistance at U _R	≥ 10 GΩ	≥ 10 GΩ or R x C ≥ 500 Ω x F, whichever is less	
Operating Temperature	- 55 °C to + 125 °C		- 25 °C to + 85 °C
Capacitance Change	± 30 ppm	± 15 %	+ 30 %/- 80 %
Termination	Ni/Sn lead (Pb)-free termination		

Notes

⁽¹⁾ Measured at 30 % ~ 70 % related humidity

NP0: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 MHz ± 10 % at the conditions of 25 °C ambient temperature

X7R: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 % at the conditions of 25 °C ambient temperature

Y5V: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 % at the conditions of 20 °C ambient temperature

⁽²⁾ Preconditioning for X7R, Y5V MLCC: Perform a heat treatment at 150 °C ± 10 °C for 1 h, then leave in ambient condition for 24 h ± 2 h before measurement.

VJ06C4....W1BC MLCC Chip Array



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Surface Mount Multilayer Ceramic Chip Capacitors
Array for Commodity Applications

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0612	50	10 pF	470 pF
X7R	0612	50	180 pF	100 nF
Y5V	0612	50	10 nF	100 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ06C4	A	100	J	X	A	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	RATED VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
06C4	A = C0G (NP0) Y = X7R G = Y5V	Two significant digits followed by the number of zeros. R is in place of decimal point: 100 = 10 pF 101 = 100 pF	J = ± 5 % K = ± 10 % M = ± 20 % Z = - 20 %/ + 80 %	X = Ni Barrier	J = 16 V A = 50 V	C = 7" reel/paper tape	

DIMENSIONS in inches (millimeters)							
	SIZE	L	W	T MAX.	S	BW	P
	0612 (1632)	0.125 ± 0.006 (3.20 ± 0.15)	0.063 ± 0.006 (1.60 ± 0.15)	0.036 (0.90)	0.012 ± 0.008 (0.30 ± 0.20)	0.016 ± 0.006 (0.40 ± 0.15)	0.031 ± 0.006 (0.80 ± 0.15)



VJ06C4....W1BC MLCC Chip Array

Surface Mount Multilayer Ceramic Chip Capacitors
Array for Commodity Applications

Vishay

SELECTION CHART					
DIELECTRIC		COG (NP0)	X7R		Y5V
STYLE		VJ06C4			
EIA CODE		0612 (4 x 0603)			
VOLTAGE V_{DC}		50 V	16 V	50 V	50 V
VOLTAGE CODE		A	J	A	A
CAP. CODE	CAP.				
100	10 pF	B			
150	15 pF	B			
220	22 pF	B			
330	33 pF	B			
470	47 pF	B			
680	68 pF	B			
101	100 pF	B			
151	150 pF	B			
181	180 pF	B		B	
221	220 pF	B		B	
271	270 pF	B			
331	330 pF	B		B	
471	470 pF	B		B	
102	1.0 nF			B	
152	1.5 nF			B	
222	2.2 nF			B	
332	3.3 nF			B	
472	4.7 nF			B	
682	6.8 nF			B	
103	10 nF			B	B
153	15 nF		B	B	B
223	22 nF		B	B	B
333	33 nF		B		B
473	47 nF		B		B
683	68 nF		B		B
104	100 nF		B		B

Note

- Letters indicate product thickness, see packaging quantities

VJ06C4....W1BC MLCC Chip Array

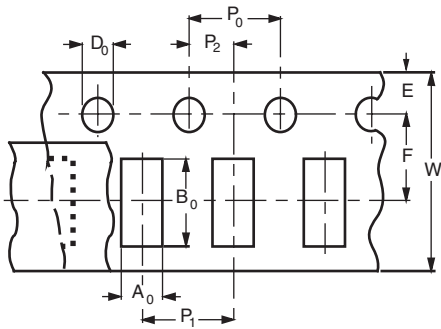


Vishay

Surface Mount Multilayer Ceramic Chip Capacitors
Array for Commodity Applications

PACKAGING QUANTITIES			
SIZE CODE	THICKNESS (mm)	PAPER TAPE	
		7" REEL (C)	13" REEL (P)
06C4 (4 x 0603)	0.80 ± 0.10	4K	-

PAPER TAPE SPECIFICATIONS

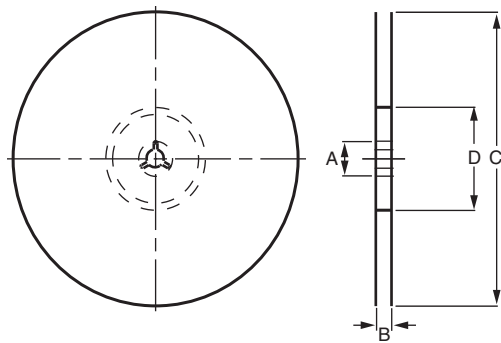


DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE
	06C4 (4 x 0603)
A_0	2.00 ± 0.10
B_0	3.50 ± 0.10
W	8.00 ± 0.10
E	1.75 ± 0.05
F	3.50 ± 0.05
D_0	1.50 ± 0.05
P_0	4.00 ± 0.10
P_1	4.00 ± 0.10
P_2	2.00 ± 0.05

REEL SPECIFICATION



REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	Ø 180 mm; 7"	Ø 330 mm; 13"
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

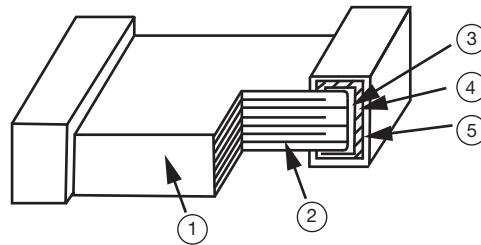


VJ06C4....W1BC MLCC Chip Array

Surface Mount Multilayer Ceramic Chip Capacitors
Array for Commodity Applications

Vishay

CONSTRUCTION			
NO.	NAME	COG (NP0), X7R, Y5V	
1	Ceramic material	BaTiO ₃ based	
2	Inner electrode	Ni	
3	Termination	Inner layer	Cu
4		Middle layer	Ni
5		Outer layer	Sn



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Surface Mount Multilayer Chip Capacitors for Commodity Solutions

Below tables are test procedures and requirements unless specified in detail datasheet

VJ....W1BC TEST PROCEDURES AND REQUIREMENTS																																																																					
TEST	PROCEDURE	REQUIREMENTS																																																																			
1) Visual and mechanical		<ul style="list-style-type: none"> No remarkable defect Dimensions should confirm to individual specification sheet. 																																																																			
2) Capacitance		<ul style="list-style-type: none"> Shall not exceed the limits given in the detailed specification. <p>C0G (NP0): Cap. ≥ 30 pF: Q ≥ 1000 Cap. < 30 pF: Q ≥ 400 °C + 20 C</p> <p>X7R, X5R:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>DF</th> <th colspan="2">EXCEPTION OF DF</th> </tr> </thead> <tbody> <tr> <td>≥ 50 V</td> <td>≤ 2.5 %</td> <td>≤ 3 %</td> <td>0603 ≥ 0.047 μF, 0805 ≥ 0.18 μF, 1206 ≥ 0.47 μF</td> </tr> <tr> <td rowspan="3">25 V</td> <td rowspan="3">≤ 3.5 %</td> <td>≤ 5 %</td> <td>0805 ≥ 1 μF, 1210 ≥ 10 μF</td> </tr> <tr> <td>≤ 7 %</td> <td>0603 ≥ 0.33 μF, 1206 ≥ 4.7 μF,</td> </tr> <tr> <td>≤ 10 %</td> <td>0402 ≥ 0.10 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 ≥ 6.8 μF</td> </tr> <tr> <td rowspan="2">16 V</td> <td rowspan="2">≤ 3.5 %</td> <td>≤ 5 %</td> <td>0402 ≥ 0.033 μF, 0603 ≥ 0.15 μF, 0805 ≥ 0.68 μF, 1206 ≥ 2.2 μF, 1210 ≥ 4.7 μF</td> </tr> <tr> <td>≤ 10 %</td> <td>0603 ≥ 0.68 μF, 0805 ≥ 2.2 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF</td> </tr> <tr> <td rowspan="2">10 V</td> <td rowspan="2">≤ 5.0 %</td> <td>≤ 10 %</td> <td>0402 ≥ 0.33 μF, 0603 ≥ 0.33 μF, 0805 ≥ 2.2 μF, 1206 ≥ 2.2 μF, 1210 ≥ 22 μF</td> </tr> <tr> <td>≤ 15 %</td> <td>0201 ≥ 0.1 μF, 0402 ≥ 1 μF</td> </tr> <tr> <td rowspan="2">6.3 V</td> <td rowspan="2">≤ 10 %</td> <td>≤ 15 %</td> <td>0603 ≥ 10 μF, 0805 ≥ 4.7 μF, 1210 ≥ 100 μF</td> </tr> <tr> <td>≤ 20 %</td> <td>0402 ≥ 2.2 μF</td> </tr> </tbody> </table> <p>Y5V:</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>DF</th> <th colspan="2">EXCEPTION OF DF</th> </tr> </thead> <tbody> <tr> <td>≥ 50 V</td> <td>≤ 5.0 %</td> <td>≤ 7 %</td> <td>0603 ≥ 0.1 μF, 0805 ≥ 0.47 μF, 1206 ≥ 4.7 μF</td> </tr> <tr> <td rowspan="2">25 V</td> <td rowspan="2">≤ 5.0 %</td> <td>≤ 7 %</td> <td>0402 ≥ 0.047 μF, 0603 ≥ 0.1 μF, 0805 ≥ 0.33 μF, 1206 ≥ 1 μF, 1210 μF ≥ 4.7 μF</td> </tr> <tr> <td>≤ 9 %</td> <td>0402 ≥ 0.068 μF, 0603 ≥ 0.47 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF</td> </tr> <tr> <td rowspan="2">16 V (C < 1.0 μF)</td> <td rowspan="2">≤ 7.0 %</td> <td>≤ 9 %</td> <td>0402 ≥ 0.068 μF, 0603 ≥ 0.68 μF</td> </tr> <tr> <td>≤ 12.5 %</td> <td>0402 ≥ 0.22 μF</td> </tr> <tr> <td>16 V (C ≥ 1 μF)</td> <td>≤ 9.0 %</td> <td>≤ 12.5 %</td> <td>0603 ≥ 2.2 μF, 0805 ≥ 3.3 μF, 1206 ≥ 10 μF, 1210 μF ≥ 22 μF, 1812 ≥ 47 μF</td> </tr> <tr> <td>10 V</td> <td>≤ 12.5 %</td> <td>≤ 20 %</td> <td>0402 ≥ 0.47 μF</td> </tr> <tr> <td>6.3 V</td> <td>≤ 20 %</td> <td>-</td> <td>-</td> </tr> </tbody> </table>		RATED VOLTAGE	DF	EXCEPTION OF DF		≥ 50 V	≤ 2.5 %	≤ 3 %	0603 ≥ 0.047 μ F, 0805 ≥ 0.18 μ F, 1206 ≥ 0.47 μ F	25 V	≤ 3.5 %	≤ 5 %	0805 ≥ 1 μ F, 1210 ≥ 10 μ F	≤ 7 %	0603 ≥ 0.33 μ F, 1206 ≥ 4.7 μ F,	≤ 10 %	0402 ≥ 0.10 μ F, 0603 ≥ 0.47 μ F, 0805 ≥ 2.2 μ F, 1206 ≥ 6.8 μ F	16 V	≤ 3.5 %	≤ 5 %	0402 ≥ 0.033 μ F, 0603 ≥ 0.15 μ F, 0805 ≥ 0.68 μ F, 1206 ≥ 2.2 μ F, 1210 ≥ 4.7 μ F	≤ 10 %	0603 ≥ 0.68 μ F, 0805 ≥ 2.2 μ F, 1206 ≥ 4.7 μ F, 1210 ≥ 22 μ F	10 V	≤ 5.0 %	≤ 10 %	0402 ≥ 0.33 μ F, 0603 ≥ 0.33 μ F, 0805 ≥ 2.2 μ F, 1206 ≥ 2.2 μ F, 1210 ≥ 22 μ F	≤ 15 %	0201 ≥ 0.1 μ F, 0402 ≥ 1 μ F	6.3 V	≤ 10 %	≤ 15 %	0603 ≥ 10 μ F, 0805 ≥ 4.7 μ F, 1210 ≥ 100 μ F	≤ 20 %	0402 ≥ 2.2 μ F	RATED VOLTAGE	DF	EXCEPTION OF DF		≥ 50 V	≤ 5.0 %	≤ 7 %	0603 ≥ 0.1 μ F, 0805 ≥ 0.47 μ F, 1206 ≥ 4.7 μ F	25 V	≤ 5.0 %	≤ 7 %	0402 ≥ 0.047 μ F, 0603 ≥ 0.1 μ F, 0805 ≥ 0.33 μ F, 1206 ≥ 1 μ F, 1210 μ F ≥ 4.7 μ F	≤ 9 %	0402 ≥ 0.068 μ F, 0603 ≥ 0.47 μ F, 1206 ≥ 4.7 μ F, 1210 ≥ 22 μ F	16 V (C < 1.0 μ F)	≤ 7.0 %	≤ 9 %	0402 ≥ 0.068 μ F, 0603 ≥ 0.68 μ F	≤ 12.5 %	0402 ≥ 0.22 μ F	16 V (C ≥ 1 μ F)	≤ 9.0 %	≤ 12.5 %	0603 ≥ 2.2 μ F, 0805 ≥ 3.3 μ F, 1206 ≥ 10 μ F, 1210 μ F ≥ 22 μ F, 1812 ≥ 47 μ F	10 V	≤ 12.5 %	≤ 20 %	0402 ≥ 0.47 μ F	6.3 V	≤ 20 %	-	-
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3) Q/DF (dissipation factor)	<p>Class 1: C0G (NP0) Cap. ≤ 1000 pF; $1.0 V_{RMS} \pm 0.2 V_{RMS}$; 1 MHz ± 10 % Cap. > 1000 pF; $1.0 V_{RMS} \pm 0.2 V_{RMS}$ 1 kHz ± 10 %</p> <p>Class 2: X7R, X5R, Y5V Cap. ≤ 10 μF; $1.0 V_{RMS} \pm 0.2 V_{RMS}$; 1 kHz ± 10 %</p> <p>Cap. > 10 μF; $0.5 V_{RMS} \pm 0.2 V_{RMS}$ 120 Hz ± 20 %</p>																																																																				



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TEST	PROCEDURE		REQUIREMENTS	
4) Dielectric strength	<ul style="list-style-type: none"> To apply voltage (≤ 100 V) 250 % Duration: 1 s to 5 s Charge and discharge current less than 50 mA 		<ul style="list-style-type: none"> No evidence of damage or flash-over during test 	
	<ul style="list-style-type: none"> To apply voltage 200 V to 300 V ≥ 2 times V_{DC} 500 V to 999 V ≥ 1.5 times V_{DC} 1000 V to 3000 V ≥ 1.2 times V_{DC} Cut-off, set at 10 mA TEST = 15 s RAMP = 0 			
5) Insulation resistance	Rated voltage ≤ 100 V: To apply rated voltage for max. 120 s		≥ 10 G Ω or $R \times C \geq 500$ Ω F whichever is smaller Class 2 (X7R, X5R, Y5V):	
			RATED VOLTAGE	INSULATION RESISTANCE
			100 V: X7R	$R \times C \geq 100$ Ω F
			16 V: 0402 ≥ 0.22 μ F	
			10 V: 0201 ≥ 47 nF, 0402 ≥ 0.47 μ F, 0603 ≥ 0.47 μ F, 0805 ≥ 2.2 μ F, 1206 ≥ 4.7 μ F, 1210 ≥ 47 μ F	
		6.3 V		
	Rated voltage: 200 V to 500 V	To apply rated voltage (500 V max.) for 60 s	≥ 10 G Ω or $R \times C > 100$ Ω F whichever is smaller	
	Rated voltage: ≥ 630 V	To apply 500 V for 60 s	≥ 10 G Ω	
6) Temperature coefficient	With no electrical load:			
	T.C.	Operating Temp.	T.C.	Capacitance change
	C0G (NP0)	- 55 to 125 °C at 25 °C	C0G (NP0)	Within ± 30 ppm/°C
	X7R	- 55 to 125 °C at 25 °C	X7R	Within ± 15 %
	X5R	- 55 to 85 °C at 25 °C	X5R	Within ± 15 %
	Y5V	- 25 to 85 °C at 20 °C	Y5V	Within + 30 %/- 80 %
7) Adhesive strength of termination	<ul style="list-style-type: none"> Pressurizing force: 0201: 2N 0402 and 0603: 5 N > 0603: 10 N Test time 10 s \pm 1 s 		<ul style="list-style-type: none"> No remarkable damage or removal of the terminations 	
8) Vibration resistance	<ul style="list-style-type: none"> Vibration frequency: 10 Hz/min to 55 Hz/min Total amplitude: 1.5 mm Test time: 6 h (2 h each in 3 mutually perpendicular directions) 		<ul style="list-style-type: none"> No remarkable damage Capacitance change and Q/DF: to meet initial specification 	
9) Solderability	<ul style="list-style-type: none"> Solder temperature: 235 °C \pm 5 °C Dipping time: 2 s \pm 0.5 s 		95 % minimum coverage of all metallized area	

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TEST	PROCEDURE			REQUIREMENTS
10) Bending test	<ul style="list-style-type: none"> The middle part of the substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per s until the deflection becomes 1 mm and then the pressure shall be maintained for 5 s ± 1 s Measurement to be made after keeping at room temperature for 24 h ± 2 h (class 1) or 48 h ± 4 h (class 2) 			<ul style="list-style-type: none"> No remarkable damage Capacitance change: C0G (NP0): within ± 5.0 % or ± 0.5 pF whichever is larger X7R, X5R: within ± 12.5 % Y5V: within ± 30 % (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test)
11) Resistance to soldering heat	<ul style="list-style-type: none"> Solder temperature: 270 °C ± 5 °C Dipping time: 10 s ± 1 s Preheating: 120 °C to 150 °C for 1 min before immerse the capacitor in a eutectic solder Before initial measurement (class 2 only): Perform 150 °C + 0 °C/ - 10 °C for 1 h and then set for 48 h ± 4 h at room temperature Measurement to be made after keeping at room temperature for 24 h ± 2 h (class 1) or 48 h ± 4 h (class 2) 			<ul style="list-style-type: none"> No remarkable damage Capacitance change: C0G (NP0): within ± 2.5 % or ± 0.25 pF whichever is larger X7R, X5R: within ± 7.5 % Y5V: within ± 20 % Q/DF, I.R. and dielectric strength: To meet initial requirements 25 % maximum leaching on each edge
12) Temperature cycle	<ul style="list-style-type: none"> Conduct the 5 cycles according to the temperature and time 			<ul style="list-style-type: none"> No remarkable damage Capacitance change: C0G (NP0): within ± 2.5 % or ± 0.25 pF whichever is larger X7R, X5R: within ± 7.5 % Y5V: within ± 20 % Q/DF, I.R. and dielectric strength: To meet initial requirements
	Step	Temperature (°C)	Time (min.)	
	1	Min. operating temp. + 0/- 3	30 ± 3	
	2	Room temperature	2 ~ 3	
	3	Max. operating temp. + 3/- 0	30 ± 3	
	4	Room temperature	2 ~ 3	
<ul style="list-style-type: none"> Before initial measurement (class 2 only): Perform 150 °C + 0 °C/ - 10 °C for 1 h and then set for 48 h ± 4 h at room temperature. Measurement to be made after keeping at room temperature for 24 h ± 2 h (class 1) or 48 h ± 4 h (class 2) 				



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TEST	PROCEDURE	REQUIREMENTS			
13) Humidity (damp heat) steady state	<ul style="list-style-type: none"> • Test temperature: 40 °C ± 2 °C • Humidity: 90 % to 95 % RH • Test time: 500 h + 24 h/- 0 h • Measurement to be made after keeping at room temperature for 24 h ± 2 h (class 1) or 48 ± 4 h (class 2) 	<ul style="list-style-type: none"> • No remarkable damage • Capacitance change: COG (NP0): within ± 5.0 % or ± 0.5 pF whichever is larger X7R, X5R: ≥ 10 V within ± 12.5 %; 6.3 V, within ± 25 % Y5V: ≥ 10 V within ± 30 %, 6.3 V within + 30 %/- 40 % • Q/DF value: COG (NP0): more than 30 pF: Q ≥ 350 10 pF ≤ C ≤ 30 pF: Q ≥ 275 + 2.5 C; Less than 10 pF: Q ≥ 200 + 10 C 			
		X7R, X5R:			
		RATED VOLTAGE	DF	EXCEPTION OF DF	
		≥ 50 V	≤ 3.0 %	≤ 6 %	0603 ≥ 0.047 μF, 0805 ≥ 0.18 μF, 1206 ≥ 0.47 μF
		25 V	≤ 5.0 %	≤ 10 %	0805 ≥ 1 μF, 1210 ≥ 10 μF
				≤ 14 %	0603 ≥ 0.33 μF, 1206 ≥ 4.7 μF
				≤ 15 %	0402 ≥ 0.10 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 ≥ 6.8 μF
		16 V	≤ 5.0 %	≤ 10 %	0603 ≥ 0.15 μF, 0805 ≥ 0.68 μF, 1206 ≥ 2.2 μF, 1210 ≥ 4.7 μF
				≤ 15 %	0402 ≥ 0.033 μF, 0603 ≥ 0.68 μF, 0805 ≥ 2.2 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF
		10 V	≤ 7.5 %	≤ 15 %	0402 ≥ 0.33 μF, 0603 ≥ 0.33 μF, 0805 ≥ 2.2 μF, 1206 ≥ 2.2 μF, 1210 ≥ 22 μF
				≤ 20 %	0201 ≥ 0.1 μF, 0402 ≥ 1 μF
		6.3 V	≤ 15 %	≤ 30 %	0402 ≥ 2.2 μF, 0603 ≥ 10 μF, 0805 ≥ 4.7 μF, 1210 ≥ 100 μF
		Y5V:			
		RATED VOLTAGE	DF	EXCEPTION OF DF	
		≥ 50 V	≤ 7.5 %	≤ 10 %	0603 ≥ 0.1 μF, 0805 ≥ 0.47 μF, 1206 ≥ 4.7 μF
		25 V	≤ 7.5 %	≤ 10 %	0402 ≥ 0.047 μF, 0603 ≥ 0.1 μF, 0805 ≥ 0.33 μF, 1206 ≥ 1 μF, 1210 ≥ 4.7 μF
				≤ 15 %	0402 ≥ 0.068 μF, 0603 ≥ 0.47 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF
		16 V (C < 1.0 μF)	≤ 10 %	≤ 12.5 %	0402 ≥ 0.068 μF, 0603 ≥ 0.68 μF
				≤ 20 %	0402 ≥ 0.22 μF
		16 V (C ≥ 1.0 μF)	≤ 12.5 %	≤ 20 %	0603 ≥ 2.2 μF, 0805 ≥ 3.3 μF, 1206 ≥ 10 μF, 1210 ≥ 22 μF, 1812 > 47 μF
		10 V	≤ 20 %	≤ 30 %	0402 ≥ 0.47 μF
		≤ 6.3 V	≤ 30 %	-	-
				<ul style="list-style-type: none"> • I.R.: ≥ 10 V: 1 GΩ or R x C ≥ 50 ΩF whichever is smaller 	
CLASS 2 (X7R, X5R, Y5V):					
RATED VOLTAGE		INSULATION RESISTANCE			
100 V: X7R		R x C ≥ 10 ΩF			
16 V: 0402 ≥ 0.22 μF					
10 V: 0201 ≥ 47 nF, 0402 ≥ 0.47 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 ≥ 4.7 μF, 1210 ≥ 47 μF					
6.3 V:					

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TEST	PROCEDURE	REQUIREMENTS			
14) Humidity (damp heat) load	<ul style="list-style-type: none"> • Test temperature: 40 °C ± 2 °C • Humidity: 90 % ~ 95 % RH • Test time: 500 h + 24 h/- 0 h • To apply voltage: rated voltage (Max. 500 V) • Measurement to be made after keeping at room temperature for 24 h ± 2 h (class 1) or 48 h ± 4 h (class 2) 	<ul style="list-style-type: none"> • No remarkable damage • Capacitance change: C0G (NP0): within ± 7.5 % or ± 0.75 pF whichever is larger. X7R, X5R: ≥ 10 V within ± 12.5 %; 6.3 V, with ± 25 % Y5V: ≥ 10 V within ± 30 %; 6.3 V, within + 30 %/- 40 % • Q/DF value: C0G (NP0): Cap ≥ 30 pF: Q ≥ 200; Cap < 30 pF: Q ≥ 100 + 10/3 C 			
		X7R, X5R:			
		RATED VOLTAGE	DF	EXCEPTION OF DF	
		≥ 50 V	≤ 3.0 %	≤ 6 %	0603 ≥ 0.047 μF, 0805 ≥ 0.18 μF, 1206 ≥ 0.47 μF
		25 V	≤ 5.0 %	≤ 10 %	0805 ≥ 1 μF; 1210 ≥ 10 μF
				≤ 14 %	0603 ≥ 0.33 μF, 1206 ≥ 4.5 μF
				≤ 15 %	0402 ≥ 0.10 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 ≥ 6.8 μF
		16 V	≤ 5.0 %	≤ 10 %	0603 ≥ 0.15 μF, 0805 ≥ 0.68 μF, 1206 ≥ 2.2 μF, 1210 ≥ 4.7 μF
				≤ 15 %	0402 ≥ 0.033 μF, 0603 ≥ 0.68 μF, 0805 ≥ 2.2 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF
		10 V	≤ 7.5 %	≤ 15 %	0402 ≥ 0.033 μF, 0603 ≥ 0.33 μF, 0805 ≥ 2.2 μF, 1206 ≥ 2.2 μF, 1210 ≥ 22 μF
		6.3 V	≤ 15 %	≤ 20 %	0201 ≥ 0.1 μF, 0402 ≥ 1 μF
				≤ 30 %	0402 ≥ 2.2 μF, 0603 ≥ 10 μF, 0805 ≥ 4.7 μF, 1210 ≥ 100 μF
		Y5V:			
		RATED VOLTAGE	DF	EXCEPTION OF DF	
		≥ 50 V	≤ 7.5 %	≤ 10 %	0603 ≥ 0.1 μF, 0805 ≥ 0.47 μF, 1206 ≥ 4.7 μF
		25 V	≤ 7.5 %	≤ 10 %	0402 ≥ 4.7 μF, 0603 ≥ 0.1 μF, 0805 ≥ 0.33 μF, 1206 ≥ 1.0 μF, 1210 ≥ 4.7 μF
				≤ 15 %	0402 ≥ 0.068 μF, 0603 ≥ 0.47 μF, 1206 ≥ 4.7 μF, 1210 ≥ 2.2 μF
		16 V (C < 1.0 μF)	≤ 10 %	≤ 12.5 %	0402 ≥ 0.068 μF, 0603 ≥ 0.68 μF
				≤ 20 %	0402 ≥ 0.22 μF
		16 V (C ≥ 1 μF)	≤ 12.5 %	≤ 20 %	0603 ≥ 2.2 μF, 0805 ≥ 3.3 μF, 1206 ≥ 10 μF, 1210 ≥ 22 μF, 1812 ≥ 47 μF
		10 V	≤ 15 %	-	0402 ≥ 0.47 μF
		6.3 V	≤ 30 %	-	-
		• I.R.: ≥ 10 V: 500 MΩ or 25 ΩF whichever is smaller			
CLASS 2 (X7R, X5R, Y5V):					
RATED VOLTAGE		INSULATION RESISTANCE			
100 V: X7R		R x C ≥ 5 ΩF			
16 V: 0402 ≥ 0.22 μF					
10 V: 0201 ≥ 47 nF, 0402 ≥ 0.47 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 > 4.7 μF, 1210 > 47 μF					
6.3 V:					



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TEST	PROCEDURE				REQUIREMENTS		
15) High temperature load (endurance)	<ul style="list-style-type: none"> Test temperature: C0G (NP0), X7R/X7E: 125 °C ± 3 °C X5R, Y5V: 85 °C ± 3 °C To apply voltage: (1.1) 100 % of rated voltage for below range 				<ul style="list-style-type: none"> No remarkable damage Capacitance change: C0G (NP0): ± 3.0 % or ± 0.3 pF whichever is larger. X7R, X5R: ≥ 10 V within ± 12.5 %; 6.3 V, with ± 25 % Y5V: ≥ 10 V within ± 30 %; 6.3 V, within + 30 % to - 40 % Q/DF value: C0G (NP0): More than 30 pF, Q ≥ 350 10 pF ≤ C < 30 pF: Q ≥ 275 C + 2.5 C; Less than 10 pF: Q ≥ 200 C + 10 C 		
	SIZE	DIELECTRIC	RATED VOLTAGE	CAP. RANGE	RATED VOLTAGE	DF	EXCEPTION OF DF
	0201	X5R	6.3 V, 10 V	C ≥ 0.1 μF	≥ 50 V	≤ 3.0 %	≤ 6 % 0603 ≥ 0.047 μF, 0805 ≥ 0.18 μF, 1206 ≥ 0.47 μF
	0402	X5R, Y5V		C ≥ 1.0 μF	25 V	≤ 5.0 %	≤ 10 % 0805 ≥ 1 μF, 1210 ≥ 10 μF
	0603	X5R		C ≥ 4.7 μF			≤ 14 % 0603 ≥ 0.33 μF, 1206 ≥ 4.7 μF
	0805	X5R	6.3 V	C ≥ 22 μF			≤ 15 % 0402 ≥ 0.10 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 ≥ 6.8 μF
	(1.2) 6.3 V or C ≥ 10 μF: 150 % of rated voltage (2) 10 V ≤ U _R < 500 V: 200 % of rated voltage 150 % of rated voltage for below range:				16 V	≤ 5.0 %	≤ 10 % 0603 ≥ 0.15 μF, 0805 ≥ 0.68 μF, 1206 ≥ 2.2 μF, 1210 ≥ 4.7 μF
	SIZE	DIELECTRIC	RATED VOLTAGE	CAP. RANGE			≤ 15 % 0402 ≥ 0.033 μF, 0603 ≥ 0.68 μF, 0805 ≥ 2.2 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF
	0603	X5R	10 V, 16 V	C ≥ 1.0 μF	10 V	≤ 7.5 %	≤ 15 % 0402 ≥ 0.33 μF, 0603 ≥ 0.33 μF, 0805 ≥ 2.2 μF, 1206 ≥ 2.2 μF, 1210 ≥ 22 μF
				C ≥ 4.7 μF	6.3 V	≤ 15 %	≤ 20 % 0201 ≥ 0.1 μF, 0402 ≥ 1 μF
	0805	X5R	10 V	C ≥ 2.2 μF and T = 0.85 ± 0.1 mm			≤ 30 % 0402 ≥ 2.2 μF, 0603 ≥ 10 μF, 0805 ≥ 4.7 μF, 1210 ≥ 100 μF
	1206	X5R	10 V	C ≥ 4.7 μF and T = 0.85 ± 0.1 mm	Y5V:		
	(3) 500 V : 150 % of rated voltage (4) U _R ≥ 630 V: 120 % of rated voltage				RATED VOLTAGE	DF	EXCEPTION OF DF
	<ul style="list-style-type: none"> Test time: 1000 h + 24 h/- 0 h Measurement to be made after keeping at room temperature for 24 h ± 2 h (class 1) or 48 h ± 4 h (class 2) 				≥ 50 V	≤ 7.5 %	≤ 10 % 0603 ≥ 0.1 μF, 0805 ≥ 0.47 μF, 1206 ≥ 4.7 μF
					25 V	≤ 7.5 %	≤ 10 % 0402 ≥ 0.047 μF, 0603 ≥ 0.1 μF, 0805 ≥ 0.33 μF, 1206 ≥ 1 μF, 1210 ≥ 4.7 μF
				16 V (C < 1.0 μF)	≤ 10 %	≤ 15 % 0402 ≥ 0.068 μF, 0603 ≥ 0.47 μF, 1206 ≥ 4.7 μF, 1210 ≥ 22 μF	
				16 V (C ≥ 1.0 μF)	≤ 12.5 %	≤ 12.5 % 0402 ≥ 0.068 μF, 0603 ≥ 0.68 μF	
				10 V	≤ 15 %	≤ 20 % 0603 ≥ 2.2 μF, 0805 ≥ 3.3 μF, 1206 ≥ 10 μF, 1210 ≥ 22 μF, 1812 ≥ 47 μF	
				6.3 V	≤ 30 %	≤ 30 % 0402 ≥ 0.47 μF	
				<ul style="list-style-type: none"> I. R.: ≥ 10 V: 1 GΩ or 50 ΩF whichever is smaller 			
				CLASS 2 (X7R, X5R, Y5V):			
				RATED VOLTAGE	INSULATION RESISTANCE		
				100 V: X7R	R x C ≥ 10 ΩF		
				16 V: 0402 ≥ 0.22 μF			
				10 V: 0201 ≥ 47 nF, 0402 ≥ 0.47 μF, 0603 ≥ 0.47 μF, 0805 ≥ 2.2 μF, 1206 > 4.7 μF, 1210 > 47 μF			
				6.3 V:			

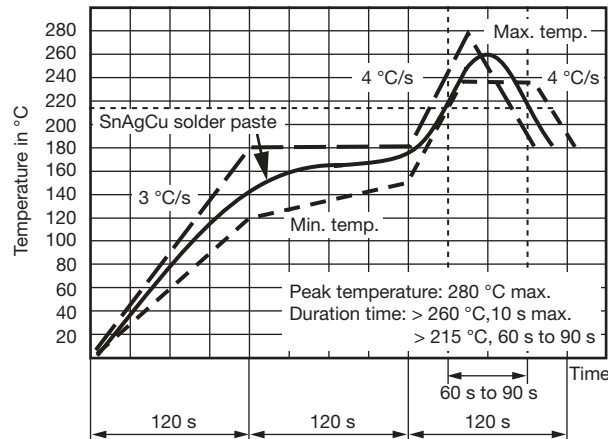
Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications

RECOMMENDED SOLDERING CONDITIONS

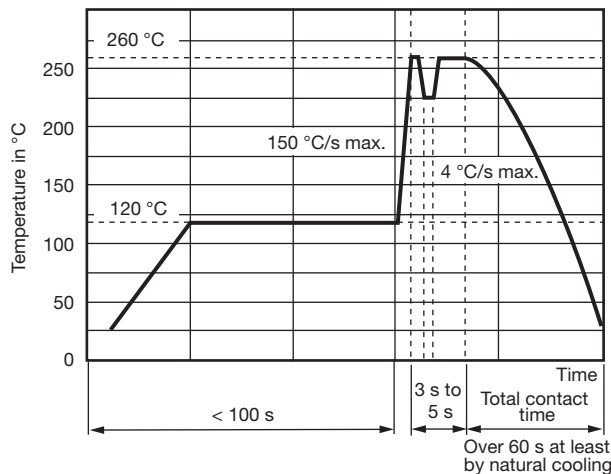
Lead (Pb)-free terminated MLCCs are not only used on SMT with lead (Pb)-free solder paste, but also suitable to be used with lead-containing solder paste. In case the optimized solder joint is requested, increasing soldering time, temperature and concentration of N₂ within the oven are recommended.

SOLDERING PROFILES

Recommended IR reflow soldering profile for SMT process with SnAgCu series solder paste



Recommended wave soldering profile for SMT process with SnAgCu series solder

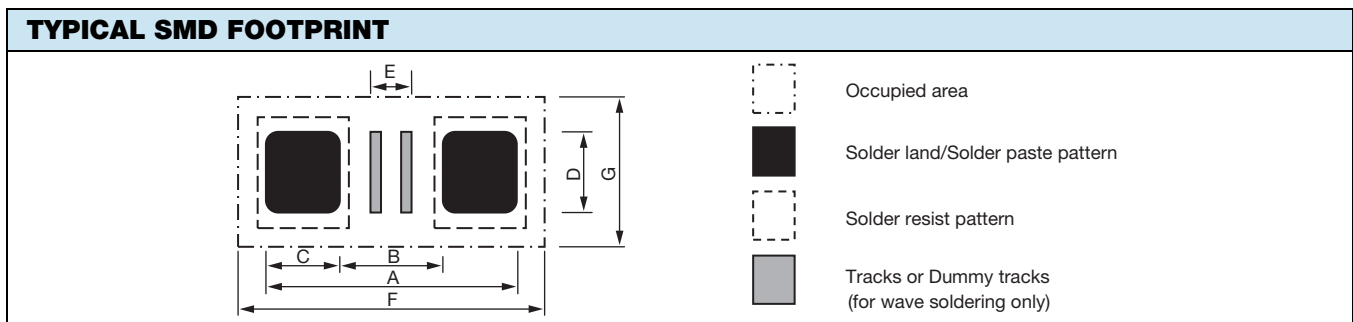


FOOTPRINT DESIGN

Circuit board design first steps are to consider how the surface mount board will be manufactured. The manufacturing process determines the necessary dimensions of the solder land, the minimum spacing between components, the area underneath the SMD where tracks may be laid down and the required component orientation during wave soldering. Therefore a footprint related to the manufacturing process with all this information is an essential tool for SMD circuit board design.

Footprint details depend on following parameters:

- Component dimensions and tolerance as given in the component data
- Board dimensional accuracy
- Placement accuracy of the component with respect to the solder lands on the board
- Solder paste position tolerances with respect to the solder lands (for reflow soldering only)
- The soldering parameters
- Solder resist position tolerances with respect to the solder lands
- Solder joint parameters for reliable joints



REFLOW SOLDERING

SIZE	FOOTPRINT DIMENSIONS in mm							PROCESSING REMARKS	PLACEMENT ACCURACY
	A	B	C	D	E	F	G		
0201	0.65	0.23	0.21	0.30	N/A	0.90	0.60	Reflow or hot plate soldering	± 0.05
0402	1.50	0.50	0.50	0.50	0.10	1.75	0.95		± 0.15
0603	2.30	0.70	0.80	0.80	0.20	2.55	1.40		± 0.25
0805	2.80	1.00	0.90	1.30	0.40	3.05	1.85		± 0.25
1206	4.00	2.20	0.90	1.60	1.60	4.25	2.25		± 0.25
1210	4.00	2.20	0.90	2.50	1.60	4.25	3.15		± 0.25

WAVE SOLDERING

SIZE	FOOTPRINT DIMENSIONS in mm							PROPOSED NUMBER AND DIMENSIONS OF DUMMY TRACKS	PLACEMENT ACCURACY
	A	B	C	D	E	F	G		
0603	2.40	1.00	0.70	0.80	0.20	3.10	1.90	1 x (0.20 x 0.80)	± 0.10
0805	3.20	1.40	0.90	1.30	0.36	4.10	2.50	1 x (0.30 x 1.30)	± 0.15
1206	4.80	2.30	1.25	1.70	1.25	5.90	3.20	3 x (0.25 x 1.70)	± 0.25
1210	5.30	2.30	1.50	2.60	1.25	6.30	4.20	3 x (0.25 x 2.60)	± 0.25

FOOTPRINT FOR MLCC CHIP ARRAY

SIZE	DIMENSIONS in mm
A	2.85 + 0.10/- 0.05
B	0.45 ± 0.05
D	0.80 ± 0.10
P	0.80
F	3.10 ± 0.30

The diagram shows a footprint for an MLCC chip array with dimensions A, B, D, L, and P. Dimension A is the total width, B is the width of the chip, D is the width of the solder land, L is the length of the chip, and P is the pitch between chips.



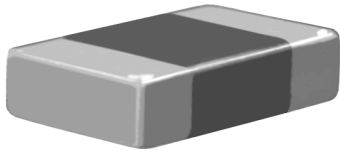


MLCCs for Commercial Applications (NME Technology)

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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
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

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

ELECTRICAL SPECIFICATIONS

COG (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_{DC} to 1000 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 Rate: 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

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_{DC} to 1000 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):

10 V ratings: 5 % maximum at 1.0 V_{RMS} and 1 kHz
16 V/25 V ratings: 5 % maximum at 1.0 V_{RMS} and 1 kHz
> 25 V ratings: 3.5 % 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

≤ 250 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



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	820 pF
	0805	500	1.0 pF	3.9 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	1.5 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 ⁽³⁾	Y	102	K	X	A	A	T	### ⁽²⁾
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640	A = C0G (NP0) Y = X7R G = X5R ⁽⁴⁾	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples 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 % Note: 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 ⁽⁵⁾	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 Note: 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 Note: "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
- (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 for list of released ratings
- (6) Termination code "E" is for conductive epoxy assembly. Contact mlcc@vishay.com for availability

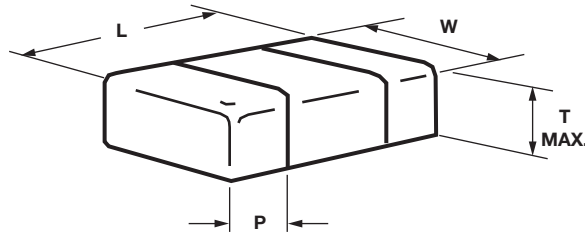
VJ Commercial Series



Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Commercial Applications

DIMENSIONS in inches (millimeters)



EIA 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 ± 0.005 (1.60 ± 0.12)	0.031 ± 0.005 (0.80 ± 0.12)	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)
-	VJ1808	0.180 ± 0.012 (4.57 ± 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 ± 0.008 (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)
-	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)
-	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)
-	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:
1206 and smaller case sizes: Length 0.002"(0.05 mm)
1210 and larger case sizes: Length 0.004"(0.10 mm)



VJ Commercial Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Commercial Applications

Vishay Vitramon

SELECTION CHART																					
DIELECTRIC		COG (NP0)																			
STYLE		VJ0402			VJ0603			VJ0805				VJ1206 ⁽¹⁾					VJ1210 ⁽¹⁾				
EIA CODE		0402			0603			0805				1206					1210				
VOLTAGE (V _{DC})		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

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

•• Paper tape • Plastic tape

VJ Commercial Series



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Surface Mount Multilayer Ceramic Chip Capacitors
for Commercial Applications

SELECTION CHART															
DIELECTRIC		C0G (NP0)													
STYLE		VJ1808 ⁽¹⁾					VJ1812 ⁽¹⁾					VJ1825 ⁽¹⁾			
EIA CODE		-					1812					1825			
VOLTAGE (V _{DC})		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

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



SELECTION CHART												
DIELECTRIC		COG (NP0)										
STYLE		VJ2220 ⁽¹⁾					VJ2225 ⁽¹⁾					
EIA CODE		2220					2225					
VOLTAGE (V _{DC})		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

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

- Plastic tape

VJ Commercial Series



Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Commercial Applications

SELECTION CHART																	
DIELECTRIC		X7R ⁽²⁾															
STYLE		VJ0402				VJ0603					VJ0805 ⁽²⁾						
EIA CODE		0402				0603					0805						
VOLTAGE (V _{DC})		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) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

(2) X5R (- 55 °C to + 85 °C TCC: ± 15 %) for all 0805/10 V ratings

•• Paper tape • Plastic tape



SELECTION CHART																
DIELECTRIC		X7R														
STYLE		VJ1206 ⁽¹⁾							VJ1210 ⁽¹⁾							
EIA CODE		1206 ⁽¹⁾							1210 ⁽¹⁾							
VOLTAGE (V _{DC})		16	25	50	100	200	250	500	630	16	25	50	100	200	500	630
VOLTAGE CODE		J	X	A	B	C	P	E	L	J	X	A	B	C	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

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

•• Paper tape • Plastic tape

VJ Commercial Series



Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Commercial Applications

SELECTION CHART																					
DIELECTRIC		X7R																			
STYLE		VJ1808 ⁽¹⁾					VJ1812 ⁽¹⁾								VJ1825 ⁽¹⁾						
EIA CODE		-					1812								1825						
VOLTAGE (V _{DC})		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																				

Note

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

- Plastic tape



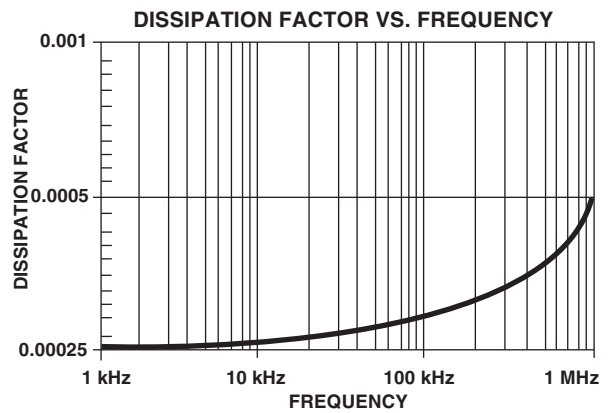
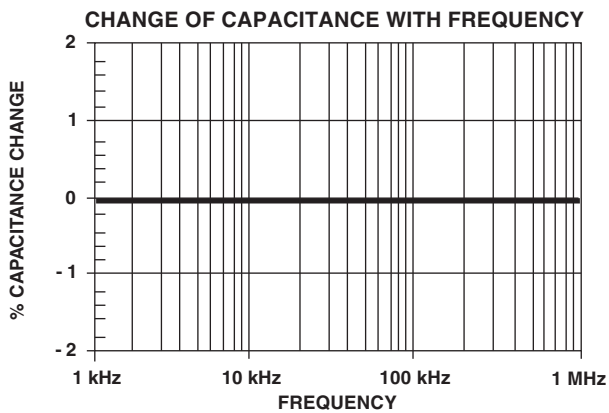
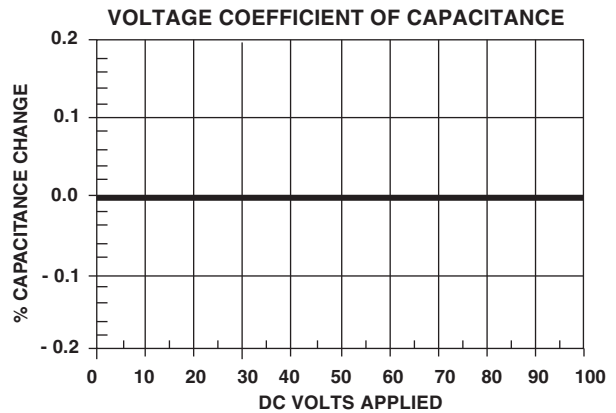
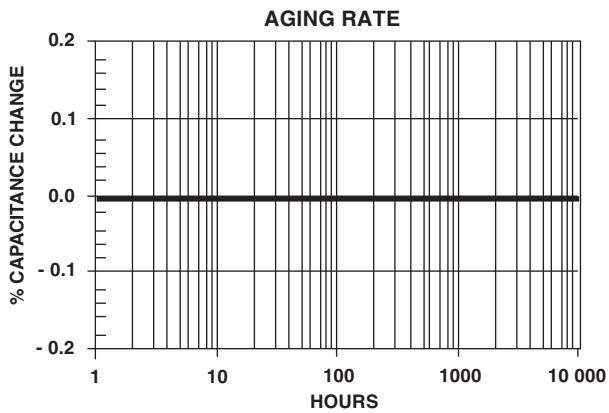
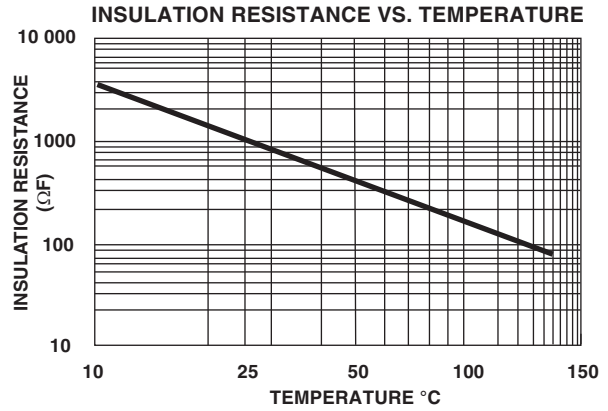
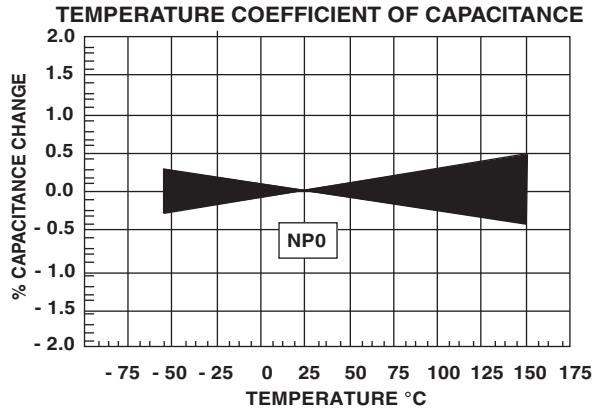
SELECTION CHART																
DIELECTRIC		X7R														
STYLE		VJ2220 ⁽¹⁾				VJ2225 ⁽¹⁾						VJ3640 ⁽¹⁾				
EIA CODE		-														
VOLTAGE (V _{DC})		50	100	200	500	25	50	100	200	500	1000	25	50	100	200	500
VOLTAGE CODE		A	B	C	E	X	A	B	C	E	G	X	A	B	C	E
CAP. CODE	CAP.															
121	120 pF															
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															

Note

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

- Plastic tape

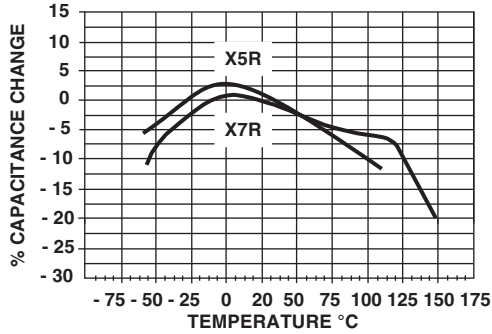
COG (NP0) DIELECTRIC - TYPICAL PARAMETERS



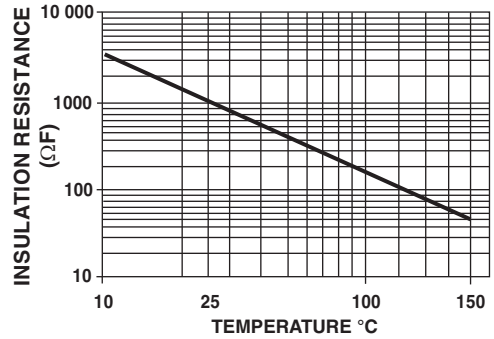


X7R/X5R DIELECTRIC - TYPICAL PARAMETERS

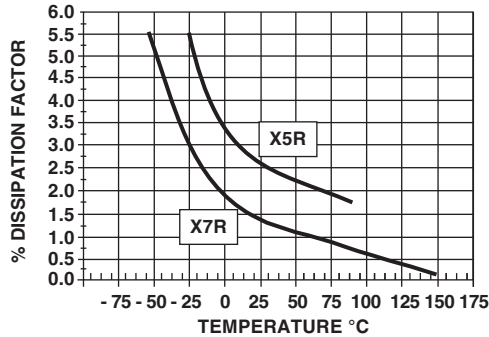
TEMPERATURE COEFFICIENT OF CAPACITANCE



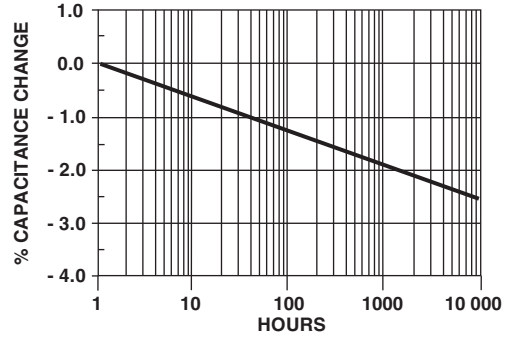
INSULATION RESISTANCE VS. TEMPERATURE



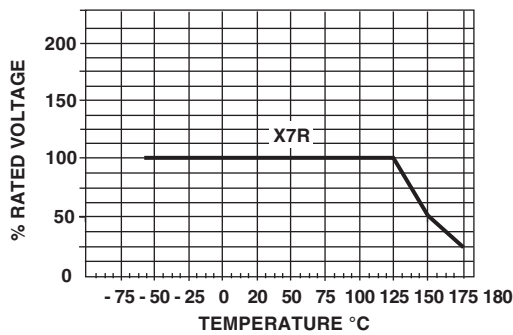
DISSIPATION FACTOR VS. TEMPERATURE



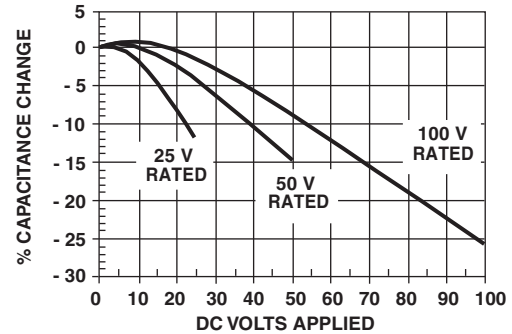
AGING RATE



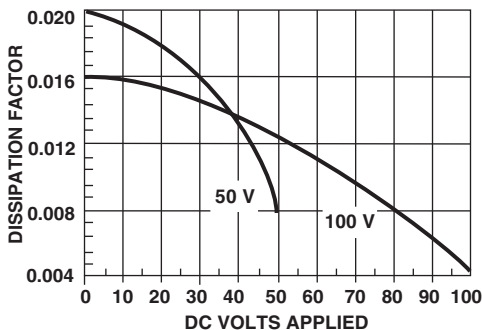
RATED VOLTAGE VS. TEMPERATURE



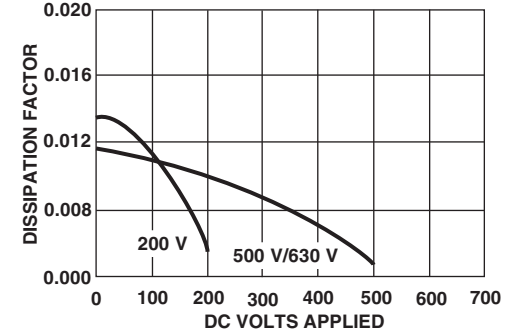
VOLTAGE COEFFICIENT OF CAPACITANCE



DISSIPATION FACTOR VS. VOLTAGE



DISSIPATION FACTOR VS. VOLTAGE



VJ Commercial Series



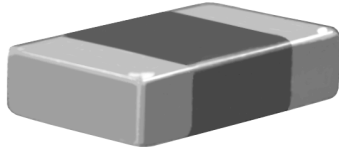
Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors
for Commercial Applications

STANDARD PACKAGING QUANTITIES (1)(2)(3)					
BODY SIZE	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

Surface Mount Multilayer Ceramic Capacitors for High Frequency Applications



FEATURES

- Ultra-stable dielectric offering a Temperature Coefficient of Capacitance (TCC) of $0 \text{ ppm}/^{\circ}\text{C} \pm 30 \text{ ppm}/^{\circ}\text{C}$ over the entire temperature range
- Low Dissipation Factor (DF)
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



APPLICATIONS

- Ideal for critical timing applications
- Ideal for tuning applications

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C unless otherwise specified

Operating Temperature: - 55 °C to + 150 °C

Voltage Range: 50 V_{DC} to 200 V_{DC}

Capacitance Range: 1.0 pF to 220 pF

Temperature Coefficient of Capacitance (TCC):
 $0 \text{ ppm}/^{\circ}\text{C} \pm 30 \text{ ppm}/^{\circ}\text{C}$ from - 55 °C to + 125 °C

Dissipation Factor (DF):
0.1 % maximum at 1.0 V_{RMS} and 1 MHz for values $\leq 1000 \text{ pF}$
0.1 % maximum at 1.0 V_{RMS} and 1 kHz for values $> 1000 \text{ pF}$

Aging Rate: 0 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 M Ω minimum or, 1000 ΩF whichever is less.

At + 125 °C and rated voltage 10 000 M Ω minimum or 100 ΩF , whichever is less.

Dielectric Strength Test:

Performed per method 103 of EIA 198-2-E.

Applied test voltages:

$\leq 200 \text{ V}_{\text{DC}}$ -rated: 250 % of rated voltage

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
HIGH Q COG (NP0)	0603	100	1.0 pF	100 pF
	0805	200	1.0 pF	220 pF

Note

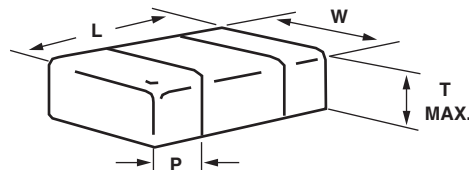
- Detail ratings see selection chart

ORDERING INFORMATION								
VJ0805	Q	101	K	X	A	A	C	### ⁽²⁾
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0603 0805	Q = High Q	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples: 101 = 100 pF 1R8 = 1.8 pF	B = ± 0.10 pF C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % Note: B, C, D < 10 pF F, G, J, K ≥ 10 pF	X = Ni barrier 100 % tin plated F, E = AgPd ⁽³⁾	A = 50 V B = 100 V C = 200 V	A = Unmarked	C = 7" reel/paper tape O = reel/flamed paper tape I = 11 1/4"/13" reel/flamed paper tape P = 11 1/4"/13" reel/paper tape Note: "O" and "I" are used for "F" and "E" termination	

Notes

- Size 0402 available with Vishay Basic Commodity series, see datasheet: www.vishay.com/doc?28534
- (1) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: 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) Termination code "E" is for conductive epoxy assembly, contact mlcc@vishay.com for availability

DIMENSIONS in inches (millimeters)



EIA STYLE	PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION (P)	
					MINIMUM	MAXIMUM
0603	VJ0603	0.063 ± 0.005 (1.60 ± 0.12)	0.031 ± 0.005 (0.80 ± 0.12)	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)



Surface Mount Multilayer Ceramic Capacitors
for High Frequency Applications

VJ High Q
Vishay Vitramon

SELECTION CHART						
DIELECTRIC		HIGH Q				
STYLE		VJ0603		VJ0805		
EIA CODE		0603		0805		
VOLTAGE (V _{DC})		50	100	50	100	200
VOLTAGE CODE		A	B	A	B	C
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					

Notes

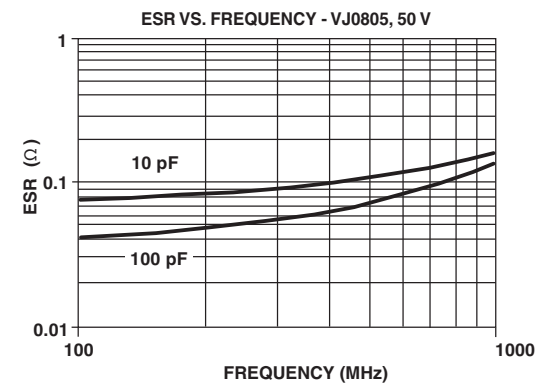
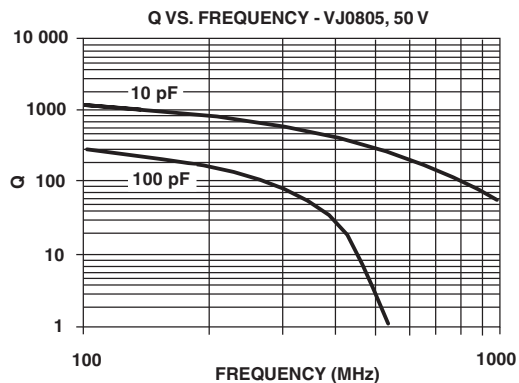
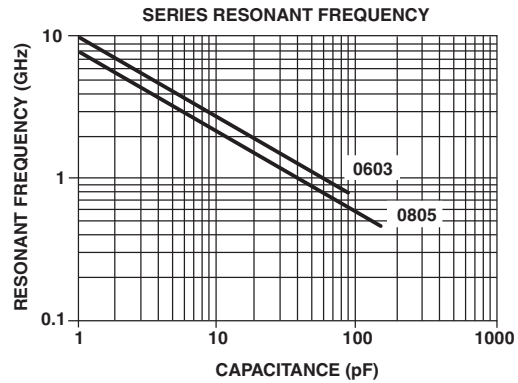
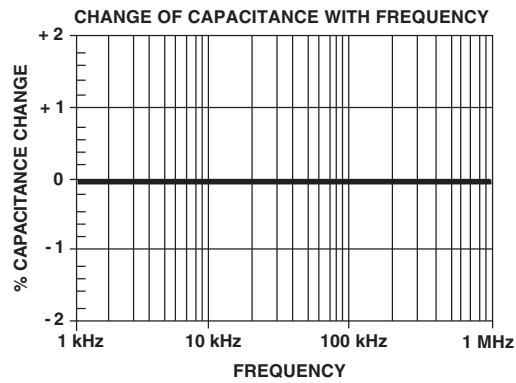
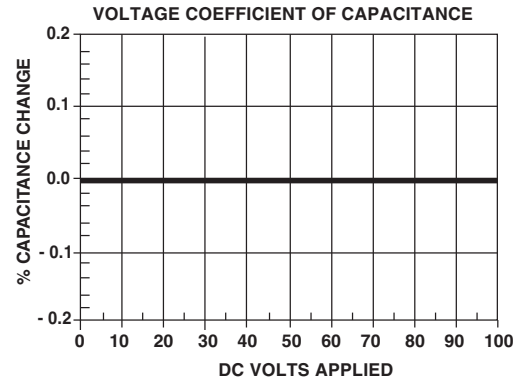
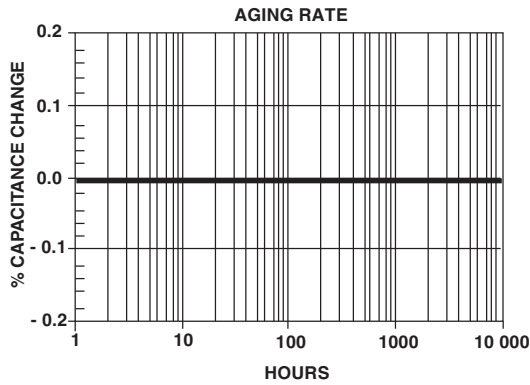
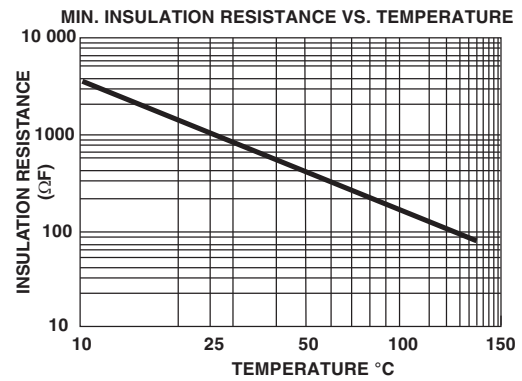
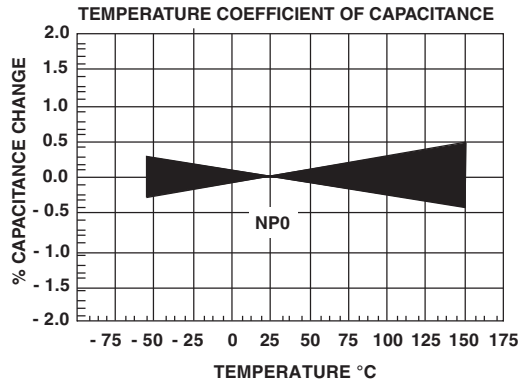
- See soldering recommendations within this data book, or visit www.vishay.com/doc?45034
- Available in paper carrier tape only

HIGH Q PACKAGING QUANTITIES ⁽¹⁾			
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES	11 1/4" AND 13" REEL QUANTITIES
		PACKAGING CODE "C"/"O"	PACKAGING CODE "P"/"I"
0603	8 mm	4000	10 000
0805	8 mm	3000	10 000

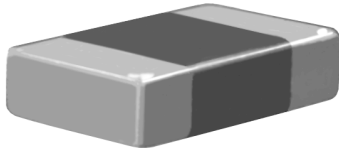
Note

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

HIGH Q DIELECTRIC - TYPICAL PARAMETERS



Surface Mount Multilayer Ceramic Chip Capacitors for High Temperature Applications



FEATURES

- Specialty: High temperature applications
- High operating temperature dielectric, up to + 150 °C
- Maintains capacitance at high temperature for frequency stability
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- High temperature modules

ELECTRICAL SPECIFICATIONS

Note

Electrical characteristics at + 25 °C unless otherwise specified.

Operating Temperature: - 55 °C to + 150 °C

Capacitance Range: 470 pF to 390 nF

Voltage Range: 25 V_{DC} to 50 V_{DC}

Temperature Coefficient of Capacitance (TCC):
± 15 % from - 55 °C to + 150 °C

Dissipation Factor (DF):

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

Aging Rate: 1 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 MΩ minimum or 1000 ΩF, whichever is less

At + 125 °C and rated voltage 10 000 MΩ minimum or 100 ΩF, whichever is less

Dielectric Strength Test:

Performed per method 103 of EIA-198-2-E

Applied test voltage:

≤ 50 V_{DC}-rated: 250 % of rated voltage

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
X8R	0603	50	470 pF	33 nF
	0805	50	470 pF	100 nF
	1206	50	1.0 nF	220 nF
	1210	50	10 nF	390 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION								
VJ0805	H	102	K	X	A	A	C	### ⁽²⁾
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0603 0805 1206 1210	H = X8R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 102 = 1000 pF	J = ± 5 % K = ± 10 % M = 20 %	X = Ni barrier 100 % tin plated F, E = AgPd ⁽³⁾	X = 25 V A = 50 V	A = Unmarked M = Marked Note: Marking is only available for 0805 and 1206		
						T = 7" reel/plastic tape C = 7" reel/paper tape R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape O = 7" reel/flamedpaper tape I = 11 1/4"/13" reel/flamed paper tape Note: "I" and "O" are used for "F" and "E" termination size 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
- (2) Process code may be added with up to three digits, used to control non-standard products and requirements
- (3) Termination code "E" for conductive epoxy assembly, contact mlcc@vishay.com for availability

DIMENSIONS in inches (millimeters)						
EIA STYLE	PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION (P)	
					MINIMUM	MAXIMUM
0603	VJ0603	0.063 ± 0.005 (1.60 ± 0.12)	0.031 ± 0.005 (0.80 ± 0.12)	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)



Surface Mount Multilayer Ceramic Chip Capacitors
for High Temperature Applications

Vishay Vitramon

SELECTION CHART									
DIELECTRIC		X8R							
STYLE		VJ0603		VJ0805		VJ1206		VJ1210 ⁽¹⁾	
EIA CODE		0603		0805		1206		1210	
VOLTAGE (V _{DC})		25	50	25	50	25	50	25	50
VOLTAGE CODE		X	A	X	A	X	A	X	A
CAP. CODE	CAP.								
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								

Note

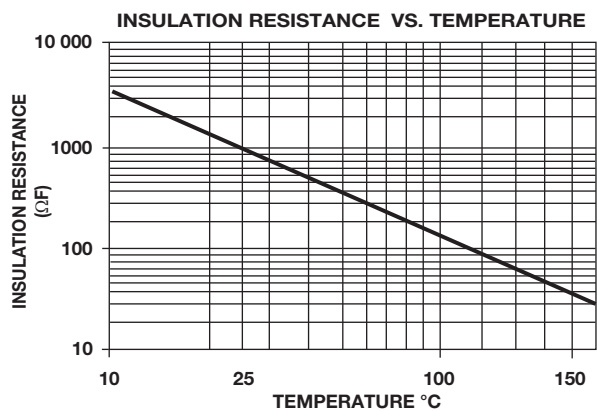
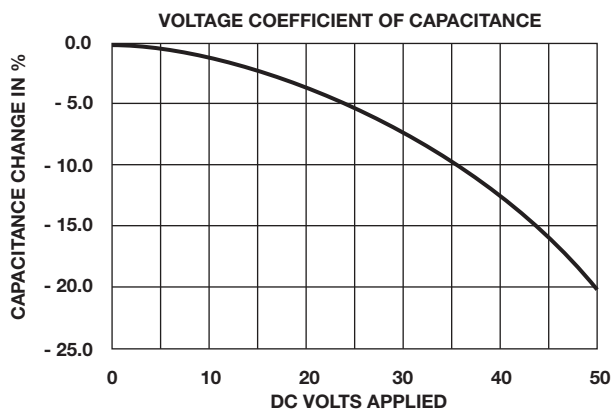
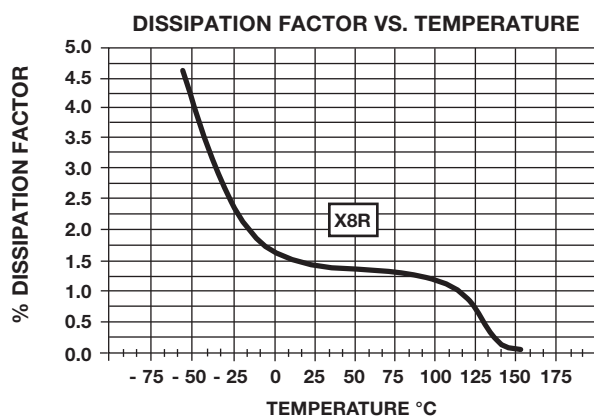
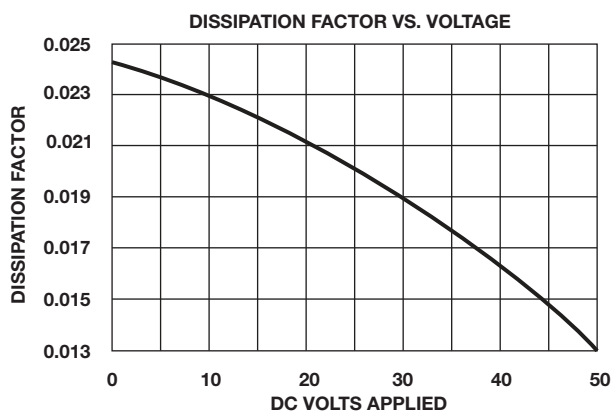
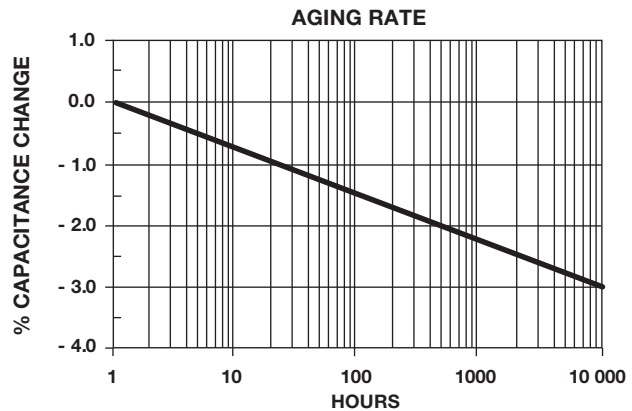
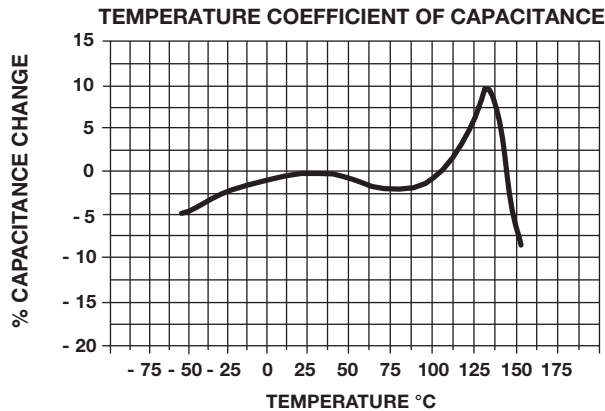
- (1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034
 - Plastic Tape, •• Paper Tape

X8R PACKAGING QUANTITIES ⁽¹⁾					
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	
		PACKAGING CODE		PACKAGING CODE	
		"C"/"O"	"T"	"P"/"I"	"R"
0603	8 mm	4000	N/A	10 000	N/A
0805	8 mm	3000	3000	10 000	10 000
1206	8 mm	N/A	3000	10 000	10 000
1210	8 mm	N/A	3000	10 000	10 000

Note

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

X8R DIELECTRIC - TYPICAL PARAMETERS



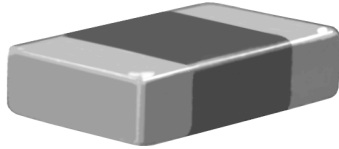


MLCCs for Automotive Applications

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Surface Mount Multilayer Ceramic Chip Capacitors for Automotive Applications



FEATURES

- AEC-Q200 with PPAP available
- Available in 0402 to 1812 body size
- Four dielectric materials
- AgPd termination available for silver epoxy bonding
- High operating temperature
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- Find more about Vishay’s Automotive Grade Product requirements at: www.vishay.com/applications



For more than 20 years Vishay Vitramon has supported the automotive industry with robust, highly reliable MLCCs that have made it a leader in this segment. All Vishay Vitramon MLCCs are manufactured in “Precious Metal Technology” (PMT/NME) with a wet build process. They are qualified according to AEC-Q200 with PPAP available on request. Applications for these devices include automotive “under the hood”, safety and comfort electronics. Their termination finish is 100 % tin plate matte and AgPd which is used with silver epoxy bonding. A Polymer (flexible) termination with 100 % tin plate matte finish is offered for intensive boardflex requirements.

COG (NPO) DIELECTRIC	
GENERAL SPECIFICATION	
Note Electrical characteristics at + 25 °C unless otherwise specified	
Operating Temperature: - 55 °C to + 150 °C (above + 125 °C changed characteristics 2.3)	
Capacitance Range: 1 pF to 22 nF	
Voltage Range: 25 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	
≤ 250 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
3000 V _{DC} -rated:	120 % of rated voltage

X5R, X7R, X8R 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 2.3) (X7R above + 125 °C changed characteristics 2.3)	
Capacitance Range: 120 pF to 1.0 μF	
Voltage Range: 10 V _{DC} to 1000 V _{DC}	
Temperature Coefficient of Capacitance (TCC): X5R: ± 15 % from - 55 °C to + 85 °C, with 0 V _{DC} applied ⁽⁵⁾ X7R: ± 15 % from - 55 °C to + 125 °C, with 0 V _{DC} applied X8R: ± 15 % from - 55 °C to + 150 °C, with 0 V _{DC} applied	
Dissipation Factor (DF): 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 > 25 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	
≤ 250 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



VJ....31/VJ....34 Automotive MLCC

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

Vishay Vitramon

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	820 pF
	0805	500	1.0 pF	3.9 nF
	1206	630	1.0 pF	10 nF
	1210	630	100 pF	22 nF
	1812	3000	12 pF	22 nF
X5R	0805	10	560 nF	1.0 μ F
X7R	0402	100	120 pF	47 nF
	0603	200	330 pF	150 nF
	0805	500	330 pF	470 nF
	1206	630	220 pF	1.0 μ F
	1210	630	390 pF	1.0 μ F
	1812	630	10 nF	1.0 μ F
X8R	0603	50	470 pF	33 nF
	0805	50	470 pF	100 nF
	1206	50	10 nF	220 nF
	1210	50	10 nF	390 nF

Note

- Detail ratings see selection chart

VJ....31/VJ....34 Automotive MLCC



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors for Automotive Applications

ORDERING INFORMATION - TIN TERMINATION								
VJ0805 ⁽²⁾	Y	102	K	X	A	A	C	31
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DCVOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1812	A = COG (NP0) Y = X7R G = X5R ⁽⁵⁾ H = X8R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples 4R7 = 4.7 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 % Note: COG(NP0): B, C, D < 10 pF F, G, J, K ≥ 10 pF X7R: J, K, M	X = Ni barrier 100 % tin plate matte finish B = Polymer 100 % tin plate matte finish ⁽³⁾	Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V C = 200 V P = 250 V T = 400V ⁽⁴⁾ E = 500 V L = 630 V G = 1000 V H = 3000 V	A = Unmarked B = Marked Note: Marking is only available for 0805 and 1206 vendor ID and date code		31 = Automotive 100 % tin plate matte finish
							E/T = 7" reel/plastic tape ⁽⁶⁾ C = 7" reel/paper tape M/R = 11 1/4"/13" reel/plastic tape ⁽⁶⁾ P = 11 1/4"/13" reel/paper tape	

ORDERING INFORMATION - SILVER PALLADIUM TERMINATION								
VJ0805 ⁽²⁾	Y	102	K	F	A	A	O	34
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DCVOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1812	A = COG (NP0) Y = X7R G = X5R ⁽⁵⁾ H = X8R	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	B = ± 0.10 pF C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note: COG(NP0): B, C, D < 10 pF F, G, J, K ≥ 10 pF X7R: J, K, M	F, E = AgPd ⁽⁷⁾	Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V C = 200 V P = 250 V T = 400V ⁽⁴⁾ E = 500 V L = 630 V G = 1000 V H = 3000 V	A = Unmarked Note: Marking is not available		34 = Automotive AgPd finish
							E/T = 7" reel/plastic tape ⁽⁶⁾ O = 7" reel/flamed paper tape M/R = 11 1/4"/13" reel/plastic tape ⁽⁶⁾ I = 11 1/4"/13" reel/flamed paper tape Note: "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
- (2) Case size designator may be replaced by a four digit drawing number
- (3) Polymer termination contact mlcc@vishay.com for availability of ratings
- (4) Per customer request. Contact: mlcc@vishay.com for availability
- (5) Selected values for X5R, see dielectric selection chart
- (6) Packaging "T" and "R" is used for 1812 size
- (7) Termination code "E" is for conductive epoxy assembly. Contact: mlcc@vishay.com for availability

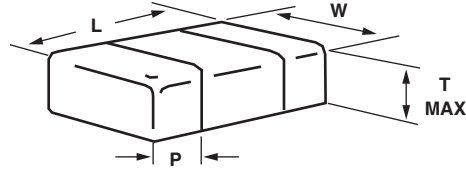


VJ....31/VJ....34 Automotive MLCC

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

Vishay Vitramon

DIMENSIONS in inches (millimeters)



EIA CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATIONS PAD (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 ± 0.005 (1.60 ± 0.12)	0.031 ± 0.005 (0.80 ± 0.12)	0.038 (0.97)	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 ± 0.25)	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)	0.076 (1.94)	0.010 (0.25)	0.028 (0.71)
1812	VJ1812	0.177 ± 0.010 (4.50 ± 0.25)	0.126 ± 0.010 (3.20 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)

Note

- Polymer (B-termination) have increased dimensions:
1206 and smaller case sizes: Length 0.002" (0.05 mm)
1210 and larger case sizes: Length 0.004" (0.10 mm)

VJ....31/VJ....34 Automotive MLCC



Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

SELECTION CHART										
DIELECTRIC		C0G (NP0)								
STYLE		VJ0402		VJ0603			VJ0805			
EIA CODE		0402		0603			0805			
VOLTAGE (V _{DC})		25/50	100	50	100	200	50	100	200	500
VOLTAGE CODE		X/A	B	A	B	C	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						+			
242	2.4 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

•• Paper tape, • Plastic tape, ++ Paper tape, + Plastic tape, see table "Product drawings (in use)"
 (1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034



VJ....31/VJ....34 Automotive MLCC

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

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SELECTION CHART																
DIELECTRIC		C0G (NP0)														
STYLE		VJ1206 ⁽¹⁾					VJ1210 ⁽¹⁾					VJ1812 ⁽¹⁾				
EIA CODE		1206 ⁽¹⁾					1210 ⁽¹⁾					1812 ⁽¹⁾				
VOLTAGE (V _{DC})		50	100	200	250	500/630	50	100	200	500/630	50	100	200	500/630	1000	3000
VOLTAGE CODE		A	B	C	P	E/L	A	B	C	E/L	A	B	C	E/L	G	H
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	+	+	+	+	+	+	+	+	+	•	•	•	•	•	•
242	2.4 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

•• Paper tape, • Plastic tape, ++ Paper tape, + Plastic tape, see table "Product drawings (in use)"

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

VJ....31/VJ....34 Automotive MLCC



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors
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SELECTION CHART																		
DIELECTRIC		X7R																
STYLE		VJ0402				VJ0603					VJ0805 ⁽²⁾							
EIA CODE		0402				0603					0805							
VOLTAGE (V _{DC})		16	25	50	100	16	25	50	100	200	10	16	25	50	100	200	250	500
VOLTAGE CODE		J	X	A	B	J	X	A	B	C	Q	J	X	A	B	C	P	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
 •• Paper tape, • Plastic tape, ++ Paper tape, + Plastic tape, see table "Product drawings (in use)"
 (1) See soldering recommendations within this data book, or visit www.vishay.com/doc?45034
 (2) X5R (- 55 °C to + 85 °C TCC: ± 15 %) for all 0805/10 V ratings



VJ....31/VJ....34 Automotive MLCC

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

Vishay Vitramon

SELECTION CHART																		
DIELECTRIC		X7R																
STYLE		VJ1206						VJ1210 ⁽¹⁾						VJ1812 ⁽¹⁾				
EIA CODE		1206 ⁽¹⁾						1210 ⁽¹⁾						1812 ⁽¹⁾				
VOLTAGE (V _{DC})		16	25	50	100	200	500/630	16	25	50	100	200	500/630	50	100	200	500	630
VOLTAGE CODE		J	X	A	B	C	E/L	J	X	A	B	C	E/L	A	B	C	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

•• Paper tape, • Plastic tape, ++ Paper tape, + Plastic tape, see table "Product drawings (in use)"
⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

VJ....31/VJ....34 Automotive MLCC



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Surface Mount Multilayer Ceramic Chip Capacitors
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SELECTION CHART									
DIELECTRIC		X8R							
STYLE		VJ0603		VJ0805		VJ1206		VJ1210 ⁽¹⁾	
EIA CODE		0603		0805		1206		1210 ⁽¹⁾	
VOLTAGE (V _{DC}) ⁽²⁾		25	50	25	50	25	50	25	50
VOLTAGE CODE		X	A	X	A	X	A	X	A
CAP. CODE	CAP.								
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			•	•	•	•	•	•
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								

Notes

•• Paper tape, • Plastic tape

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

⁽²⁾ For other voltage ratings, please contact mlcc@vishay.com



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PRODUCT DRAWING (in use)					
SIZE	CODE	X - TERMINATION CODE (100 % MATTE TIN)		F, E - TERMINATION CODE (AgPd)	
		DRAWING C0G (NP0)	DRAWING X7R	DRAWING C0G (NP0)	DRAWING X7R
0402	•• = Papertape	7175	9172	7175	9072
	++ = Papertape	7172	7172	7072	7072
0603	•• = Papertape	7179	9155	7179	9097
	++ = Papertape	7155	7155	7097	7097
	• = Plastictape	7179	9155	7179	9097
	+ = Plastictape	7155	7155	7097	7097
0805	•• = Papertape	7188	9156	7188	9080
	++ = Papertape	7156	7156	7080	7080
	• = Plastictape	7188	9156	7188	9080
	+ = Plastictape	7156	7156	7080	7080
1206	• = Plastictape	7180	9157	7180	9081
	+ = Plastictape	7157	7157	7081	7081
1210	• = Plastictape	7190	9158	7190	9099
	+ = Plastictape	7158	7158	7099	7099

STANDARD PACKAGING QUANTITIES (1)(2)					
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	
		PAPER TAPE PACKAGING CODE "C"/"O" (4)	PLASTIC TAPE PACKAGING CODE "E/T" (6)	PAPER TAPE PACKAGING CODE "P"/"I" (4)	PLASTIC TAPE PACKAGING CODE "M/R" (6)
0402	8 mm	5000/10 000 (3)	N/A	10 000/30 000 (3)	N/A
0603	8 mm	4000	N/A	10 000	N/A
0805 (5)	8 mm	3000	3000	10 000	10 000
1206 (5)	8 mm	N/A	3000	N/A	10 000
1210 (5)	8 mm	N/A	2000/2500/3000	N/A	9000/10 000
1812	12 mm	N/A	1000	N/A	4000

Notes

- (1) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (2) N/A = Not available
- (3) Quantity can vary with customer request
- (4) Flamed paper tape code "O" (7" reel) and "I" (11 1/4/13" reel) for AgPd terminated parts (termination code F, E)
- (5) Packaging "C/P" or "E/M" and quantity can depend from product thickness
- (6) Packaging code "T", "R" are used for size 1812.

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1 - GENERAL CERTIFICATES

# Quality management system acc. to ISO/TS 16949: 2009	Yes
# Quality management system acc. to ISO 9001: 2008	Yes
# Environmental certification acc. to ISO 14001: 2004	Yes
# Health and safety system acc. to OSHA 18001	Yes

2 - TECHNICAL REQUIREMENTS

Unless specified in component specification, these parameters are the minimum requirements for the components.

2.1 OPERATING TEMPERATURE RANGE

For standard applications	T _A : - 55 °C to + 125 °C	see characteristics 2.3
For high temperature applications	T _A : - 55 °C to + 150 °C	see characteristics 2.3
For ultra high temperature applications	T _A : - 55 °C to + 175 °C	see characteristics 2.3

2.2 STORAGE TEMPERATURE RANGE

Comment: Only for the part without packaging	T _A : - 55 °C to + 175 °C
--	--------------------------------------

2.3 CHARACTERISTICS

PARAMETER	CERAMIC TYPE	SYMBOL	RATINGS	TEST CONDITIONS/ REMARKS
Rated voltage in temperature range - 55 °C to + 85 °C	X5R	U _R	10 V	
Rated voltage in temperature range - 55 °C to + 125 °C	C0G (NP0)	U _R	25 V to 3000 V	
	X7R		16 V to 630 V	
Rated voltage in temperature range - 55 °C to + 150 °C	X8R		25 V/50 V	
Derating at higher temperature up to + 150 °C	C0G (NP0),		25 V to 100 V	U _{DC} ≤ 1/2 U _R
	X7R		16 V to 100 V	U _{DC} ≤ 1/2 U _R
Derating at higher temperature up to + 175 °C	C0G (NP0),		25 V to 100 V	U _{DC} ≤ 1/4 U _R
	X7R	16 V to 100 V	U _{DC} ≤ 1/4 U _R	
	X8R	25 V/50 V	U _{DC} ≤ 1/4 U _R	
Temperature coefficient in temperature range - 55 °C to + 125 °C	C0G (NP0)	α _C	≤ ± 30 ppm/C	if C _R < 10 pF: α _C ≤ ± 120 ppm/K
	X7R	ΔC	≤ ± 15 %	
Temperature coefficient in temperature range - 55 °C to + 150 °C	C0G (NP0)	α _C	≤ ± 30 ppm/C	if C _R < 10 pF: α _C ≤ ± 120 ppm/K
	X7R		+ 15 %/- 30 %	
	X8R	ΔC	≤ ± 15 %	
Temperature coefficient in temperature range - 55 °C to + 175 °C	X7R	ΔC	+ 15 %/- 50 %	
Dissipation factor in temperature range - 55 °C to + 175 °C	C0G (NP0)	tan δ	≤ 0.0015	
	X7R		≤ 0.06	
	X8R		≤ 0.06	

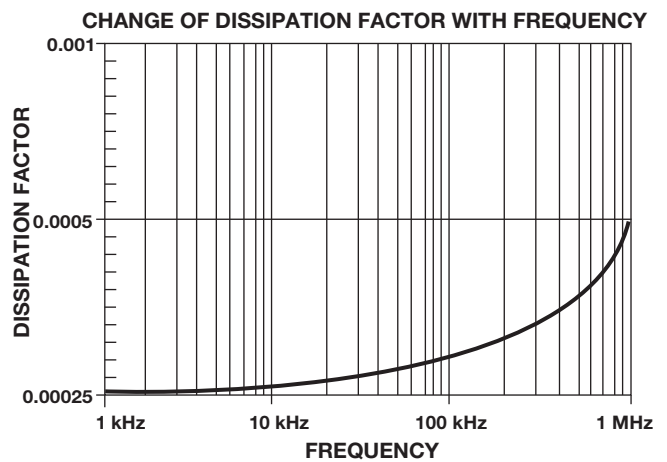
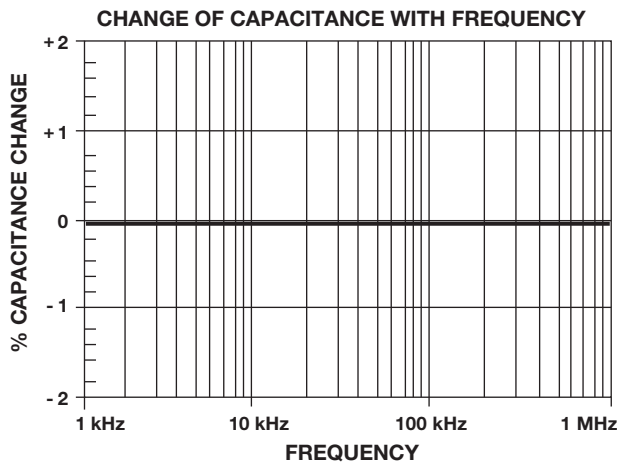
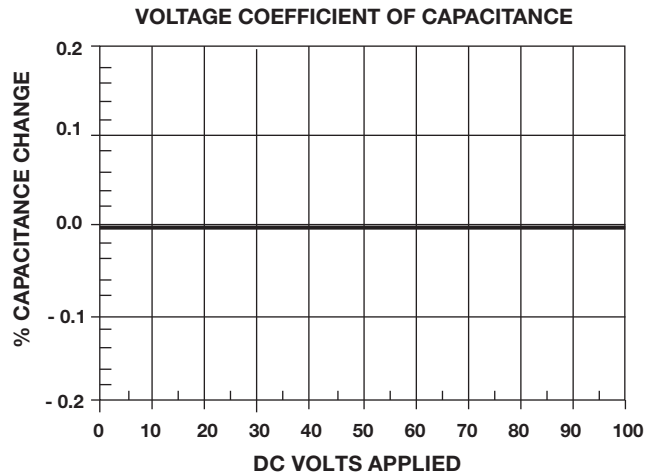
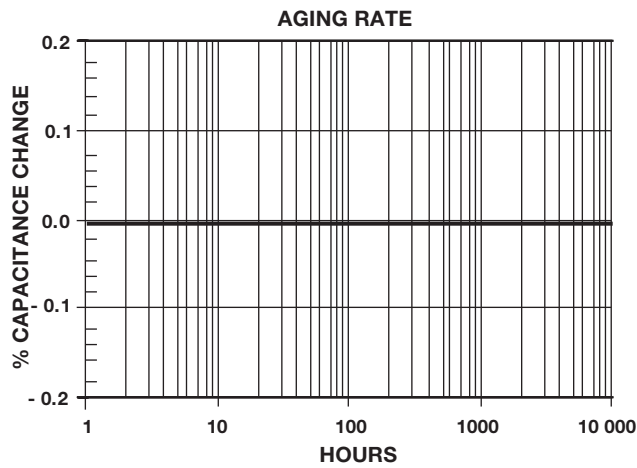
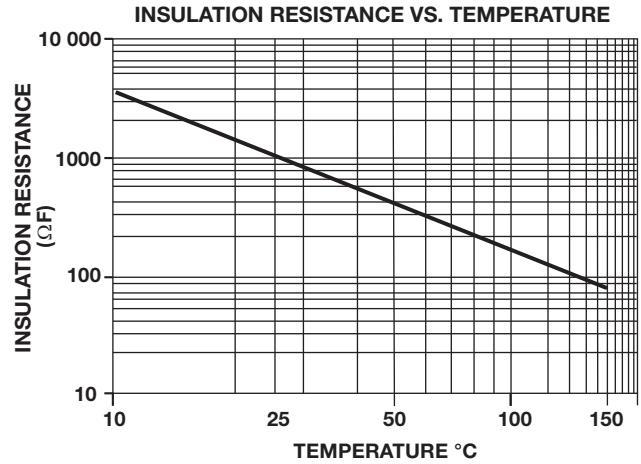
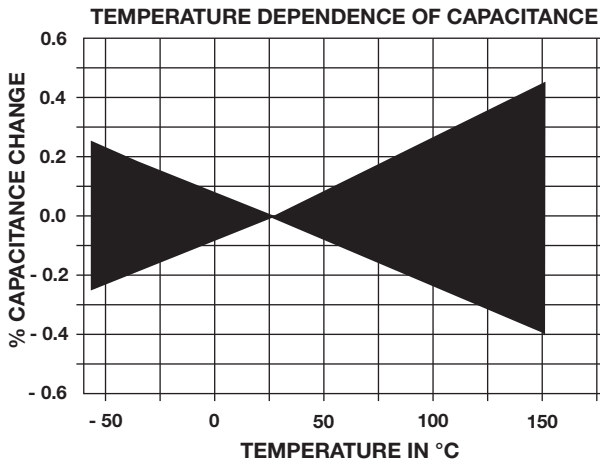


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Surface Mount Multilayer Ceramic Chip Capacitors
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COG (NP0) DIELECTRIC - TYPICAL PARAMETERS

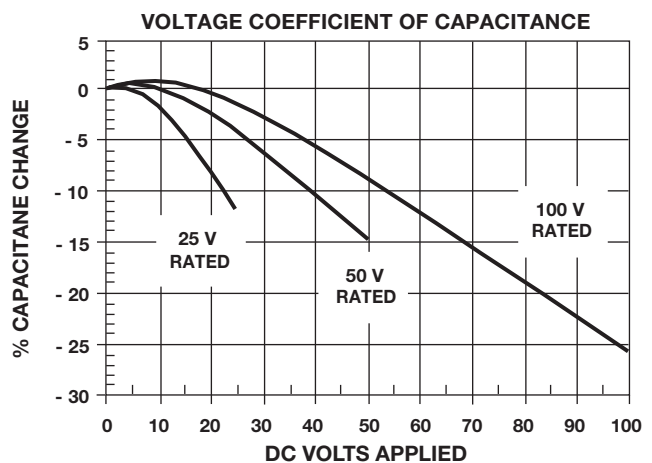
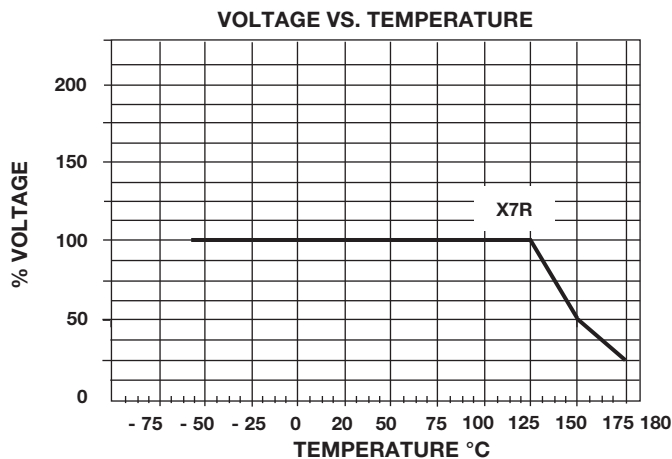
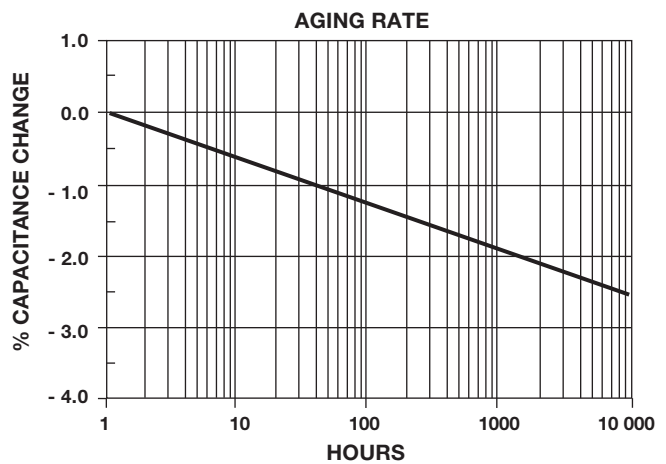
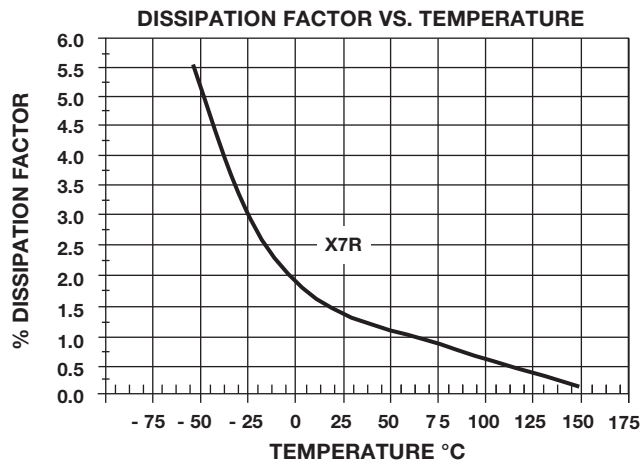
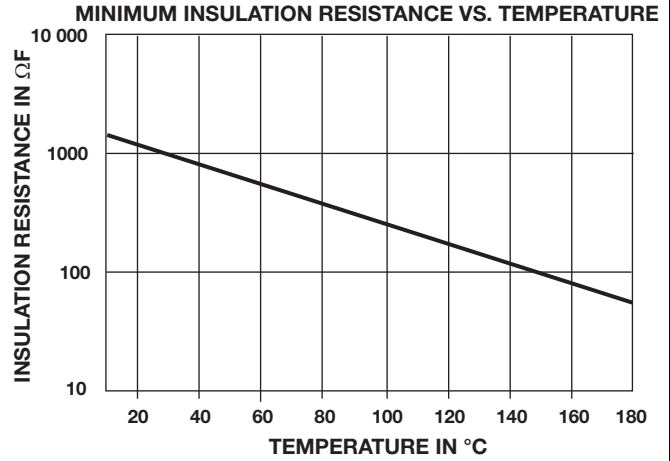
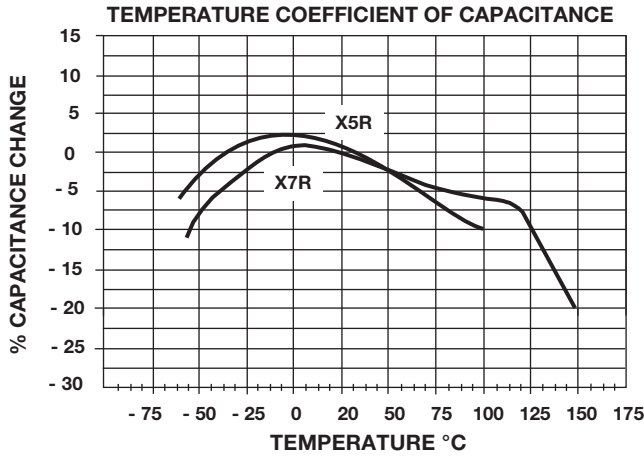


VJ....31/VJ....34 Automotive MLCC



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors for Automotive Applications

X7R DIELECTRIC - TYPICAL PARAMETERS



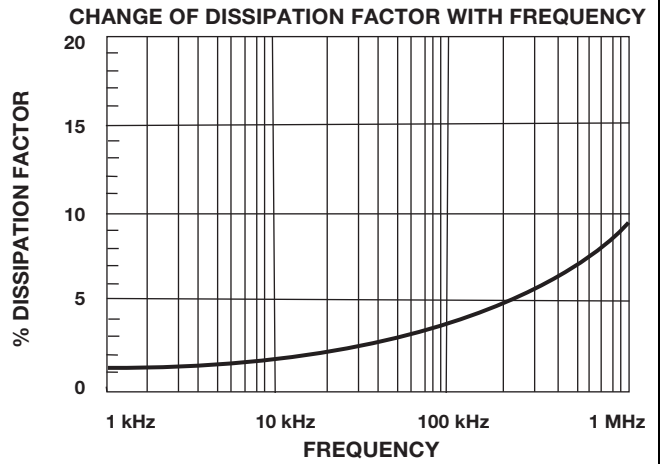
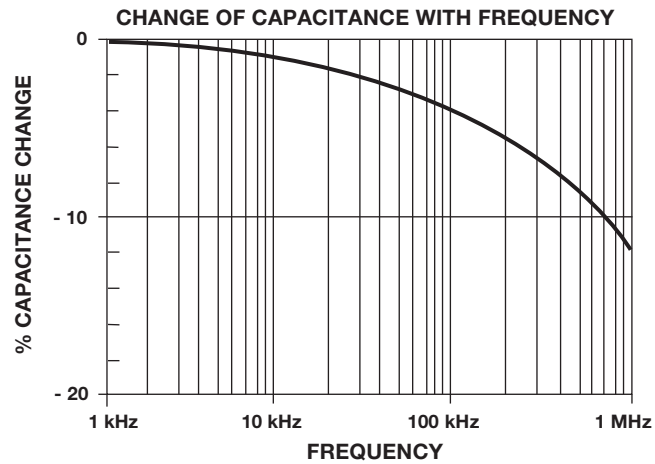
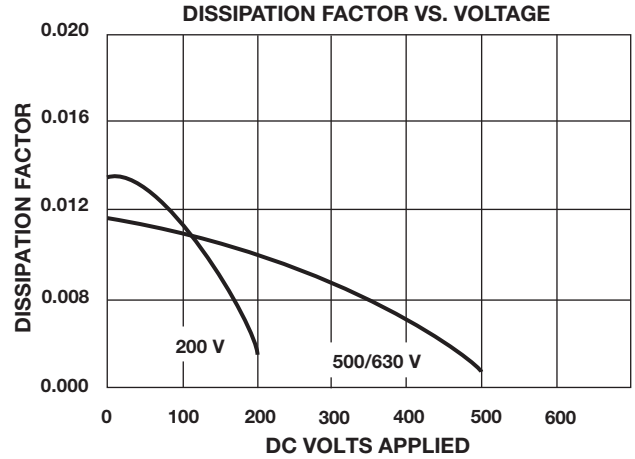
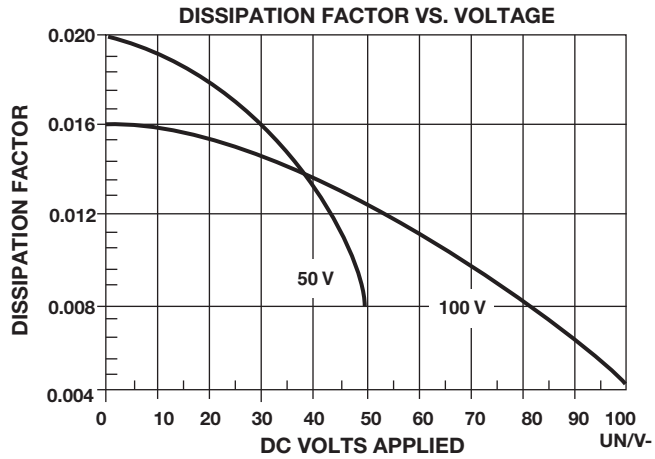


VJ....31/VJ....34 Automotive MLCC

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

Vishay Vitramon

X7R DIELECTRIC - TYPICAL PARAMETERS

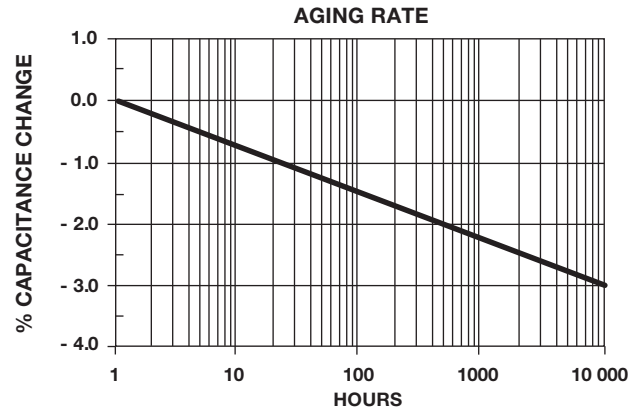
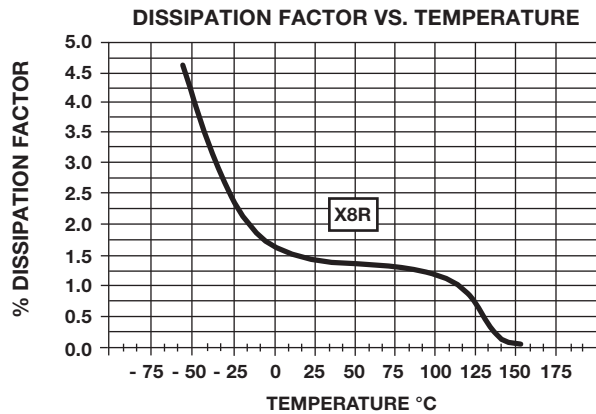
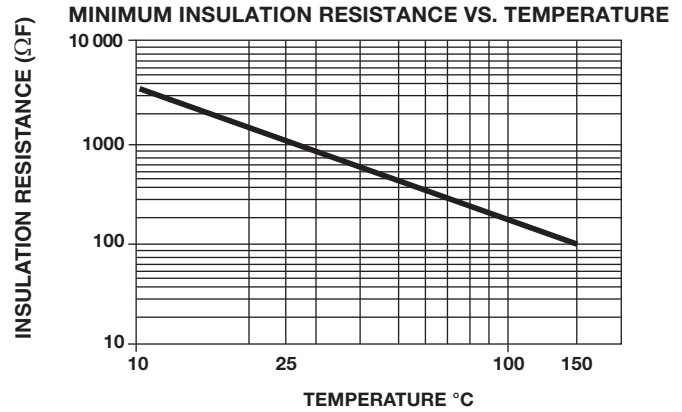
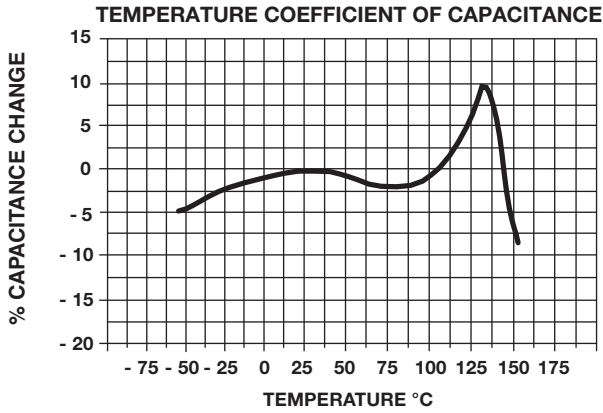


VJ....31/VJ....34 Automotive MLCC



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

X8R DIELECTRIC - TYPICAL PARAMETERS





VJ....31/VJ....34 Automotive MLCC

Surface Mount Multilayer Ceramic Chip Capacitors
for Automotive Applications

Vishay Vitramon

3 - LOT ACCEPTANCE TESTS

Process tests available in classes (on request)

GROUP	ACTION
A	Components are tested within the monitoring program of the supplier. The supplier shall submit the part numbers of the selected component to the customer during the component specification discussions.
B	Components (customer P/N) shall be tested quarterly. Records available only on special request by the customer.
C	Test with each shipment. Records are provided on a monthly basis. Customer special requirement; requirement should be determined in a specific component specification.

Upon request the records can be submitted in electronic format on monthly basis.

3.1 THERMAL STRENGTH, THERMAL SHOCK SENSIBILITY

Sample size	200
Handling	Mounted on PCB
Thermal shock	1 x 280 °C, no pre-heat, 5 s to 10 s
IR - test (IRATS)	U = U _R , T = room temperature, verified
Burn in (BIATS)	Equivalent to 12 h burn-in, 2 x U _R /125 °C, verification time to failure

Acceptance criteria: Zero defects (IRATS and BIATS).

3.2 BOARD FLEX TEST

Sample size	20 pcs/lot
X5R, X7R, X8R	Every lot
C0G	At least three different part numbers of one component family matrix per quarter
Max. deflection	8 mm (data to be reported, available on request)

3.3 SOLDERABILITY/RESISTANCE TO SOLDERING HEAT

Temperature profile for reflow soldering of SMD parts IPC/JEDEC-J-STD-020C.

Test is done on a regular basis for samples taken randomly out of the line.

Acceptance criteria: At least 95 % new solder and no detachment or leaching of terminations.

Solderability is guaranteed at least for one year when stored in original package.

4 - ENVIRONMENTAL REQUIREMENTS

A list of the chemical substances content, which must not be used or whose use shall be limited by international law, is available on request.

Vishay confirms that the components specified in this specification do not contain asbestos nor cadmium, not even in the smallest volumes.

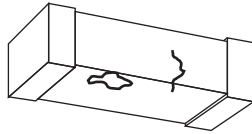
The manufacturer/supplier confirms that the component during normal handling, storage and assembly, as well as during operation in the automobile, is non toxic.

5 - INSPECTION CRITERIA

The supplier shall carry out visual examination with suitable equipment with approximately 10 x magnification and lighting appropriate to the specimen under test and the required quality level.

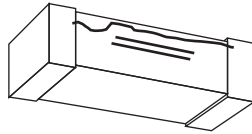
Chipping

The components shall be free of cracks or fissures. Small damages which do not deteriorate the performance of the component shall be less than 50 % of the surface of the MLCC as defined in EIA 595.



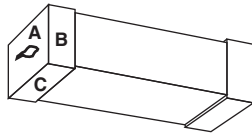
Delamination or Exposed Electrodes

No visible separation or delamination between layers of the capacitor and no exposed electrodes between the two terminals of the capacitor must be seen.



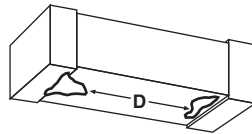
Metallization

For the metallization, no visible detachment of the metallized terminals and no exposed electrodes must be seen. Defects and gaps in the metallization on each sides of the terminal must not exceed 10 % of the total area (e.g. A, B, C, ...). Leaching shall not exceed 25 %.



Electrode Distance

The ceramic body shall be free of any conducting material between the terminals which reduces the distance of the electrodes. The minimum distance 'd' is 400 μm for all package sizes, except 0603. For the component package '0603' the minimum distance is 200 μm .



6 - BOARD FLEX TEST CONDITIONS

6.1 BOARD FLEX DEFINITIONS OF TEST

PCB thickness = (1.6 ± 0.1) mm

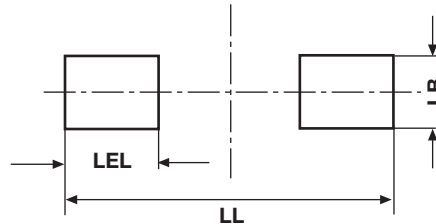
Copper thickness = 35 μ m

Material FR4 (EP-GC 02 according to DIN 40 802)

LAYOUT/PAD DESIGN (Dimensions in mm)			
TYPE	PAD SIZE		
	LL	LB	LEL
0603	2.20	1.00	0.75
0805	3.40	1.30	1.20
1206	4.50	1.80	1.20
1210	4.50	2.80	1.30
1812	4.75	3.60	1.50

Note

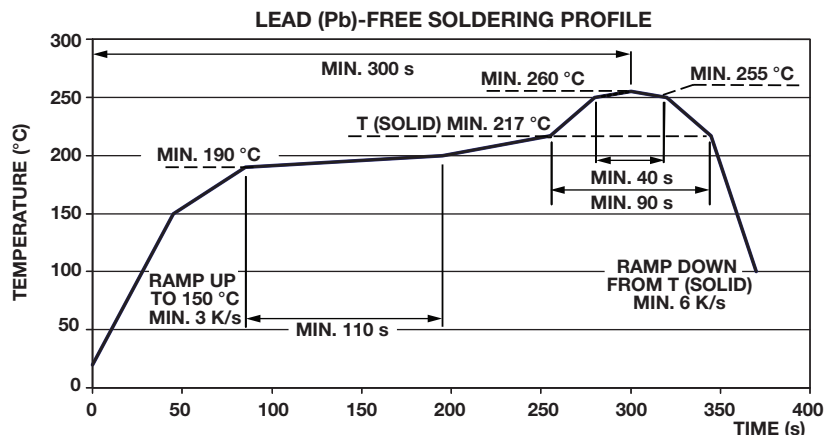
- LL = total length; LB = width of the pad; LEL = single pad length



6.2 SOLDERING INSTRUCTIONS

THICKNESS, RECOMMENDED FOR SOLDER PASTE (Reflow soldering)	
TYPE	THICKNESS in μ m
0402	75 to 90
0603	150 to 200
0805	150 to 200
1206	150 to 200
1210	150 to 200
1812	150 to 200

6.3 TYPICAL TEMPERATURE PROFILE FOR REFLOW SOLDERING (Boardflex test)



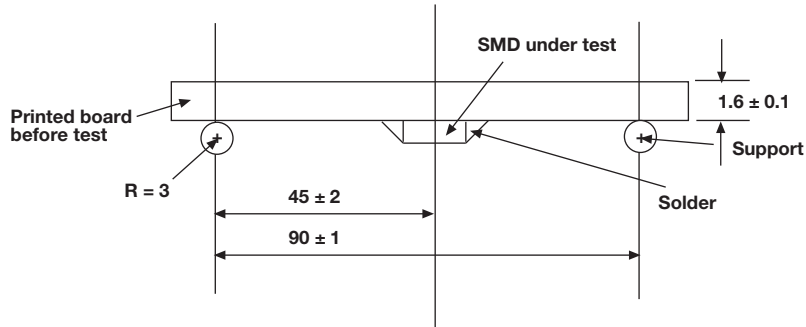
VJ....31/VJ....34 Automotive MLCC



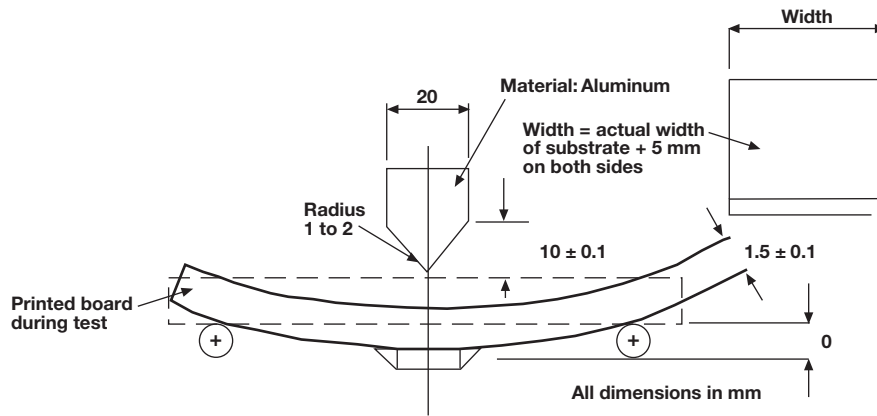
Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors for Automotive Applications

6.4 MOUNTING, DIMENSIONS AND TESTING

Mounting



Testing



6.5 PERFORMANCE OF THE TEST(S)

- A) Electrical test according to component specification (Cap, DF, IR)
- B) Mounting to PCB
- C) Storage at room temperature (min. 10 h)
- D) Board flex test

6.6 DETAILS

X5R, X7R, X8R	PCB to be deflected continuously, speed 1 mm/s (± 0.5 mm/s)
C0G	PCB to be deflected in steps until cracks or other damages are visible or can be measured. Dwell time between steps: (5 ± 1) s

6.7 FAILURE CRITERIA

X5R, X7R, X8R	Piezoelectric sensor, no failure up to 2 mm
C0G	$\Delta C/C < 1\%$ or < 1 pF, no failure up to 3 mm
Both	Electrical test according to component specification



VJ....31/VJ....34 Automotive MLCC

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7 - AEC-Q200 QUALIFICATION TESTING

NO.	AEC-Q200 TEST ITEM	REFERENCE
1	Pre- and post stress electrical test	User spec
3	High temp exposure (storage)	MIL-STD-202, method 108
4	Temperature cycling	JESD22, method JA-104
5	Destructive physical analysis	EIA-469
6	Moisture resistance	MIL-STD-202, method 106
7	Biased humidity	MIL-STD-202, method 103
8	Operation life	MIL-STD-202 method 108
9	External Visual	MIL-STD-883 method 2009
10	Physical dimension	JESD22, method JB-100
13	Mechanical shock	MIL-STD-202, method 213
14	Vibration	MIL-STD-202, method 204
15	Resistance to solder heat	MIL-STD-202, method 215
16	ESD	AEC-Q200 rev. C
17	Solderability	J-STD-002
20	Electrical characterization	User spec
21	Board flex	AEC-Q200-005
22	Terminal strength	AEC-Q200-006
23	Beam load	AEC-Q200-003



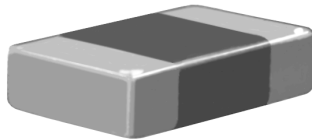


Contents

VJ OMD Series 108

MLCCs for Boardflex Sensitive Applications with Open Mode Design

Surface Mount Multilayer Ceramic Chip Capacitor Solutions for Boardflex Sensitive Applications



FEATURES

- Open Mode Design (OMD) reduces risk of shorts or leakage in board flex applications.
- Excellent reliability and thermal shock performance
- Efficient low-power consumption, ripple current capable to 1.2 A_{RMS} at 100 kHz
- High voltage breakdown compared to standard design
- 100 % voltage conditioning available up to 630 V_{DC} rating (process code “5H”) Contact mlcc@vishay.com for higher voltages.
- Polymer termination available for intensive board flex requirements
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Demanding boardflex applications
- Input filter capacitors
- Output filter capacitors
- Snubber capacitors reduce MOSFET voltage spikes
- High frequency filtering for switching power supplies
- For lighting and other AC applications please contact: mlcc@vishay.com

ELECTRICAL SPECIFICATIONS

COG (NPO)

GENERAL SPECIFICATION

Note

Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range: 10 pF to 47 nF

Voltage Range: 50 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 Rate: 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

X7R

GENERAL SPECIFICATION

Note

Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range: 100 pF to 1.8 μF

Voltage Range: 16 V_{DC} to 3000 V_{DC}

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

Dissipation Factor (DF):

< 50 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

≤ 250 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} to 3000 V _{DC} -rated:	120 % of rated voltage



QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
COG (NP0)	1206	1500	10 pF	4.7 nF
	1210	2000	10 pF	8.2 nF
	1808	3000	10 pF	8.2 nF
	1812	3000	10 pF	18 nF
	1825	1000	15 pF	33 nF
	2220	1000	270 pF	39 nF
	2225	1000	270 pF	47 nF
X7R	0805	630	470 pF	220 nF
	1206	2000	270 pF	680 nF
	1210	2000	390 pF	1.0 μF
	1808	3000	220 pF	18 nF
	1812	3000	100 pF	1.2 μF
	1825	2000	5.6 nF	1.5 μF
	2220	3000	1.0 nF	1.8 μF
	2225	2000	5.6 nF	1.8 μF

Note

- Detail ratings see selection chart

ORDERING INFORMATION								
VJ1210	Y	474	J	X	A	A	T	# (2)
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING (1)	MARKING	PACKAGING	PROCESS CODE
0805 1206 1210 1808 1812 1825 2220 2225	A = COG (NP0) Y = X7R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples 474 = 470 000 pF	F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note COG (NP0): F, G, J, K X7R: J, K, M	X = Ni barrier 100 % tin plated matte finish F, E = AgPd (3) B = Polymer 100 % tin plated matte finish N = Non-magnetic	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 R = 1500 V F = 2000 V H = 3000 V	A = Unmarked	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 Note "I" and "O" are used for "F", "E" termination size 0805	4X = OMD cap 5H = OMD cap 100 % voltage conditioning

Notes

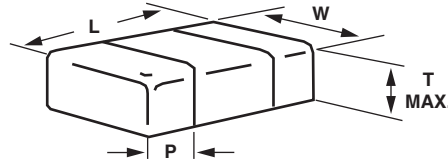
(1) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance.

Consult for questions: mlcc@vishay.com

(2) Process code with 2 digits has to be added

(3) Termination code "E" is for conductive epoxy assembly. Contact: mlcc@vishay.com for availability.

DIMENSIONS in inches (millimeters)



EIA CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
					MINIMUM	MAXIMUM
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)
-	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)
-	VJ2220	0.220 ± 0.008 (5.59 ± 0.20)	0.200 ± 0.008 (5.08 ± 0.20)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
-	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)

Note

- Polymer (B-termination) have increased dimensions:
1206 and smaller case sizes: Length 0.002" (0.05 mm)
1210 and larger case sizes: Length 0.004" (0.10 mm)



SELECTION CHART																									
DIELECTRIC		COG (NPO)																							
STYLE		VJ1206 ⁽¹⁾						VJ1210 ⁽¹⁾						VJ1808 ⁽¹⁾											
EIA CODE		1206						1210						1808											
VOLTAGE (V _{DC})		50	100	200	500	630	1000	1500	50	100	200	500	630	1000	1500	2000	50	100	200	500	630	1000	1500	2000	3000
VOLTAGE CODE		A	B	C	E	L	G	R	A	B	C	E	L	G	R	F	A	B	C	E	L	G	R	F	H
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
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																								

Note

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

SELECTION CHART																
DIELECTRIC		COG (NP0)														
STYLE		VJ1812 ⁽¹⁾								VJ1825 ⁽¹⁾						
EIA CODE		1812								1825						
VOLTAGE (V _{DC})		50	100	200	500	630	1000	1500	2000	3000	50	100	200	500	630	1000
VOLTAGE CODE		A	B	C	E	L	G	R	F	H	A	B	C	E	L	G
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Note

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



SELECTION CHART													
DIELECTRIC		COG (NP0)											
STYLE		VJ2220 ⁽¹⁾						VJ2225 ⁽¹⁾					
EIA CODE		2220						2225					
VOLTAGE (V _{DC})		50	100	200	500	630	1000	50	100	200	500	630	1000
VOLTAGE CODE		A	B	C	E	L	G	A	B	C	E	L	G
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	•	•	•	•	•	•	•	•	•	•	•	•
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												

Note

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



SELECTION CHART																			
DIELECTRIC		X7R																	
STYLE		VJ0805 ⁽¹⁾							VJ1206 ⁽¹⁾										
EIA CODE		0805							1206										
VOLTAGE (V _{DC})		16	25	50	100	200	500	630	16	25	50	100	200	500	630	1000	1500	2000	
VOLTAGE CODE		J	X	A	B	C	E	L	J	X	A	B	C	E	L	G	R	F	
CAP. CODE	CAP.																		
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	•	•	•	•	•			•	•	•	•	•	•	•	•	•	•	
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																		

Notes

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

- Paper tape
- Plastic tape



SELECTION CHART																
DIELECTRIC		X7R														
STYLE		VJ1210 ⁽¹⁾									VJ1808 ⁽¹⁾					
EIA CODE		1210									1808					
VOLTAGE (V _{DC})		16	25	50	100	200	500	630	1000	1500	2000	630	1000	1500	2000	3000
VOLTAGE CODE		J	X	A	B	C	E	L	G	R	F	L	G	R	F	H
CAP. CODE	CAP.															
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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															

Note

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

SELECTION CHART																		
DIELECTRIC		X7R																
STYLE		VJ1812 ⁽¹⁾									VJ1825 ⁽¹⁾							
EIA CODE		1812									1825							
VOLTAGE (V _{DC})		50	100	200	250	500	630	1000	1500	2000	3000	100	200	500	630	1000	1500	2000
VOLTAGE CODE		A	B	C	P	E	L	G	R	F	H	B	C	E	L	G	R	F
CAP. CODE	CAP.																	
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
203	20 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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Note

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

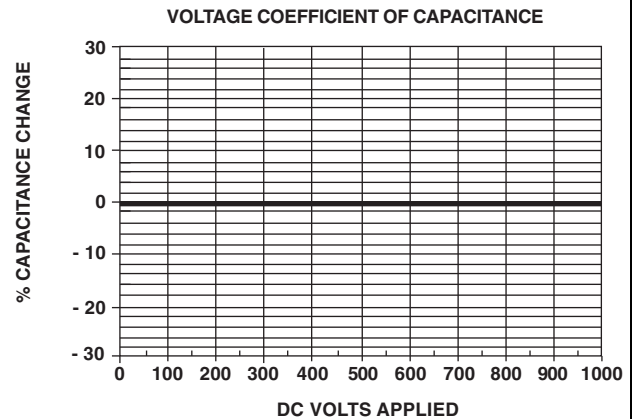
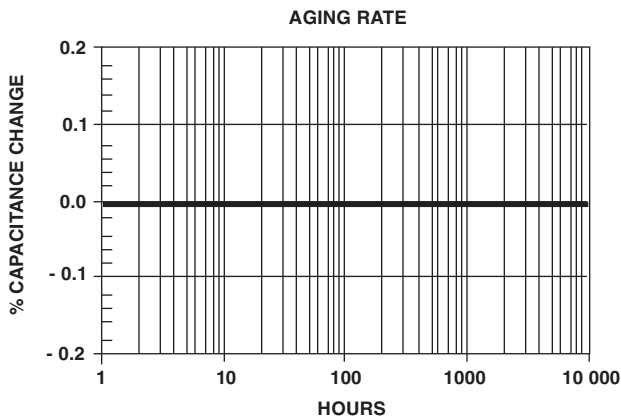
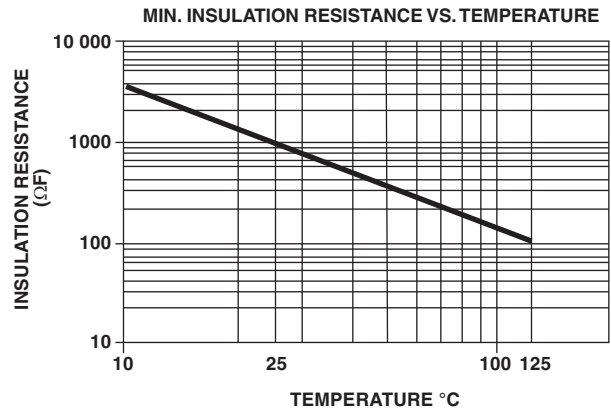
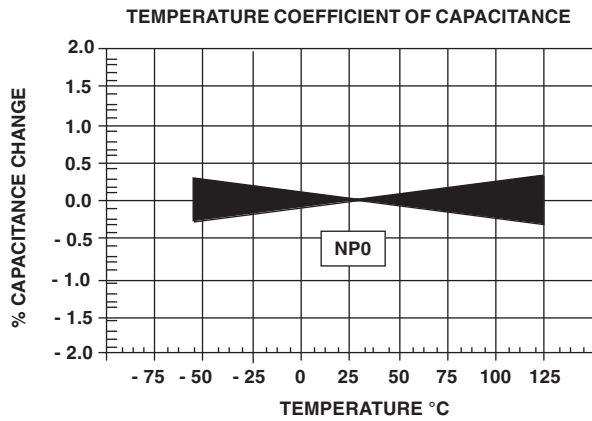


SELECTION CHART																	
DIELECTRIC		X7R															
STYLE		VJ2220 ⁽¹⁾									VJ2225 ⁽¹⁾						
EIA CODE		2220									2225						
VOLTAGE (V _{DC})		50	100	200	250	500	630	1000	2000	3000	100	200	500	630	1000	1500	2000
VOLTAGE CODE		A	B	C	P	E	L	G	F	H	B	C	E	L	G	R	F
CAP. CODE	CAP.																
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
203	20 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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Note

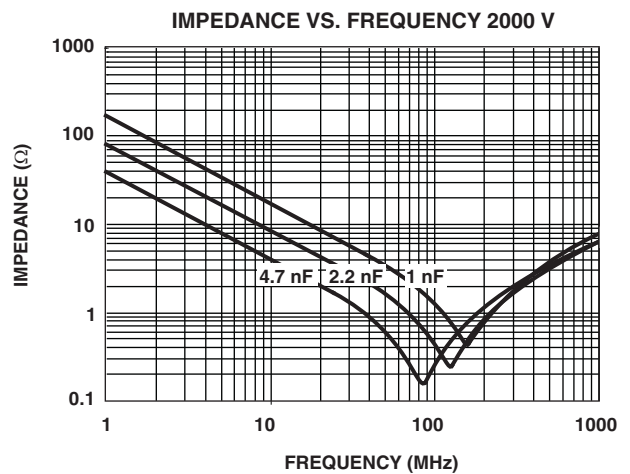
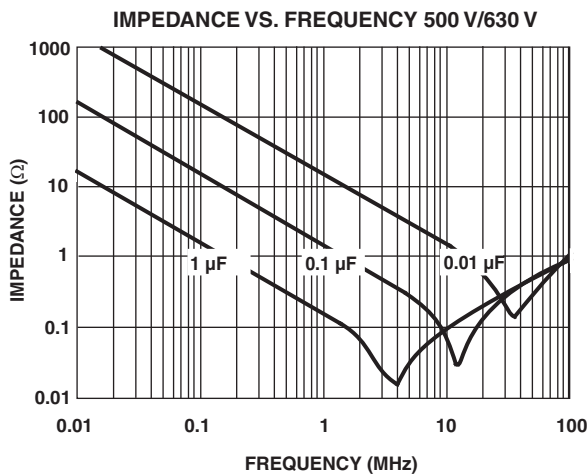
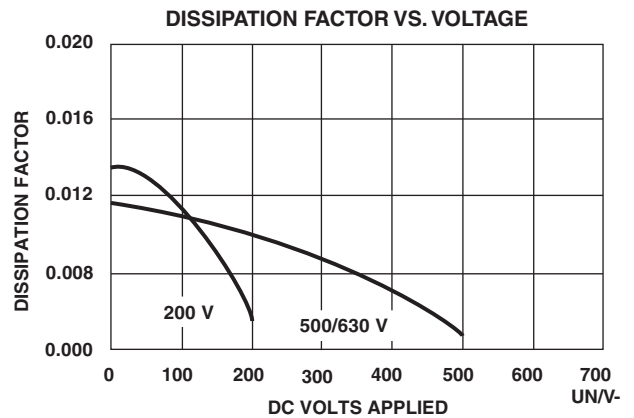
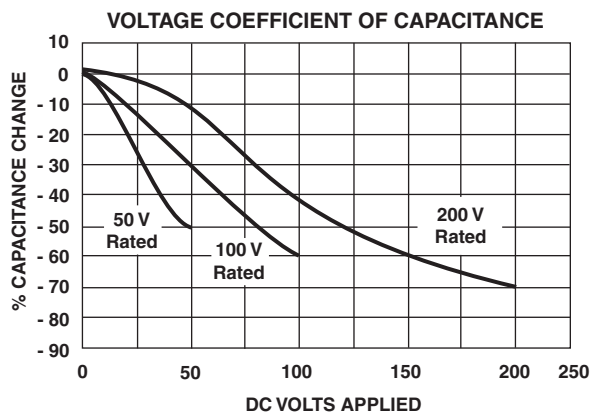
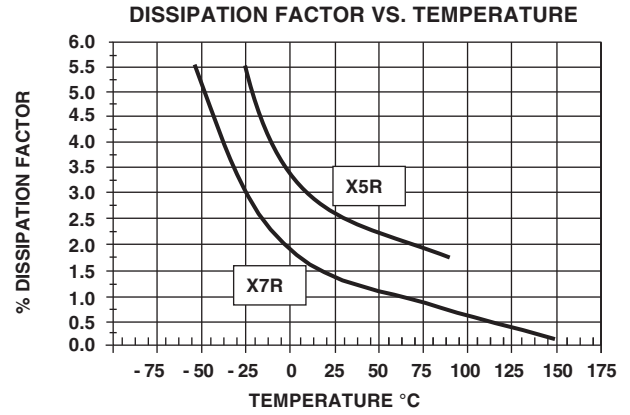
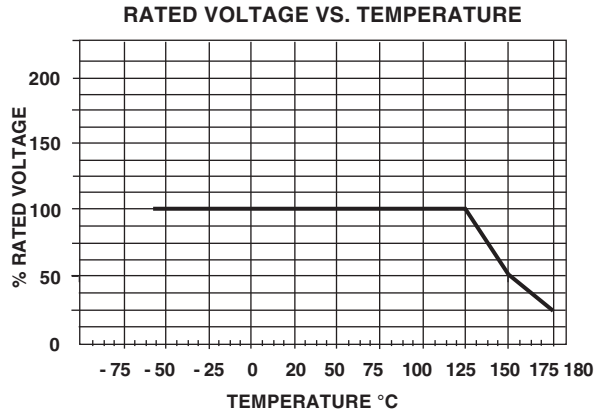
⁽¹⁾ See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

OMD - COG (NPO) CAPACITORS - TYPICAL PARAMETERS



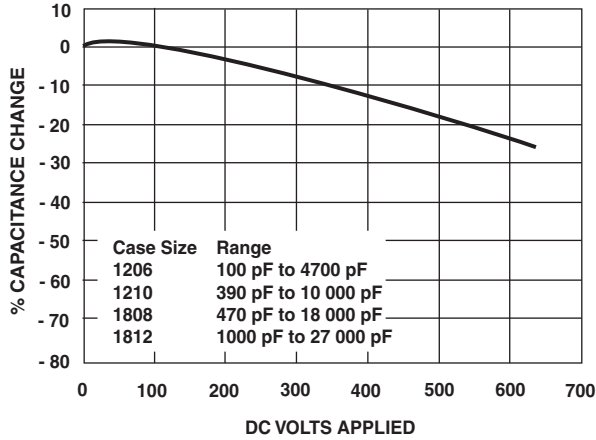


OMD - X7R DIELECTRIC - TYPICAL PARAMETERS

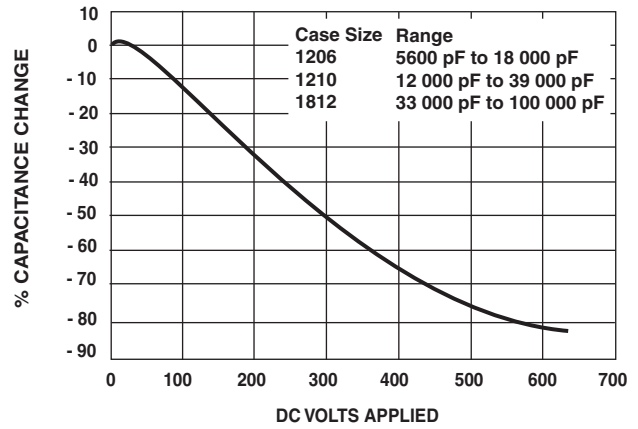


OMD - X7R DIELECTRIC - TYPICAL PARAMETERS

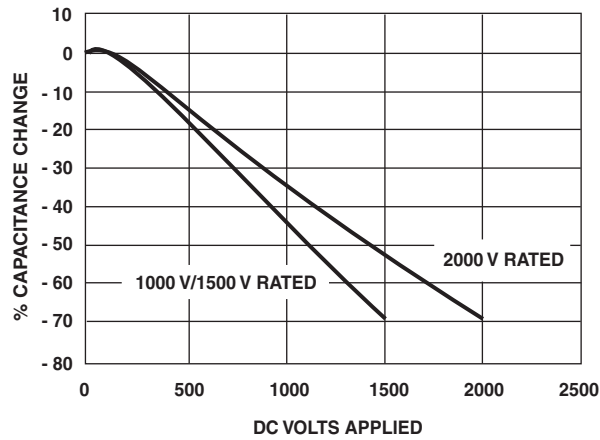
VOLTAGE COEFFICIENT OF CAPACITANCE
LOWER CAPACITANCE



VOLTAGE COEFFICIENT OF CAPACITANCE
HIGHER CAPACITANCE



VOLTAGE COEFFICIENT OF CAPACITANCE



BOARDFLEX SENSITIVE APPLICATIONS - SOLUTION:

A predominant failure mode in multilayer ceramic chip capacitors is cracking caused by board flexure. Cracks can then create a path for current to pass from one electrode through the dielectric to an opposing electrode or from the terminations at one end of the MLCC through the dielectric to an opposing electrode. This may subsequently result in capacitance loss, leakage - low Insulation Resistance (IR) - and/or more seriously, high current shorts. A short circuit condition in the surface mounted capacitors can cause further failures of downstream components. Vishay's Open Mode Design Capacitors (VJ OMD - Cap. series) reduce the risk of these destructive conditions through MLCC designs that prevent board flexure cracks reaching the opposing electrode.

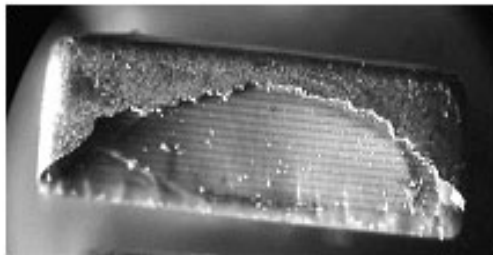
VJ OMD - Cap. MLCCs reduce the risk of early field failures associated with board flex cracks. However, it is important to note that even in the open mode designs the presence of flexure related cracks can cause capacitance loss leading to localized stresses on the parts. eventually, depending on the application environment, including such factors and high voltage pulse frequency and thermal cycling this may lead to internal breakdown of the component.

POLYMER TERMINATION

Polymer termination provides additional protection against board flexure damage by absorbing greater mechanical and thermal stresses. Components can be packaged, transported, stored and handled the same standard terminated product. Wave and reflow soldering of MLCC does not require modification to equipment and/or process. Polymer termination greatly reduces the risk of mechanical cracking however it does not completely eliminate.

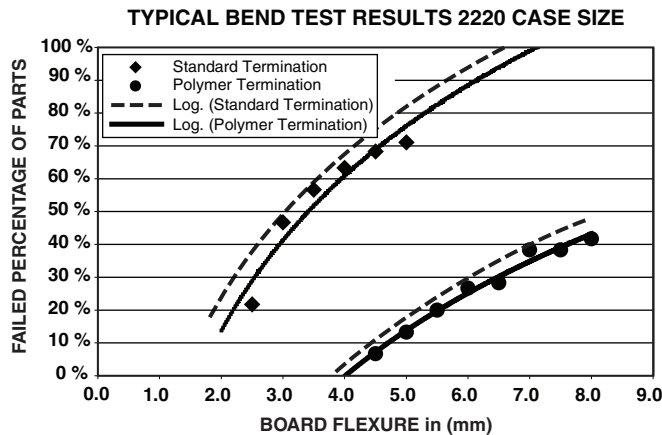
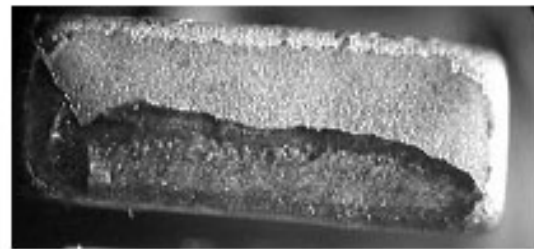
STANDARD TERMINATION

Exposed Electrodes = Electrical short



OMD CAP PLUS POLYMER TERMINATION

No Exposed Electrodes = No Electrical short



STANDARD PACKAGING QUANTITIES (1)(2)(3)					
BODY SIZE	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"
0805 ⁽⁴⁾	8 mm	3000	3000	10 000	10 000
1206 ⁽⁴⁾	8 mm	N/A	3000/2500	N/A	10 000/9000
1210 ⁽⁴⁾	8 mm	N/A	3000/2500/2000	N/A	10 000/9000
1808 ⁽⁴⁾	12 mm	N/A	2000	N/A	10 000
1812 ⁽⁴⁾	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

Notes

- (1) Vishay Vitramon uses embossed plastic, and punch paper carrier tapes. Paper tape is not available for case sizes > 1206 or for component thickness > 0.035" (0.89 mm)
- (2) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (3) N/A = Not available
- (4) Packaging code "C/O", "P/I" and lower quantities can depend from product thickness



Contents

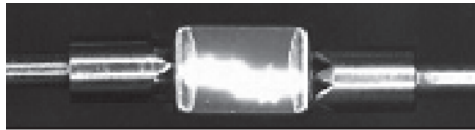
VJ HV Arc Guard® 124

MLCCs for Surface Arc-Over Prevention in High-Voltage Applications

Surface Mount Multilayer Ceramic Chip Capacitors Prohibit Surface Arc-over in High-Voltage Applications



HV Arc Guard® Capacitor with no Surface Arc-over



Standard Capacitor with Surface Arc-over

FEATURES

For this Worldwide Patented Technology

- Specialty: High-voltage applications
- MLCC that protects against surface arc-over
- Excellent high-voltage performance
- Higher capacitances and smaller case sizes that save board space, as compared to standard high-voltage MLCCs
- Voltage breakdowns as much as twice that of competitors' products
- Available with polymer termination for increase resistance to board flex cracking. Please contact factory for availability.
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Power supplies
- DC/DC converters (buck and boost)
- Voltage multipliers for flyback converters
- For lighting and other AC applications please contact: mlcc@vishay.com

ELECTRICAL SPECIFICATIONS

COG (NPO)
<p>GENERAL SPECIFICATION</p> <p>Note Electrical characteristics at + 25 °C unless otherwise specified</p> <p>Operating Temperature: - 55 °C to + 125 °C</p> <p>Capacitance Range: 10 pF to 8.2 nF</p> <p>Voltage Range: 1000 V_{DC} to 2500 V_{DC}</p> <p>Temperature Coefficient of Capacitance (TCC): 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C</p> <p>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</p> <p>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</p> <p>Aging Rate: 0 % maximum per decade</p> <p>Dielectric Strength Test: Performed per method 103 of EIA 198-2-E Applied test voltages 1000 V_{DC}-rated: 150 % of rated voltage 1500 V_{DC}, 2500 V_{DC}-rated: 120 % of rated voltage</p>

X7R
<p>GENERAL SPECIFICATION</p> <p>Note Electrical characteristics at + 25 °C unless otherwise specified</p> <p>Operating Temperature: - 55 °C to + 125 °C</p> <p>Capacitance Range: 100 pF to 270 nF</p> <p>Voltage Range: 250 V_{DC} to 1000 V_{DC}</p> <p>Temperature Coefficient of Capacitance (TCC): ± 15 % from - 55 °C to + 125 °C, with 0 V_{DC} applied</p> <p>Dissipation Factor (DF): 2.5 % maximum at 1.0 V_{RMS} and 1 kHz</p> <p>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</p> <p>Aging Rate: 1 % maximum per decade</p> <p>Dielectric Strength Test: Performed per method 103 of EIA 198-2-E. Applied test voltages ≤ 250 V_{DC}-rated: 200 % of rated voltage 500 V_{DC}-rated: min. 150 % of rated voltage 630 V_{DC}, 1000 V_{DC}-rated: 120 % of rated voltage</p>



QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0805	1500	10 pF	430 pF
	1206	1500	10 pF	1.5 nF
	1210	1500	10 pF	2.7 nF
	2220	1500	470 pF	5.6 nF
	2225	2500	470 pF	8.2 nF
X7R	0805	1000	100 pF	3.3 nF
	1206	1000	100 pF	47 nF
	1210	1000	100 pF	82 nF
	1808	1000	100 pF	100 nF
	1812	1000	100 pF	270 nF

Note

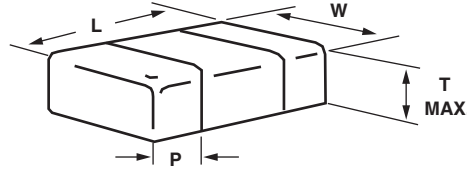
- Detail ratings see selection chart

ORDERING INFORMATION ⁽⁴⁾								
VJ0805	A	101	J	X	G	A	C	5Z ⁽²⁾
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING ⁽¹⁾	MARKING	PACKAGING	PROCESS CODE
0805 1206 1210 1808 1812 2220 2225	A = C0G (NP0) Y = X7R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples 102 = 1000 pF 223 = 22 000 pF	J = ± 5 % K = ± 10 % M = ± 20 %	X = Ni barrier 100 % tin plated F, E = AgPd ⁽³⁾ B = Polymer 100 % tin plated matte finish ⁽⁴⁾ N = Non-magnetic	P = 250 V E = 500 V L = 630 V G = 1000 V R = 1500 V O = 2500 V	A = Unmarked	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	5Z = HVArc Guard®
							<p>Note: "I" and "O" are used for "F", "E", "N" termination size 0805</p>	

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
- (2) Process code with 2 digits has to be added
- (3) Termination code "E" is for conductive epoxy assembly, contact mlcc@vishay.com for availability
- (4) Please contact factory for polymer termination availability

DIMENSIONS in inches (millimeters)



PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
VJ0805	0.079 ± 0.008 (2.00 ± 0.20)	0.049 ± 0.008 (1.25 ± 0.020)	0.057 (1.45)	0.010 (0.25)	0.028 (0.71)
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)	0.030 (0.76)
VJ1210	0.126 ± 0.008 (3.20 ± 0.20)	0.098 ± 0.008 (2.50 ± 0.020)	0.067 (1.70)	0.010 (0.25)	0.030 (0.76)
VJ1808	0.177 ± 0.010 (4.50 ± 0.25)	0.080 ± 0.010 (2.03 ± 0.25)	0.067 (1.70)	0.010 (0.25)	0.030 (0.76)
VJ1812	0.177 ± 0.010 (4.50 ± 0.25)	0.126 ± 0.008 (3.20 ± 0.20)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
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)
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)

Note

- Polymer (B-termination) have increased dimensions:
1206 and smaller case sizes: Length 0.002" (0.05 mm)
1210 and larger case sizes: Length 0.004" (0.10 mm)



SELECTION CHART COG (NP0)												
DIELECTRIC		COG (NP0)										
STYLE		VJ0805		VJ1206		VJ1210		VJ2220		VJ2225		
EIA CODE		0805		1206		1210		2220		2225		
VOLTAGE (V _{DC})		1000	1500	1000	1500	1000	1500	1000	1500	1000	1500	2500
VOLTAGE CODE		G	R	G	R	G	R	G	R	G	R	O
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	•	•	•	•	•	•					
431	430 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									•	•	•

Notes

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

- Available in plastic carrier tape only
- Available in paper carrier tape only

SELECTION CHART X7R																			
DIELECTRIC		X7R																	
STYLE		VJ0805		VJ1206				VJ1210				VJ1808				VJ1812			
EIA CODE		0805		1206				1210				1808				1812			
VOLTAGE (V _{DC})		630	1000	250	500	630	1000	250	500	630	1000	250	500	630	1000	250	500	630	1000
VOLTAGE CODE		L	G	P	E	L	G	P	E	L	G	P	E	L	G	P	E	L	G
CAP. CODE	CAP.																		
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							•	•	•	•	•	•			•	•	•	•
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																		

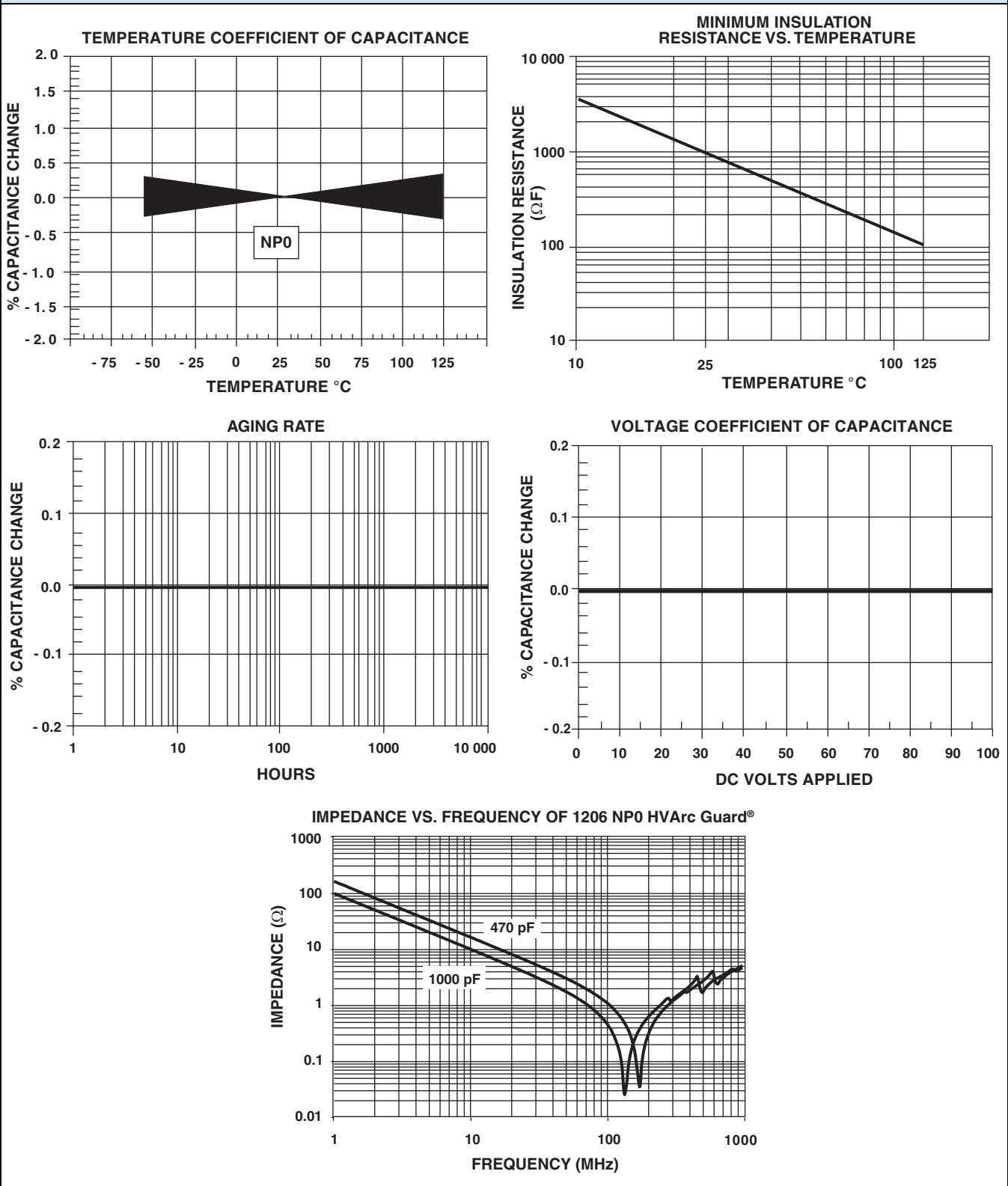
Notes

See soldering recommendations within this databook, or visit www.vishay.com/doc?45034

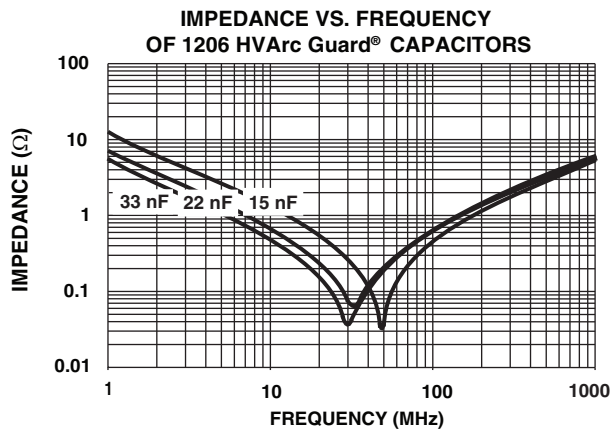
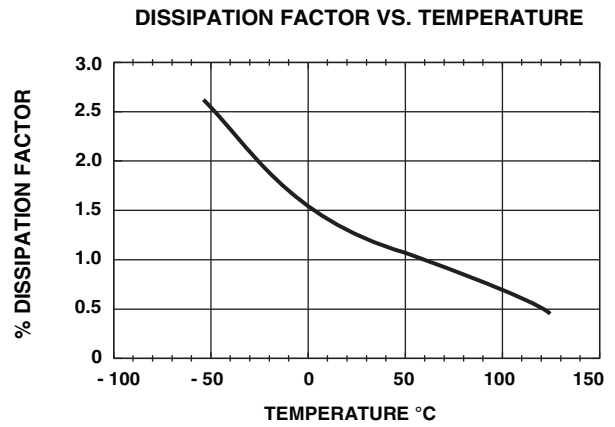
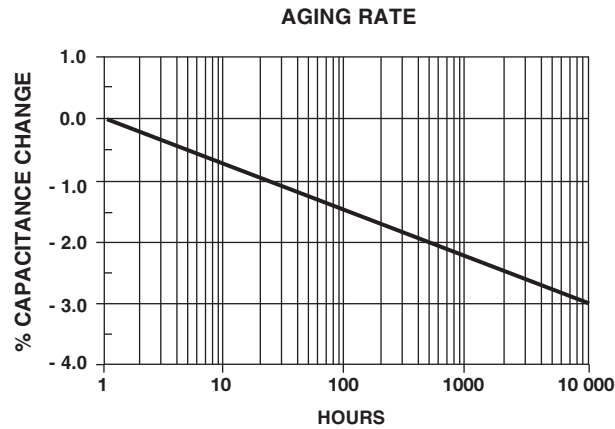
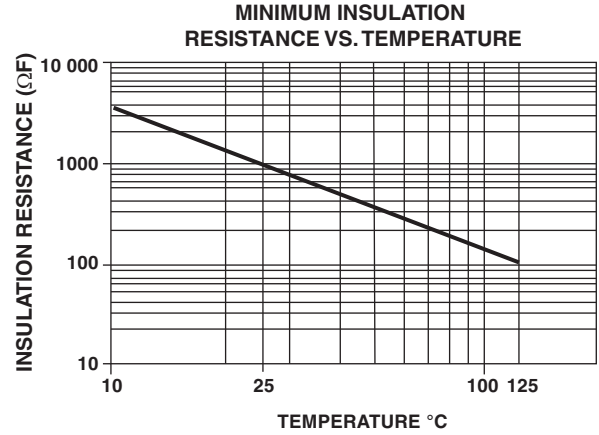
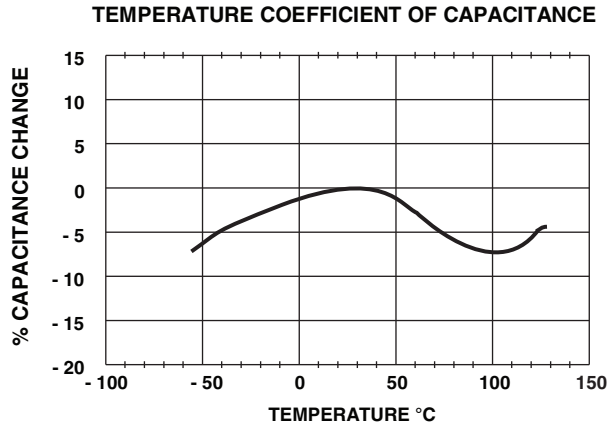
- Available in plastic carrier tape only
- Only available in paper carrier tape

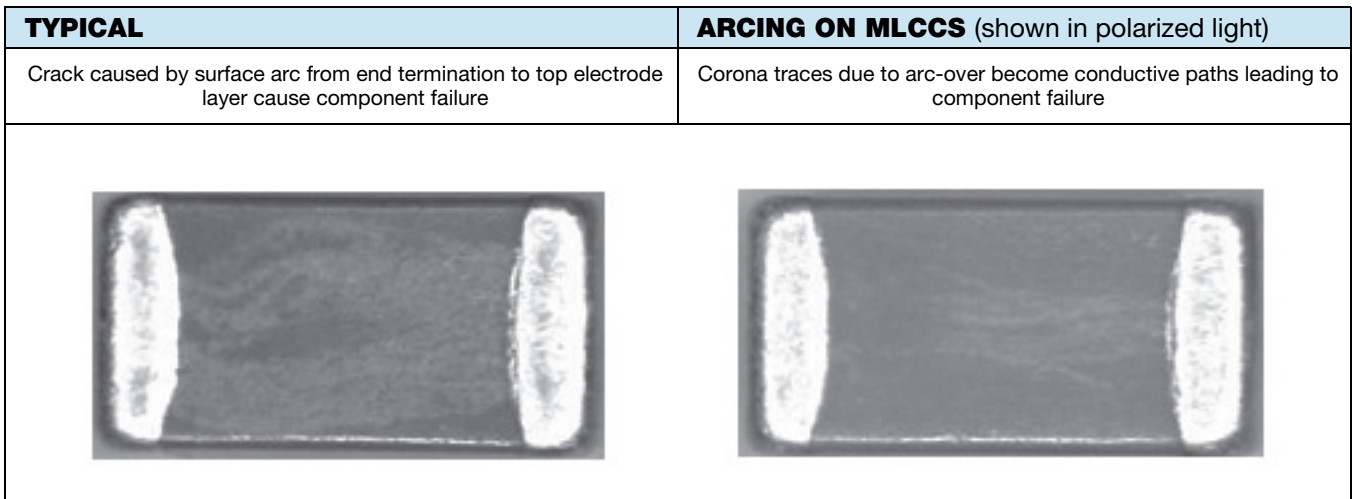
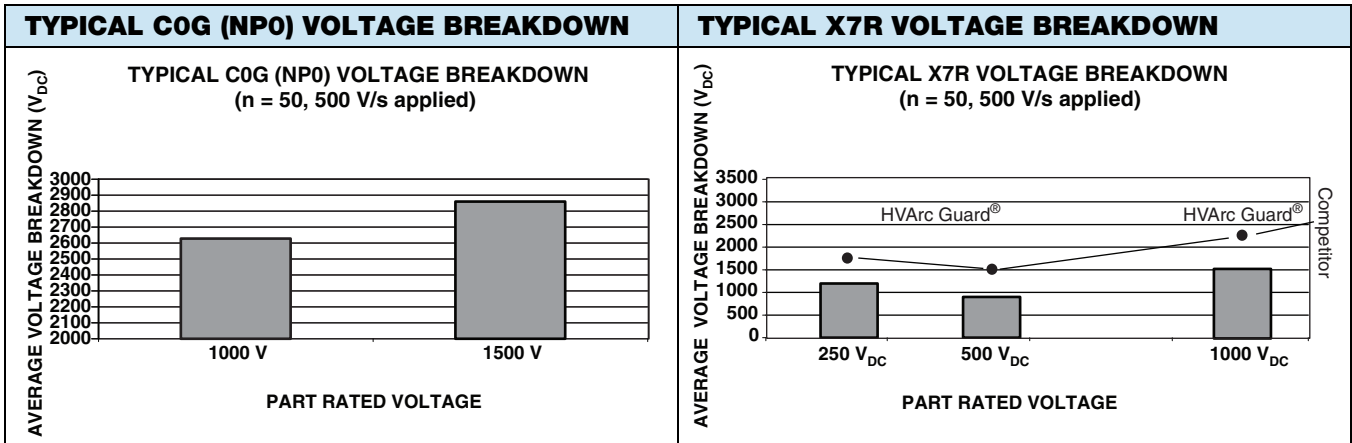


HVArc Guard® COG (NP0) DIELECTRIC - TYPICAL PARAMETERS



HVArc Guard® X7R DIELECTRIC - TYPICAL PARAMETERS





STANDARD PACKAGING QUANTITIES (1)(2)(3)(4)(5)					
BODY SIZE	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"
0805	8 mm	3000	3000	10 000	10 000
1206 ⁽⁶⁾	8 mm	N/A	2500	N/A	10 000
1210 ⁽⁶⁾	8 mm	N/A	2500	N/A	10 000
1808	12 mm	N/A	2000	N/A	10 000
1812	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

Notes

- (1) Vishay Vitramon uses embossed plastic carrier tape and punch paper carrier tape
- (2) Paper tape is not available for case sizes > 1206 or for component thickness > 0.035" (0.89 mm)
- (3) 11 1/4" reel is standard for large quantities. 13" is maybe used for large "T" dimension parts
- (4) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"
- (5) N/A = Not available
- (6) Packaging quantity can vary with product thickness
Contact mlcc@vishay.com with respect to specific part number requirements



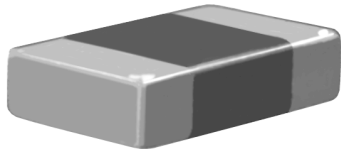


Contents

VJ Non-Magnetic Series	134
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MLCCs for Non-Magnetic Applications

Surface Mount Multilayer Ceramic Chip Capacitors for Non-Magnetic Applications



FEATURES

- Specialty: Non-magnetic MLCCs
- Manufactured with non-magnetic materials
- Safety screened for magnetic properties
- COG (NP0) and X7R/X5R dielectrics offered
- Wide range of case sizes, voltage ratings and capacitance values
- Allowed assembly methods are conductive epoxy bonding and IR reflow
- Wet built process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

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

ELECTRICAL SPECIFICATIONS

NON-MAGNETIC COG (NP0)

GENERAL SPECIFICATION

Note

Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range: 0.5 pF to 56 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



VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0402	100	0.5 pF	180 pF
	0603	200	0.5 pF	1.8 nF
	0805	500	0.5 pF	3.3 nF
	1206	600	0.5 pF	10 nF
	1210	500	0.5 pF	12 nF
	1808	3000	10 pF	10 nF
	1812	3000	10 pF	22 nF
	1825	1000	15 pF	39 nF
	2220	1000	100 pF	47 nF
	2225	1000	120 pF	56 nF
X5R	0402	16	27 nF	100 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 μ F
	1210	500	1.0 nF	1.0 μ F
	1808	3000	220 pF	270 nF
	1812	3000	270 pF	1.0 μ F
	1825	1000	10 nF	2.7 μ F
	2220	3000	1.0 nF	2.2 μ F
	2225	2000	5.6 nF	4.7 μ F
	3640	500	15 nF	6.8 μ F

Note

- Detail ratings see selection chart

VJ Non-Magnetic Series



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors for Non-Magnetic Applications

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	

Notes

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

DIMENSIONS in inches (millimeters)						
EIA CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATIONS (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 (1.60)	0.004 (0.10)	0.016 (0.41)
0603	VJ0603	0.063 ± 0.005 (1.60 ± 0.12)	0.031 ± 0.005 (0.80 ± 0.12)	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 ± 0.008 (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 ± 0.0008 (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	0.177 ± 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 ± 0.008 (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)
-	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)
-	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)
-	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)



VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

SELECTION CHART																				
DIELECTRIC		COG (NP0)																		
STYLE		VJ0402					VJ0603						VJ0805							
EIA CODE		0402					0603						0805							
VOLTAGE (V _{DC})		10	16	25	50	100	10	16	25	50	100	200	10	16	25	50	100	200	500	
VOLTAGE CODE		Q	J	X	A	B	Q	J	X	A	B	C	Q	J	X	A	B	C	E	
CAP. CODE	CAP.																			
0R5	0.5 pF	••	••	••	••	••	••	••	••	••	••	••	•	•	•	•	•	•	•	
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																			

Note

•• Flamed paper tape • Plastic tape

VJ Non-Magnetic Series



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

SELECTION CHART													
DIELECTRIC		COG (NP0)											
STYLE		VJ1206						VJ1210					
EIA 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.												
0R5	0.5 pF	•	•	•	•	•	•	•	•	•	•	•	•
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	•	•	•	•	•	•	•	•	•	•	•	•



VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

SELECTION CHART																					
DIELECTRIC		COG (NP0)																			
STYLE		VJ1808										VJ1812									
EIA CODE		1808										1812									
VOLTAGE (V _{DC})		25	50	100	200	500	630	1000	1500	2000	3000	25	50	100	200	500	630	1000	1500	2000	3000
VOLTAGE CODE		X	A	B	C	E	L	G	R	F	H	X	A	B	C	E	L	G	R	F	H
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	•	•	•	•	•										•	•	•	•	•	
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																				

VJ Non-Magnetic Series



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

SELECTION CHART																						
DIELECTRIC		COG (NP0)																				
STYLE		VJ1825						VJ2220						VJ2225								
EIA CODE		1825						2220						2225								
VOLTAGE (V _{DC})		25	50	100	200	500	630	1000	25	50	100	200	500	630	1000	25	50	100	200	500	630	1000
VOLTAGE CODE		X	A	B	C	E	L	G	X	A	B	C	E	L	G	X	A	B	C	E	L	G
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

SELECTION CHART																			
DIELECTRIC		X7R/X5R																	
STYLE		VJ0402						VJ0603						VJ0805					
EIA CODE		0402						0603						0805					
VOLTAGE (V _{DC})		6.3	10	16	25	50	100	6.3	10	16	25	50	100	10	16	25	50	100	200
VOLTAGE CODE		Y	Q	J	X	A	B	Y	Q	J	X	A	B	Q	J	X	A	B	C
CAP. CODE	CAP.																		
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	X5R ••	X5R ••	X5R ••				••	••	••	••	••		••	••	••	••	••	••
333	33 nF	X5R ••	X5R ••	X5R ••				••	••	••	••	••		••	••	••	••	••	••
393	39 nF	X5R ••						••	••	••	••	••		••	••	••	••	••	••
473	47 nF	X5R ••						••	••	••	••	••		••	••	••	••	••	••
563	56 nF	X5R ••						••	••	••	••			••	••	••	••	••	••
683	68 nF	X5R ••						••	••	••	••			••	••	••	••	••	••
823	82 nF	X5R ••						••	••	••	••			••	••	••	••	••	••
104	100 nF	X5R ••						••	••	••	••			••	••	••	••	••	••
124	120 nF							X5R ••						••	••	••	••	••	••
154	150 nF							X5R ••						••	••	••	••	••	••
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																		

Note

•• Flamed paper tape • Plastic tape

VJ Non-Magnetic Series



Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

SELECTION CHART														
DIELECTRIC		X7R												
STYLE		VJ1206						VJ1210						
EIA CODE		1206						1210						
VOLTAGE (V _{DC})		16	25	50	100	200	500	16	25	50	75	100	200	500
VOLTAGE CODE		J	X	A	B	C	E	J	X	A	K	B	C	E
CAP. CODE	CAP.													
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	•	•	•	•	•	•	•	•	•	•	•	•	•
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													



VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

SELECTION CHART																							
DIELECTRIC		X7R																					
STYLE		VJ1808										VJ1812											
EIA CODE		1808										1812											
VOLTAGE (V _{DC})		25	50	100	200	500	630	1000	1500	2000	3000	25	50	75	100	200	250	500	630	1000	1500	2000	3000
VOLTAGE CODE		X	A	B	C	E	L	G	R	F	H	X	A	K	B	C	P	E	L	G	R	F	H
CAP. CODE	CAP.																						
221	220 pF										•												
271	270 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 µF	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
123	12 µF	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
153	15 µF	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	
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																						
825	8.2 µF																						

VJ Non-Magnetic Series



Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

SELECTION CHART																	
DIELECTRIC		X7R															
STYLE		VJ1825						VJ2220									
EIA CODE		1825						2220									
VOLTAGE (V _{DC})		25	50	100	200	500	630	1000	25	50	100	200	500	630	1000	2000	3000
VOLTAGE CODE		X	A	B	C	E	L	G	X	A	B	C	E	L	G	F	H
CAP. CODE	CAP.																
221	220 pF																
271	270 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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
825	8.2 μF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	



VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

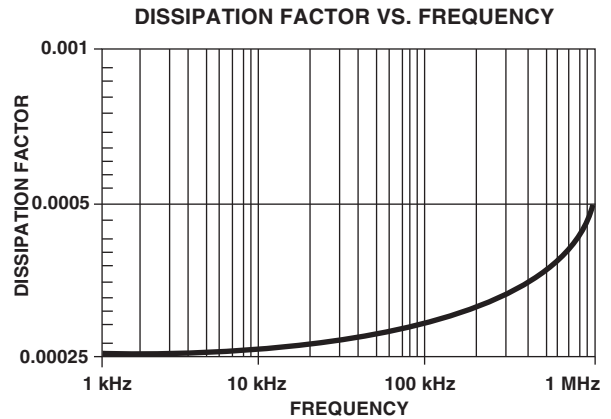
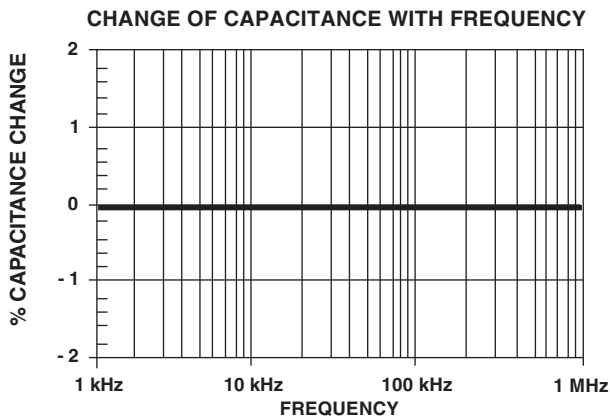
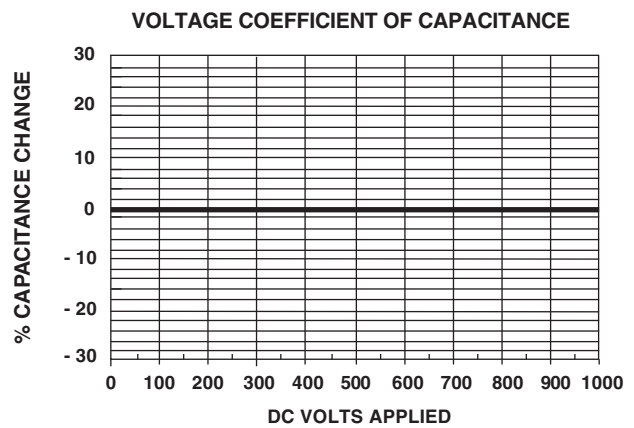
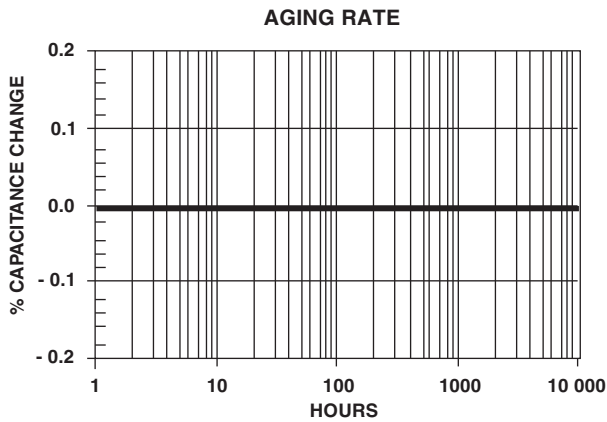
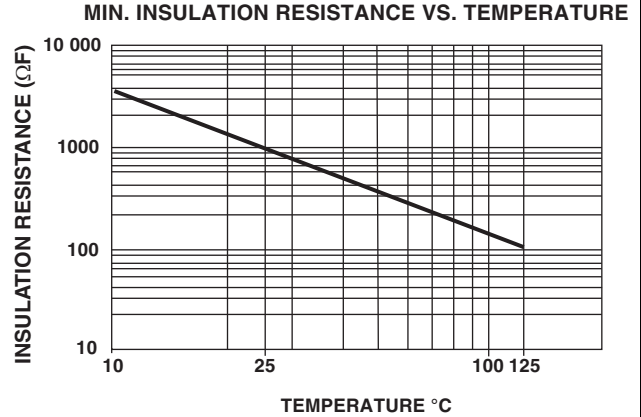
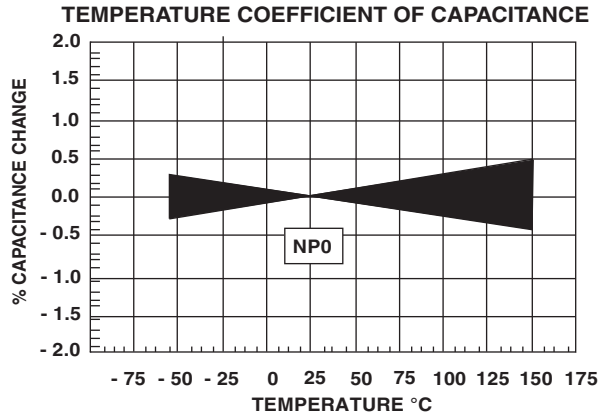
SELECTION CHART																
DIELECTRIC		X7R														
STYLE		VJ2225								VJ3640						
EIA CODE		2225										3640				
VOLTAGE (V _{DC})		25	50	100	200	500	630	1000	1500	2000	25	50	100	200	500	
VOLTAGE CODE		X	A	B	C	E	L	G	R	F	X	A	B	C	E	
CAP. CODE	CAP.															
102	1.0 nF															
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
825	8.2 μF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

VJ Non-Magnetic Series



Vishay Vitramon Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

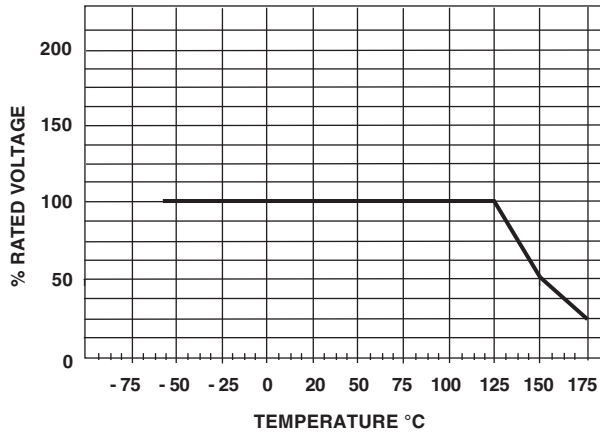
NON-MAGNETIC COG (NP0) DIELECTRIC - TYPICAL PARAMETERS



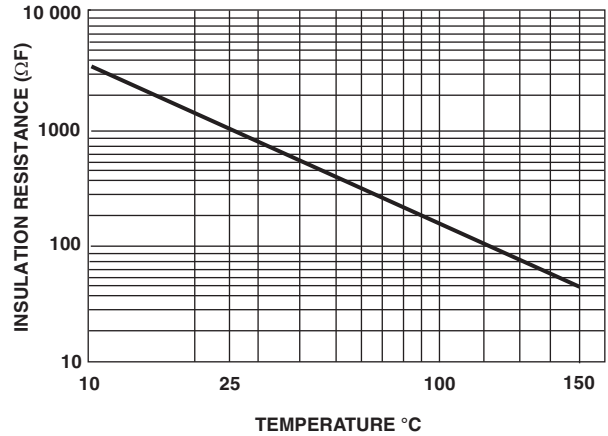


NON-MAGNETIC X7R DIELECTRIC - TYPICAL PARAMETERS

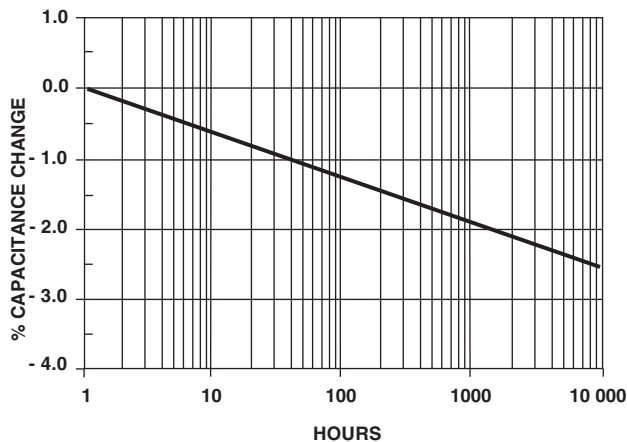
RATED VOLTAGE VS. TEMPERATURE



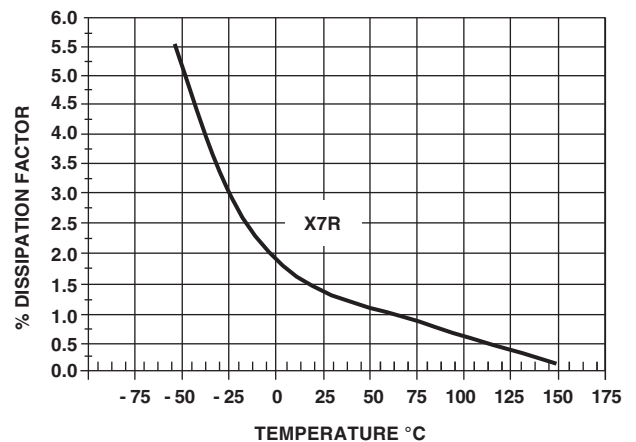
MIN. INSULATION RESISTANCE VS. TEMPERATURE



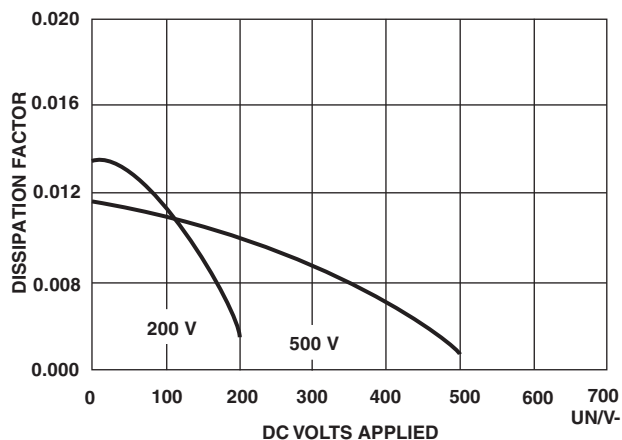
AGING RATE



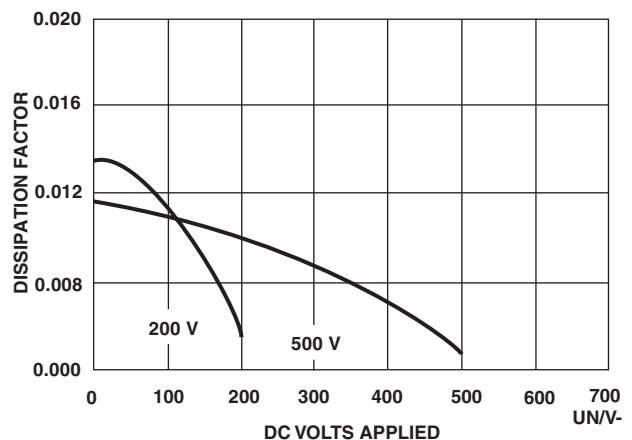
DISSIPATION FACTOR VS. TEMPERATURE



DISSIPATION FACTOR VS. VOLTAGE



DISSIPATION FACTOR VS. VOLTAGE



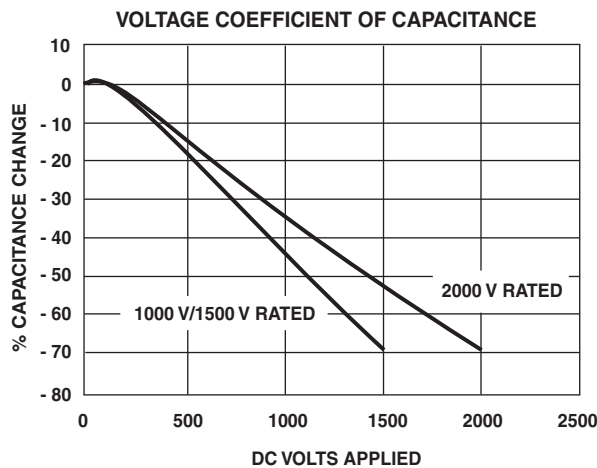
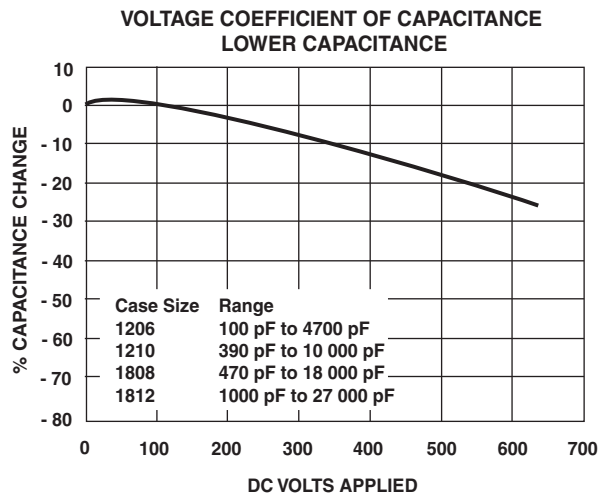
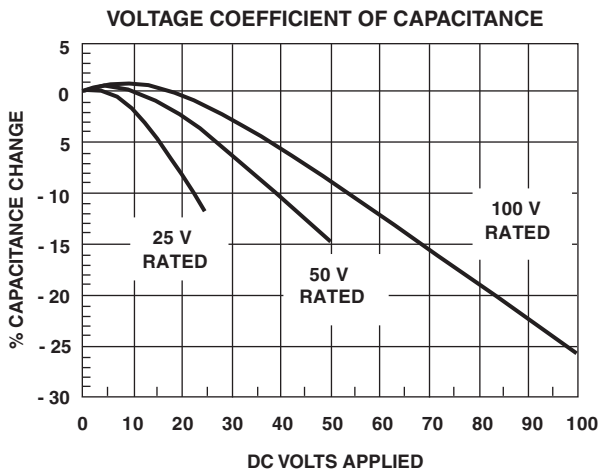
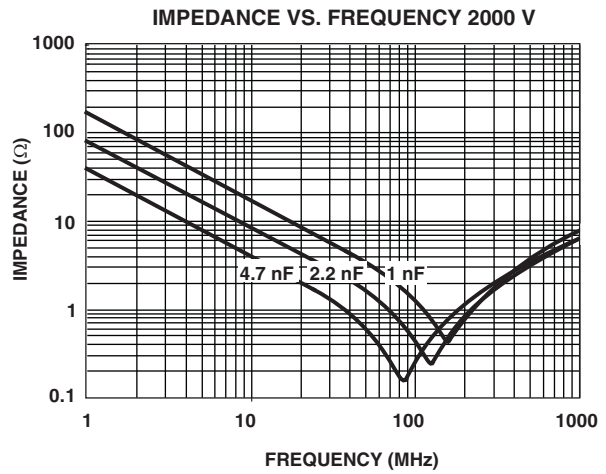
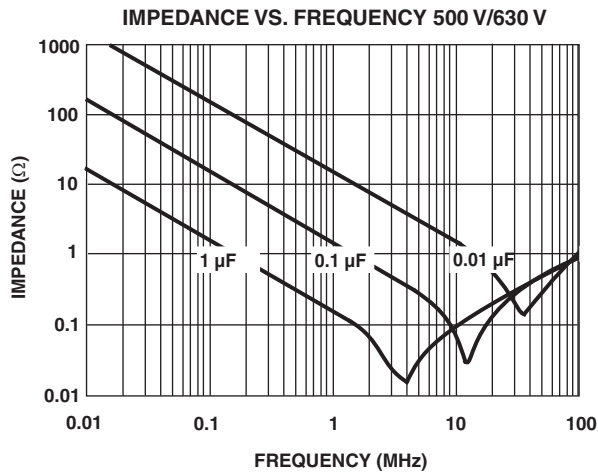
VJ Non-Magnetic Series

Vishay Vitramon

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications



NON-MAGNETIC X7R DIELECTRIC - TYPICAL PARAMETERS





VJ Non-Magnetic Series

Surface Mount Multilayer Ceramic Chip Capacitors
for Non-Magnetic Applications

Vishay Vitramon

STANDARD PACKAGING QUANTITIES (1)(2)(3)					
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	
		PAPER TAPE PACKAGING CODE "O"	PLASTIC TAPE PACKAGING CODE "T"	PAPER TAPE PACKAGING CODE "I"	PLASTIC TAPE PACKAGING CODE "R"
0402	8 mm	5000	N/A	10 000	N/A
0603	8 mm	4000	4000	10 000	10 000
0805 ⁽⁴⁾	8 mm	3000	3000	10 000	10 000
1206 ⁽⁴⁾	8 mm	N/A	3000/2500	N/A	10 000/9000
1210 ⁽⁴⁾	8 mm	N/A	3000/2500/2000	N/A	10 000/9000
1808 ⁽⁴⁾	12 mm	N/A	2000	N/A	10 000
1812 ⁽⁴⁾	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 code "O/I" or "T/R" and lower quantities can depend from product thickness



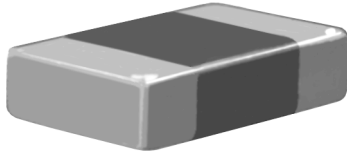


MLCCs
for
High Reliability
and
Military/Aerospace
Applications

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Surface Mount Multilayer Ceramic Chip Capacitors for High Reliability Applications



FEATURES

- Manufactured with a combination of design, materials and tight process control to achieve very high field reliability
- C0G (NP0) and X7R/X5R dielectrics offered
- MIL-PRF-55681 qualified production line
- Reliability maintenance testing to verify consistent quality (X5R max. test temperature: + 85 °C)
- Available with group A and C screening
- Available with only group A screening
- Available with only voltage conditioning
- Customized certification available on request to meet your quality requirements
- Available with tin-lead barrier terminations order code “L”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



Available
RoHS*
COMPLIANT
HALOGEN
FREE
Available

ELECTRICAL SPECIFICATIONS

C0G (NP0)	
GENERAL SPECIFICATION	
Note Electrical characteristics at + 25 °C unless otherwise specified	
Operating Temperature: - 55 °C to + 125 °C	
Capacitance Range: 0.5 pF to 56 nF	
Voltage Range: 10 V _{DC} to 600 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 Rate: 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} -rated:	150 % of rated voltage

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 500 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	
≤ 250 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

* Pb containing terminations are not RoHS compliant, exemptions may apply



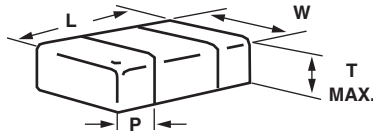
QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0402	100	0.5 pF	180 pF
	0603	200	0.5 pF	1.8 nF
	0805	500	0.5 pF	3.3 nF
	1206	600	0.5 pF	10 nF
	1210	500	0.5 pF	12 nF
	1808	500	22 pF	10 nF
	1812	500	47 pF	22 nF
	1825	500	100 pF	39 nF
	2220	500	100 pF	47 nF
X5R	0402	16	27 nF	100 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	500	1.0 nF	270 nF
	1812	500	3.9 nF	1.0 μF
	1825	500	10 nF	2.7 μF
	2220	500	10 nF	2.2 μF
	2225	500	10 nF	4.7 μF
	3640	500	15 nF	6.8 μF

ORDERING INFORMATION								
VJ1206	Y	104	J	L	A	A	T	## (2)
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING (1)	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640	A = C0G (NP0) G = X5R Y = X7R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 1R0 = 1.0 pF 103 = 10 000 pF 104 = 100 000 pF	C = ± 0.25 pF D = ± 0.50 pF F = ± 1 % G = ± 2 % H = ± 3 % J = ± 5 % K = ± 10 % M = ± 20 % Note: C0G (NP0): C, D < 10 pF F, G, H, J, K ≥ 10 pF X7R, X5R: J, K, M	X = Ni barrier 100 % tin plated L = Ni barrier with tin lead plated finish min. 4 % lead F, E = AgPd N = Non-magnetic	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V K = 75 V B = 100 V C = 200 V P = 250 V E = 500 V N = 600 V	A = Unmarked	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 Note: "I" and "O" are used for "F", "E", "N" terminations, sizes 0402/0603/0805	2L, 2M = High Rel group A and C screening (4)(5) 68 = High Rel group A screening only 5G = Voltage conditioning only

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
- (2) Process code with 2 digits has to be added
- (3) Termination code "E" is for conductive epoxy assembly. Contact: mlcc@vishay.com for availability
- (4) Process code "2L" group "C" completion not required for shipment
- (5) Process code "2M" group "C" completion required for shipment

DIMENSIONS in inches (millimeters)



EIA CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
					MINIMUM	MAXIMUM
0402	VJ0402	0.040 ± 0.004 (1.00 ± 0.10)	0.020 ± 0.004 (0.50 ± 0.10)	0.024 (0.61)	0.004 (0.10)	0.016 (0.41)
0603	VJ0603	0.063 ± 0.005 (1.60 ± 0.12)	0.031 ± 0.005 (0.80 ± 0.12)	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)	0.053 (1.35)	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)
-	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)
-	VJ2220	0.220 ± 0.008 (5.59 ± 0.20)	0.200 ± 0.008 (5.08 ± 0.20)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
-	VJ2225	0.220 ± 0.008 (5.59 ± 0.20)	0.250 ± 0.010 (6.35 ± 0.25)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)
-	VJ3640	0.360 ± 0.015 (9.14 ± 0.38)	0.400 ± 0.015 (10.2) ± (0.38)	0.086 (2.18)	0.010 (0.25)	0.030 (0.76)



SELECTION CHART COG (NPO)																			
DIELECTRIC		COG (NPO)																	
STYLE		VJ0402					VJ0603						VJ0805						
EIA CODE		0402					0603						0805						
VOLTAGE (V _{DC})		10	16	25	50	100	10	16	25	50	100	200	10	16	25	50	100	200	500
VOLTAGE CODE		Q	J	X	A	B	Q	J	X	A	B	C	Q	J	X	A	B	C	E
CAP. CODE	CAP.																		
0R5	0.5 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
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												•	•	•	•	•	•	•
282	2.8 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												•	•	•	•	•	•	•

Note

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

SELECTION CHART COG (NP0)													
DIELECTRIC		COG (NP0)											
STYLE		VJ1206						VJ1210 ⁽¹⁾					
EIA CODE		1206						1210 ⁽¹⁾					
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.												
0R5	0.5 pF	•	•	•	•	•	•	•	•	•	•	•	•
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	•	•	•	•	•	•	•	•	•	•	•	•
282	2.8 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	•	•	•	•	•	•	•	•	•	•	•	•

Note

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



Surface Mount Multilayer Ceramic Chip Capacitors
for High Reliability Applications

VJ Hi-Rel Series

Vishay Vitramon

SELECTION CHART COG (NP0)																
DIELECTRIC		COG (NP0)														
STYLE		VJ1808 ⁽¹⁾					VJ1812 ⁽¹⁾					VJ1825 ⁽¹⁾				
EIA CODE		1808 ⁽¹⁾					1812 ⁽¹⁾					1825 ⁽¹⁾				
VOLTAGE (V _{DC})		25	50	100	200	500	25	50	100	200	500	25	50	100	200	500
VOLTAGE CODE		X	A	B	C	E	X	A	B	C	E	X	A	B	C	E
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
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															

Note

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

SELECTION CHART COG (NP0)											
DIELECTRIC		COG (NP0)									
STYLE		VJ2220 ⁽¹⁾					VJ2225 ⁽¹⁾				
EIA CODE		2220 ⁽¹⁾					2225 ⁽¹⁾				
VOLTAGE (V _{DC})		25	50	100	200	500	25	50	100	200	500
VOLTAGE CODE		X	A	B	C	E	X	A	B	C	E
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	•	•	•	•	•	•	•	•	•	•
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	•	•	•	•	•	•	•	•	•	•

Note

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



SELECTION CHART X7R/X5R																			
DIELECTRIC		X7R/X5R																	
STYLE		VJ0402						VJ0603						VJ0805					
EIA CODE		0402						0603						0805					
VOLTAGE (V _{DC})		6.3	10	16	25	50	100	6.3	10	16	25	50	100	10	16	25	50	100	200
VOLTAGE CODE		Y	Q	J	X	A	B	Y	Q	J	X	A	B	Q	J	X	A	B	C
CAP. CODE	CAP.																		
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	X5R	X5R	X5R				•	•	•	•	•	•	•	•	•	•	•	•
333	33 nF	X5R	X5R	X5R				•	•	•	•	•	•	•	•	•	•	•	•
393	39 nF	X5R						•	•	•	•	•	•	•	•	•	•	•	•
473	47 nF	X5R						•	•	•	•	•	•	•	•	•	•	•	•
563	56 nF	X5R						•	•	•	•	•	•	•	•	•	•	•	•
683	68 nF	X5R						•	•	•	•	•	•	•	•	•	•	•	•
823	82 nF	X5R						•	•	•	•	•	•	•	•	•	•	•	•
104	100 nF	X5R						•	•	•	•	•	•	•	•	•	•	•	•
124	120 nF							X5R						•	•	•	•	•	•
154	150 nF							X5R						•	•	•	•	•	•
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																		

Note

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

SELECTION CHART X7R/X5R													
DIELECTRIC		X7R/X5R											
STYLE		VJ1206						VJ1210 ⁽¹⁾					
EIA CODE		1206						1210					
VOLTAGE (V _{DC})		16	25	50	100	200	500	16	25	50	100	200	500
VOLTAGE CODE		J	X	A	B	C	E	J	X	A	B	C	E
CAP. CODE	CAP.												
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	•	•	•	•	•	•	•	•	•	•	•	•
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												

Note

⁽¹⁾ See soldering recommendations within this data book, or visit: www.vishay.com/doc/245034



Surface Mount Multilayer Ceramic Chip Capacitors
for High Reliability Applications

VJ Hi-Rel Series

Vishay Vitramon

SELECTION CHART X7R																		
DIELECTRIC		X7R																
STYLE		VJ1808 ⁽¹⁾					VJ1812 ⁽¹⁾							VJ1825 ⁽¹⁾				
EIA CODE		1808 ⁽¹⁾					1812 ⁽¹⁾							1825 ⁽¹⁾				
VOLTAGE (V _{DC})		25	50	100	200	500	25	50	75	100	200	250	500	25	50	100	200	500
VOLTAGE CODE		X	A	B	C	E	X	A	K	B	C	P	E	X	A	B	C	E
CAP. CODE	CAP.																	
102	1.0 nF	•	•	•	•	•												
222	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																	
825	8.2 µF																	

Note

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

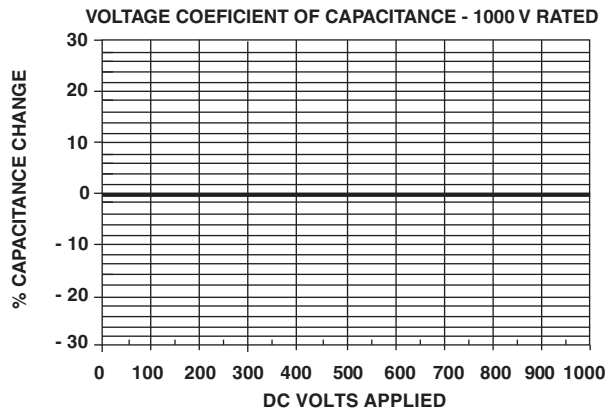
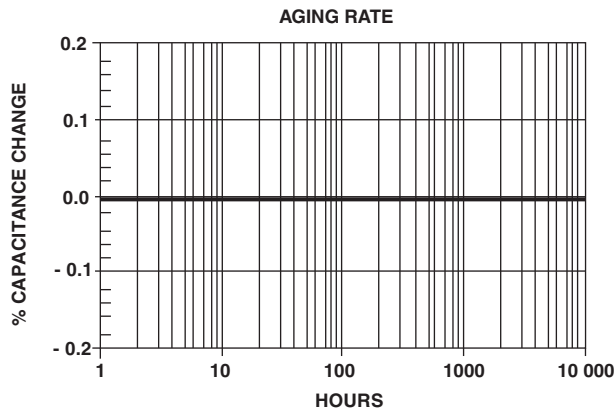
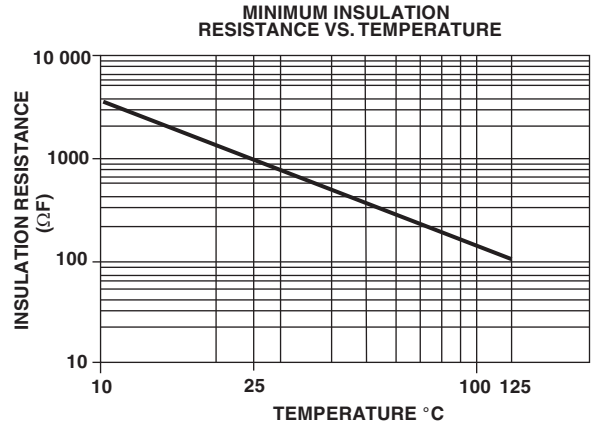
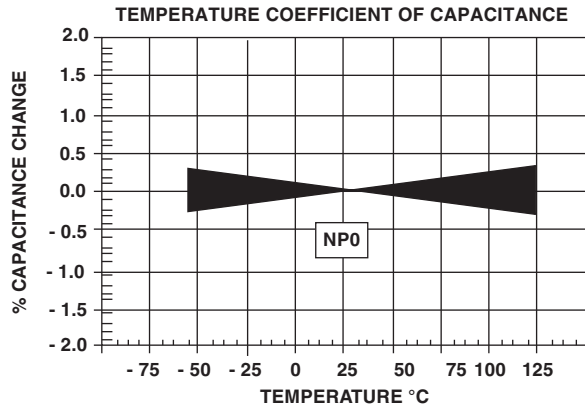
SELECTION CHART X7R																
DIELECTRIC		X7R														
EIA CODE		VJ2220 ⁽¹⁾					VJ2225 ⁽¹⁾					VJ3640 ⁽¹⁾				
EIA CODE		2220 ⁽¹⁾					2225 ⁽¹⁾					3640 ⁽¹⁾				
VOLTAGE (V _{DC})		25	50	100	200	500	25	50	100	200	500	25	50	100	200	500
VOLTAGE CODE		X	A	B	C	E	X	A	B	C	E	X	A	B	C	E
CAP. CODE	CAP.															
102	1.0 nF															
222	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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
825	8.2 μF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Note

⁽¹⁾ See soldering recommendations within this data book, or visit: www.vishay.com/doc245034

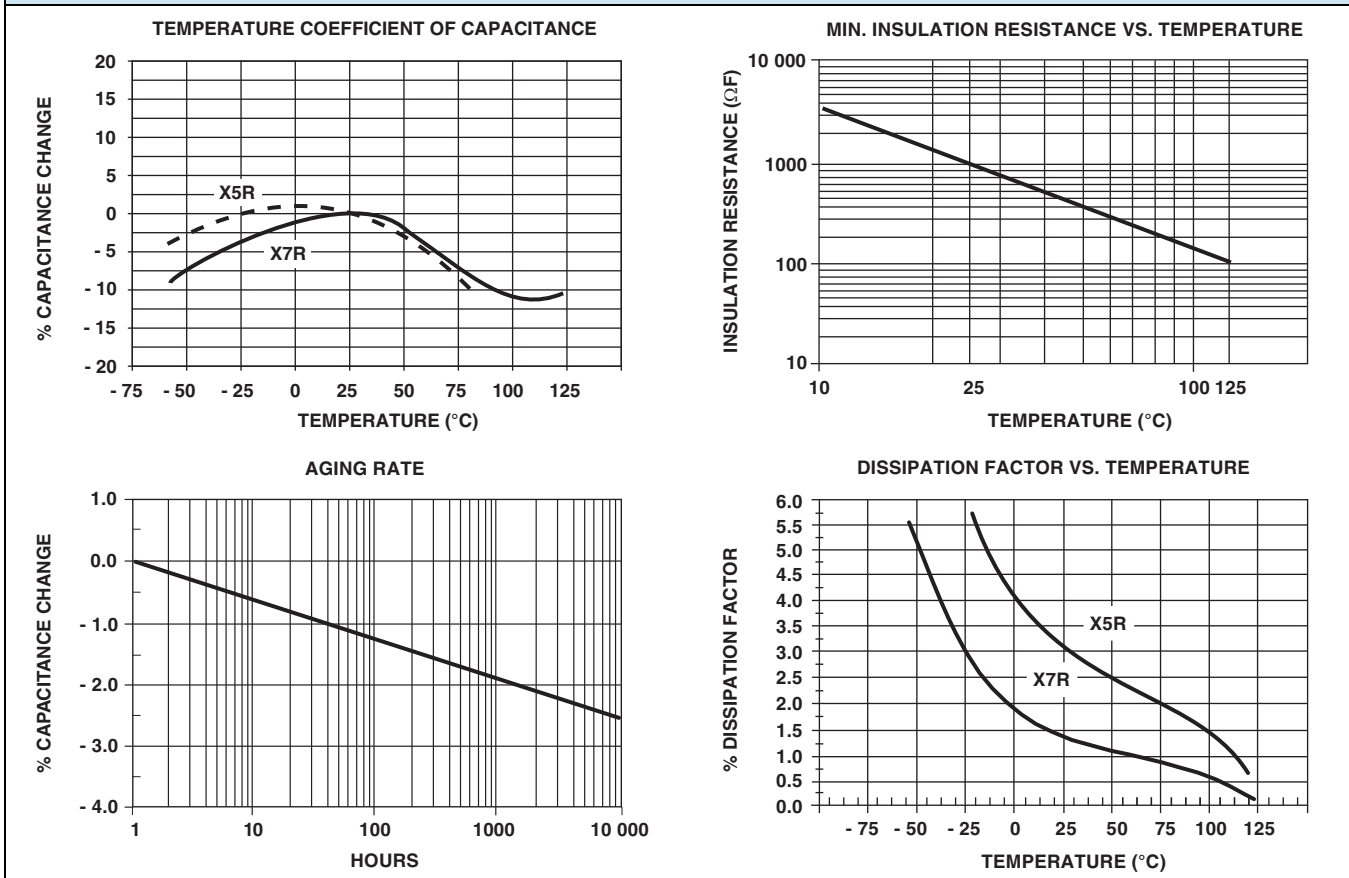


HI-REL COG (NP0) DIELECTRIC - TYPICAL PARAMETERS





HI-REL X7R/X5R DIELECTRIC - TYPICAL PARAMETERS



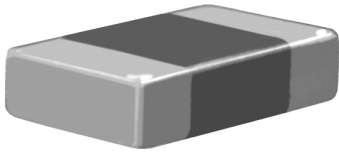
STANDARD PACKAGING QUANTITIES (1)(2)(3)

BODY SIZE	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

Surface Mount Multilayer Ceramic Chip Capacitors MIL Qualified, Type CDR



FEATURES

- Military qualified products
- Federal stock control number, CAGE CODE SHV71
- High reliability tested per MIL-PRF-55681
- Tin/lead termination codes “Z” and “U”
- Lead (Pb)-free termination codes “W”, “Y”, “M”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



APPLICATIONS

- Avionic systems
- Sonar systems
- Satellite systems
- Missiles applications
- Geographical information systems
- Global positioning systems

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range: 1.0 pF to 470 nF

Voltage Range: 50 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):

BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C,
with 0 V_{DC} applied

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

BX: + 15 %, - 25 % from - 55 °C to + 125 °C,
with 100 % rated V_{DC} applied

Dissipation Factor (DF):

BP: 0.15 % maximum

BX: 2.50 % maximum

Test frequency:

1 MHz ± 50 kHz for BP capacitors ≤ 1000 pF
and for BX capacitors ≤ 100 pF

All other BP and BX at 1 kHz ± 50 Hz

Aging Rate:

BP: 0 % maximum per decade

BX: 1 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 MΩ minimum or
1000 ΩF, whichever is less

Dielectric Strength Test:

Performed per method 103 of EIA-198-2-E

Applied test voltages:

≤ 100 V_{DC} - rated: 250 % of rated voltage

* Pb containing terminations are not RoHS compliant, exemptions may apply

QUICK REFERENCE DATA				
DIELECTRIC	STYLE (CASE)	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
BP	CDR01 (0805)	100	10 pF	180 pF
BX	CDR01 (0805)	100	120 pF	4.7 nF
BP	CDR02 (1805)	100	220 pF	270 pF
BX	CDR02 (1805)	100	3.9 nF	22 nF
BP	CDR03 (1808)	100	330 pF	1.0 nF
BX	CDR03 (1808)	100	12 nF	68 nF
BP	CDR04 (1812)	100	1.2 nF	3.3 nF
BX	CDR04 (1812)	100	39 nF	180 nF
BX	CDR06 (2225)	50	390 nF	470 nF
BP	CDR31 (0805)	100	1.0 pF	680 pF
BX	CDR31 (0805)	100	470 pF	18 nF
BP	CDR32 (1206)	100	1.0 pF	2.2 nF
BX	CDR32 (1206)	100	4.7 nF	39 nF
BP	CDR33 (1210)	100	1.0 nF	3.3 nF
BX	CDR33 (1210)	100	15 nF	100 nF
BP	CDR34 (1812)	100	2.2 nF	10 nF
BX	CDR34 (1812)	100	27 nF	180 nF
BP	CDR35 (1825)	100	4.7 nF	22 nF
BX	CDR36 (1825)	100	56 nF	470 nF

Note

- Detail ratings see selection chart

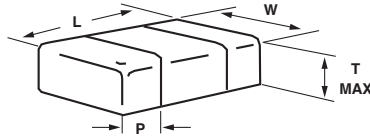
ORDERING INFORMATION - MILITARY								
CDR31	BX	102	A	K	Y	S	A	T
MILITARY STYLE	DIELECTRIC	CAPACITANCE NOMINAL CODE	DC VOLTAGE RATING ⁽¹⁾	CAPACITANCE TOLERANCE ⁽²⁾	TERMINATION	FAILURE RATE	MARKING	PACKAGING
CDR01 CDR02 CDR03 CDR04 CDR06 CDR31 CDR32 CDR33 CDR34 CDR35	BP and BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 102 = 1000 pF 1R8 = 1.8 pF	A = 50 V B = 100 V	C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % J = ± 5 % K = ± 10 % M = ± 20 %	M = Silver Palladium Y = Ni barrier with 100 % tin W = Ni barrier with 100 % tin Z = Ni barrier with tin/lead plate min. 4 % lead U = Hot solder dipped (min. of 4 %) ⁽³⁾	M = 1.0 % P = 0.1 % R = 0.01 % S = 0.001 % Consult factory for failure rate status	A = Unmarked	T = 7" reel/plastic tape J = 7" reel (low quantity) C = 7" reel/paper tape R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape B = Bulk

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
- (2) Available tolerances please see rating chart
- (3) MIL-PRF-55681 "U" termination part number have increased dimensions



DIMENSIONS in inches (millimeters)



MIL-PRF-55681	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERM. (P)	
					MINIMUM	MAXIMUM
/1	CDR01	0.080 ± 0.015 (2.03 ± 0.38)	0.050 ± 0.015 (1.27 ± 0.38)	0.055 (1.40)	0.010 (0.25)	0.030 (0.76)
	CDR02	0.180 ± 0.015 (4.57 ± 0.38)	0.050 ± 0.015 (1.27 ± 0.38)	0.055 (1.40)	0.010 (0.25)	0.030 (0.76)
	CDR03	0.180 ± 0.015 (4.57 ± 0.38)	0.080 ± 0.015 (2.03 ± 0.38)	0.080 (2.03)	0.010 (0.25)	0.030 (0.76)
	CDR04	0.180 ± 0.015 (4.57 ± 0.38)	0.125 ± 0.015 (3.20 ± 0.38)	0.080 (2.03)	0.010 (0.25)	0.030 (0.76)
/3	CDR06	0.220 ± 0.010 (5.59 ± 0.25)	0.250 ± 0.010 (6.35 ± 0.25)	0.045 (1.14)	0.010 (0.25)	0.030 (0.76)
/7	CDR31	0.078 ± 0.008 (2.00 ± 0.20)	0.049 ± 0.008 (1.25 ± 0.20)	0.051 (1.30)	0.012 (0.30)	0.028 (0.70)
/8	CDR32	0.125 ± 0.008 (3.20 ± 0.20)	0.062 ± 0.008 (1.60 ± 0.20)	0.051 (1.30)	0.012 (0.30)	0.028 (0.70)
/9	CDR33	0.125 ± 0.010 (3.20 ± 0.25)	0.098 ± 0.010 (2.50 ± 0.25)	0.059 (1.50)	0.010 (0.25)	0.030 (0.76)
/10	CDR34	0.176 ± 0.010 (4.50 ± 0.25)	0.125 ± 0.010 (3.20 ± 0.25)	0.059 (1.50)	0.010 (0.25)	0.030 (0.76)
/11	CDR35	0.176 ± 0.012 (4.50 ± 0.30)	0.250 ± 0.012 (6.40 ± 0.30)	0.059 (1.50)	0.008 (0.20)	0.032 (0.80)

“U” TERMINATION in inches (millimeters)

STYLE	LENGTH	WIDTH/THICKNESS	PACKAGING CODES
CDR01	0.020 (0.51)	0.015 (0.38)	“C”, “J”, “P”, “B”
CDR02 to CDR06	0.025 (0.64)	0.015 (0.38)	“T”, “J”, “R”, “B”
CDR31	0.023 (0.60)	0.012 (0.30)	“C”, “J”, “P”, “B”
CDR32 to CDR36	0.023 (0.60)	0.012 (0.30)	“T”, “J”, “R”, “B”

MIL-C-55681 QUALIFIED, TYPE CDR

MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR01BP					
CDR01BP100B_ _ _	100	10	J, K	BP	100
CDR01BP120BJ_ _	120	12	J	BP	100
CDR01BP150B_ _ _	150	15	J, K	BP	100
CDR01BP180BJ_ _	180	18	J	BP	100
CDR01BP220B_ _ _	220	22	J, K	BP	100
CDR01BP270BJ_ _	270	27	J	BP	100
CDR01BP330B_ _ _	330	33	J, K	BP	100
CDR01BP390BJ_ _	390	39	J	BP	100
CDR01BP470B_ _ _	470	47	J, K	BP	100
CDR01BP560BJ_ _	560	56	J	BP	100
CDR01BP680B_ _ _	680	68	J, K	BP	100
CDR01BP820BJ_ _	820	82	J	BP	100
CDR01BP101B_ _ _	101	100	J, K	BP	100
CDR01BP121B_ _ _	121	120	J, K	BP	100
CDR01BP151B_ _ _	151	150	J, K	BP	100
CDR01BP181B_ _ _	181	180	J, K	BP	100



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR01BX					
CDR01BX121B_ _ _	121	120	J, K	BX	100
CDR01BX151B_ _ _	151	150	J, K	BX	100
CDR01BX181B_ _ _	181	180	J, K	BX	100
CDR01BX221B_ _ _	221	220	K, M	BX	100
CDR01BX271BK_ _	271	270	K	BX	100
CDR01BX331B_ _ _	331	330	K, M	BX	100
CDR01BX391BK_ _	391	390	K	BX	100
CDR01BX471B_ _ _	471	470	K, M	BX	100
CDR01BX561BK_ _	561	560	K	BX	100
CDR01BX681B_ _ _	681	680	K, M	BX	100
CDR01BX821BK_ _	821	820	K	BX	100
CDR01BX102B_ _ _	102	1000	K, M	BX	100
CDR01BX122BK_ _	122	1200	K	BX	100
CDR01BX152B_ _ _	152	1500	K, M	BX	100
CDR01BX182BK_ _	182	1800	K	BX	100
CDR01BX222B_ _ _	222	2200	K, M	BX	100
CDR01BX272BK_ _	272	2700	K	BX	100
CDR01BX332B_ _ _	332	3300	K, M	BX	100
CDR01BX392AK_ _	392	3900	K	BX	50
CDR01BX472A_ _ _	472	4700	K, M	BX	50
CDR02BP					
CDR02BP221B_ _ _	221	220	J, K	BP	100
CDR02BP271BJ_ _	271	270	J	BP	100
CDR02BX					
CDR02BX392BK_ _	392	3900	K	BX	100
CDR02BX472B_ _ _	472	4700	K, M	BX	100
CDR02BX562BK_ _	562	5600	K	BX	100
CDR02BX682B_ _ _	682	6800	K, M	BX	100
CDR02BX822BK_ _	822	8200	K	BX	100
CDR02BX103B_ _ _	103	10 000	K, M	BX	100
CDR02BX123AK_ _	123	12 000	K	BX	50
CDR02BX153A_ _ _	153	15 000	K, M	BX	50
CDR02BX183AK_ _	183	18 000	K	BX	50
CDR02BX223A_ _ _	223	22 000	K, M	BX	50
CDR03BP					
CDR03BP331B_ _ _	331	330	J, K	BP	100
CDR03BP391BJ_ _	391	390	J	BP	100
CDR03BP471B_ _ _	471	470	J, K	BP	100
CDR03BP561BJ_ _	561	560	J	BP	100
CDR03BP681B_ _ _	681	680	J, K	BP	100
CDR03BP821BJ_ _	821	820	J	BP	100
CDR03BP102B_ _ _	102	1000	J, K	BP	100
CDR03BX					
CDR03BX123BK_ _	123	12 000	K	BX	100
CDR03BX153B_ _ _	153	15 000	K, M	BX	100
CDR03BX183BK_ _	183	18 000	K	BX	100
CDR03BX223B_ _ _	223	22 000	K, M	BX	100
CDR03BX273BK_ _	273	27 000	K	BX	100
CDR03BX333B_ _ _	333	33 000	K, M	BX	100
CDR03BX393AK_ _	393	39 000	K	BX	50
CDR03BX473A_ _ _	473	47 000	K, M	BX	50
CDR03BX563AK_ _	563	56 000	K	BX	50
CDR03BX683A_ _ _	683	68 000	K, M	BX	50



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR04BP					
CDR04BP122BJ_ _	122	1200	J	BP	100
CDR04BP152B_ _ _	152	1500	J, K	BP	100
CDR04BP182BJ_ _	182	1800	J	BP	100
CDR04BP222B_ _ _	222	2200	J, K	BP	100
CDR04BP272BJ_ _	272	2700	J	BP	100
CDR04BP332B_ _ _	332	3300	J, K	BP	100
CDR04BX					
CDR04BX393BK_ _	393	39 000	K	BX	100
CDR04BX473B_ _ _	473	47 000	K, M	BX	100
CDR04BX563BK_ _	563	56 000	K	BX	100
CDR04BX823AK_ _	823	82 000	K	BX	50
CDR04BX104A_ _ _	104	100 000	K, M	BX	50
CDR04BX124AK_ _	124	120 000	K	BX	50
CDR04BX154A_ _ _	154	150 000	K, M	BX	50
CDR04BX184AK_ _	184	180 000	K	BX	50
CDR06BX					
CDR06BX394AK_ _	394	390 000	K	BX	50
CDR06BX474A_ _ _	474	470 000	K, M	BX	50
CDR31BP					
CDR31BP1R0B_ _ _	1R0	1	C	BP	100
CDR31BP1R1B_ _ _	1R1	1.1	C	BP	100
CDR31BP1R2B_ _ _	1R2	1.2	C	BP	100
CDR31BP1R3B_ _ _	1R3	1.3	C	BP	100
CDR31BP1R5B_ _ _	1R5	1.5	C	BP	100
CDR31BP1R6B_ _ _	1R6	1.6	C	BP	100
CDR31BP1R8B_ _ _	1R8	1.8	C	BP	100
CDR31BP2R0B_ _ _	2R0	2	C	BP	100
CDR31BP2R2B_ _ _	2R2	2.2	C	BP	100
CDR31BP2R4B_ _ _	2R4	2.4	C	BP	100
CDR31BP2R7B_ _ _	2R7	2.7	C, D	BP	100
CDR31BP3R0B_ _ _	3R0	3	C, D	BP	100
CDR31BP3R3B_ _ _	3R3	3.3	C, D	BP	100
CDR31BP3R6B_ _ _	3R6	3.6	C, D	BP	100
CDR31BP3R9B_ _ _	3R9	3.9	C, D	BP	100
CDR31BP4R3B_ _ _	4R3	4.3	C, D	BP	100
CDR31BP4R7B_ _ _	4R7	4.7	C, D	BP	100
CDR31BP5R1B_ _ _	5R1	5.1	C, D	BP	100
CDR31BP5R6B_ _ _	5R6	5.6	C, D	BP	100
CDR31BP6R2B_ _ _	6R2	6.2	C, D	BP	100
CDR31BP6R8B_ _ _	6R8	6.8	C, D	BP	100
CDR31BP7R5B_ _ _	7R5	7.5	C, D	BP	100
CDR31BP8R2B_ _ _	8R2	8.2	C, D	BP	100
CDR31BP9R1B_ _ _	9R1	9.1	C, D	BP	100
CDR31BP100B_ _ _	100	10	F, J, K	BP	100
CDR31BP110B_ _ _	110	11	F, J, K	BP	100



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR31BP					
CDR31BP120B_ ___	120	12	F, J, K	BP	100
CDR31BP130B_ ___	130	13	F, J, K	BP	100
CDR31BP150B_ ___	150	15	F, J, K	BP	100
CDR31BP160B_ ___	160	16	F, J, K	BP	100
CDR31BP180B_ ___	180	18	F, J, K	BP	100
CDR31BP200B_ ___	200	20	F, J, K	BP	100
CDR31BP220B_ ___	220	22	F, J, K	BP	100
CDR31BP240B_ ___	240	24	F, J, K	BP	100
CDR31BP270B_ ___	270	27	F, J, K	BP	100
CDR31BP300B_ ___	300	30	F, J, K	BP	100
CDR31BP330B_ ___	330	33	F, J, K	BP	100
CDR31BP360B_ ___	360	36	F, J, K	BP	100
CDR31BP390B_ ___	390	39	F, J, K	BP	100
CDR31BP430B_ ___	430	43	F, J, K	BP	100
CDR31BP470B_ ___	470	47	F, J, K	BP	100
CDR31BP510B_ ___	510	51	F, J, K	BP	100
CDR31BP560B_ ___	560	56	F, J, K	BP	100
CDR31BP620B_ ___	620	62	F, J, K	BP	100
CDR31BP680B_ ___	680	68	F, J, K	BP	100
CDR31BP750B_ ___	750	75	F, J, K	BP	100
CDR31BP820B_ ___	820	82	F, J, K	BP	100
CDR31BP910B_ ___	910	91	F, J, K	BP	100
CDR31BP101B_ ___	101	100	F, J, K	BP	100
CDR31BP111B_ ___	111	110	F, J, K	BP	100
CDR31BP121B_ ___	121	120	F, J, K	BP	100
CDR31BP131B_ ___	131	130	F, J, K	BP	100
CDR31BP151B_ ___	151	150	F, J, K	BP	100
CDR31BP161B_ ___	161	160	F, J, K	BP	100
CDR31BP181B_ ___	181	180	F, J, K	BP	100
CDR31BP201B_ ___	201	200	F, J, K	BP	100
CDR31BP221B_ ___	221	220	F, J, K	BP	100
CDR31BP241B_ ___	241	240	F, J, K	BP	100
CDR31BP271B_ ___	271	270	F, J, K	BP	100
CDR31BP301B_ ___	301	300	F, J, K	BP	100
CDR31BP331B_ ___	331	330	F, J, K	BP	100
CDR31BP361B_ ___	361	360	F, J, K	BP	100
CDR31BP391B_ ___	391	390	F, J, K	BP	100
CDR31BP431B_ ___	431	430	F, J, K	BP	100
CDR31BP471B_ ___	471	470	F, J, K	BP	100
CDR31BP511A_ ___	511	510	F, J, K	BP	50
CDR31BP561A_ ___	561	560	F, J, K	BP	50
CDR31BP621A_ ___	621	620	F, J, K	BP	50
CDR31BP681A_ ___	681	680	F, J, K	BP	50



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR31BX					
CDR31BX471B_ _ _	471	470	K, M	BX	100
CDR31BX561B_ _ _	561	560	K, M	BX	100
CDR31BX681B_ _ _	681	680	K, M	BX	100
CDR31BX821B_ _ _	821	820	K, M	BX	100
CDR31BX102B_ _ _	102	1000	K, M	BX	100
CDR31BX122B_ _ _	122	1200	K, M	BX	100
CDR31BX152B_ _ _	152	1500	K, M	BX	100
CDR31BX182B_ _ _	182	1800	K, M	BX	100
CDR31BX222B_ _ _	222	2200	K, M	BX	100
CDR31BX272B_ _ _	272	2700	K, M	BX	100
CDR31BX332B_ _ _	332	3300	K, M	BX	100
CDR31BX392B_ _ _	392	3900	K, M	BX	100
CDR31BX472B_ _ _	472	4700	K, M	BX	100
CDR31BX562A_ _ _	562	5600	K, M	BX	50
CDR31BX682A_ _ _	682	6800	K, M	BX	50
CDR31BX822A_ _ _	822	8200	K, M	BX	50
CDR31BX103A_ _ _	103	10 000	K, M	BX	50
CDR31BX123A_ _ _	123	12 000	K, M	BX	50
CDR31BX153A_ _ _	153	15 000	K, M	BX	50
CDR31BX183A_ _ _	183	18 000	K, M	BX	50
CDR32BP					
CDR32BP1R0B_ _ _	1R0	1	C	BP	100
CDR32BP1R1B_ _ _	1R1	1.1	C	BP	100
CDR32BP1R2B_ _ _	1R2	1.2	C	BP	100
CDR32BP1R3B_ _ _	1R3	1.3	C	BP	100
CDR32BP1R5B_ _ _	1R5	1.5	C	BP	100
CDR32BP1R6B_ _ _	1R6	1.6	C	BP	100
CDR32BP1R8B_ _ _	1R8	1.8	C	BP	100
CDR32BP2R0B_ _ _	2R0	2	C	BP	100
CDR32BP2R2B_ _ _	2R2	2.2	C	BP	100
CDR32BP2R4B_ _ _	2R4	2.4	C	BP	100
CDR32BP2R7B_ _ _	2R7	2.7	C, D	BP	100
CDR32BP3R0B_ _ _	3R0	3	C, D	BP	100
CDR32BP3R3B_ _ _	3R3	3.3	C, D	BP	100
CDR32BP3R6B_ _ _	3R6	3.6	C, D	BP	100
CDR32BP3R9B_ _ _	3R9	3.9	C, D	BP	100
CDR32BP4R3B_ _ _	4R3	4.3	C, D	BP	100
CDR32BP4R7B_ _ _	4R7	4.7	C, D	BP	100
CDR32BP5R1B_ _ _	5R1	5.1	C, D	BP	100
CDR32BP5R6B_ _ _	5R6	5.6	C, D	BP	100
CDR32BP6R2B_ _ _	6R2	6.2	C, D	BP	100
CDR32BP6R8B_ _ _	6R8	6.8	C, D	BP	100
CDR32BP7R5B_ _ _	7R5	7.5	C, D	BP	100
CDR32BP8R2B_ _ _	8R2	8.2	C, D	BP	100
CDR32BP9R1B_ _ _	9R1	9.1	C, D	BP	100
CDR32BP100B_ _ _	100	10	F, J, K	BP	100



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR32BP					
CDR32BP110B_ ___	110	11	F, J, K	BP	100
CDR32BP120B_ ___	120	12	F, J, K	BP	100
CDR32BP130B_ ___	130	13	F, J, K	BP	100
CDR32BP150B_ ___	150	15	F, J, K	BP	100
CDR32BP160B_ ___	160	16	F, J, K	BP	100
CDR32BP180B_ ___	180	18	F, J, K	BP	100
CDR32BP200B_ ___	200	20	F, J, K	BP	100
CDR32BP220B_ ___	220	22	F, J, K	BP	100
CDR32BP240B_ ___	240	24	F, J, K	BP	100
CDR32BP270B_ ___	270	27	F, J, K	BP	100
CDR32BP300B_ ___	300	30	F, J, K	BP	100
CDR32BP330B_ ___	330	33	F, J, K	BP	100
CDR32BP360B_ ___	360	36	F, J, K	BP	100
CDR32BP390B_ ___	390	39	F, J, K	BP	100
CDR32BP430B_ ___	430	43	F, J, K	BP	100
CDR32BP470B_ ___	470	47	F, J, K	BP	100
CDR32BP510B_ ___	510	51	F, J, K	BP	100
CDR32BP560B_ ___	560	56	F, J, K	BP	100
CDR32BP620B_ ___	620	62	F, J, K	BP	100
CDR32BP680B_ ___	680	68	F, J, K	BP	100
CDR32BP750B_ ___	750	75	F, J, K	BP	100
CDR32BP820B_ ___	820	82	F, J, K	BP	100
CDR32BP910B_ ___	910	91	F, J, K	BP	100
CDR32BP101B_ ___	101	100	F, J, K	BP	100
CDR32BP111B_ ___	111	110	F, J, K	BP	100
CDR32BP121B_ ___	121	120	F, J, K	BP	100
CDR32BP131B_ ___	131	130	F, J, K	BP	100
CDR32BP151B_ ___	151	150	F, J, K	BP	100
CDR32BP161B_ ___	161	160	F, J, K	BP	100
CDR32BP181B_ ___	181	180	F, J, K	BP	100
CDR32BP201B_ ___	201	200	F, J, K	BP	100
CDR32BP221B_ ___	221	220	F, J, K	BP	100
CDR32BP241B_ ___	241	240	F, J, K	BP	100
CDR32BP271B_ ___	271	270	F, J, K	BP	100
CDR32BP301B_ ___	301	300	F, J, K	BP	100
CDR32BP331B_ ___	331	330	F, J, K	BP	100
CDR32BP361B_ ___	361	360	F, J, K	BP	100
CDR32BP391B_ ___	391	390	F, J, K	BP	100
CDR32BP431B_ ___	431	430	F, J, K	BP	100
CDR32BP471B_ ___	471	470	F, J, K	BP	100
CDR32BP511B_ ___	511	510	F, J, K	BP	100
CDR32BP561B_ ___	561	560	F, J, K	BP	100
CDR32BP621B_ ___	621	620	F, J, K	BP	100
CDR32BP681B_ ___	681	680	F, J, K	BP	100
CDR32BP751B_ ___	751	750	F, J, K	BP	100
CDR32BP821B_ ___	821	820	F, J, K	BP	100



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR32BP					
CDR32BP911B_ _ _	911	910	F, J, K	BP	100
CDR32BP102B_ _ _	102	1000	F, J, K	BP	100
CDR32BP112A_ _ _	112	1100	F, J, K	BP	50
CDR32BP122A_ _ _	122	1200	F, J, K	BP	50
CDR32BP132A_ _ _	132	1300	F, J, K	BP	50
CDR32BP152A_ _ _	152	1500	F, J, K	BP	50
CDR32BP162A_ _ _	162	1600	F, J, K	BP	50
CDR32BP182A_ _ _	182	1800	F, J, K	BP	50
CDR32BP202A_ _ _	202	2000	F, J, K	BP	50
CDR32BP222A_ _ _	222	2200	F, J, K	BP	50
CDR32BX					
CDR32BX472B_ _ _	472	4700	K, M	BX	100
CDR32BX562B_ _ _	562	5600	K, M	BX	100
CDR32BX682B_ _ _	682	6800	K, M	BX	100
CDR32BX822B_ _ _	822	8200	K, M	BX	100
CDR32BX103B_ _ _	103	10 000	K, M	BX	100
CDR32BX123B_ _ _	123	12 000	K, M	BX	100
CDR32BX153B_ _ _	153	15 000	K, M	BX	100
CDR32BX183A_ _ _	183	18 000	K, M	BX	50
CDR32BX223A_ _ _	223	22 000	K, M	BX	50
CDR32BX273A_ _ _	273	27 000	K, M	BX	50
CDR32BX333A_ _ _	333	33 000	K, M	BX	50
CDR32BX393A_ _ _	393	39 000	K, M	BX	50
CDR33BP					
CDR33BP102B_ _ _	102	1000	F, J, K	BP	100
CDR33BP112B_ _ _	112	1100	F, J, K	BP	100
CDR33BP122B_ _ _	122	1200	F, J, K	BP	100
CDR33BP132B_ _ _	132	1300	F, J, K	BP	100
CDR33BP152B_ _ _	152	1500	F, J, K	BP	100
CDR33BP162B_ _ _	162	1600	F, J, K	BP	100
CDR33BP182B_ _ _	182	1800	F, J, K	BP	100
CDR33BP202B_ _ _	202	2000	F, J, K	BP	100
CDR33BP222B_ _ _	222	2200	F, J, K	BP	100
CDR33BP242A_ _ _	242	2400	F, J, K	BP	50
CDR33BP272A_ _ _	272	2700	F, J, K	BP	50
CDR33BP302A_ _ _	302	3000	F, J, K	BP	50
CDR33BP332A_ _ _	332	3300	F, J, K	BP	50
CDR33BX					
CDR33BX153B_ _ _	153	15 000	K, M	BX	100
CDR33BX183B_ _ _	183	18 000	K, M	BX	100
CDR33BX223B_ _ _	223	22 000	K, M	BX	100
CDR33BX273B_ _ _	273	27 000	K, M	BX	100
CDR33BX393A_ _ _	393	39 000	K, M	BX	50
CDR33BX473A_ _ _	473	47 000	K, M	BX	50
CDR33BX563A_ _ _	563	56 000	K, M	BX	50
CDR33BX683A_ _ _	683	68 000	K, M	BX	50
CDR33BX823A_ _ _	823	82 000	K, M	BX	50
CDR33BX104A_ _ _	104	100 000	K, M	BX	50



MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR34BP					
CDR34BP222B_ _ _	222	2200	F, J, K	BP	100
CDR34BP242B_ _ _	242	2400	F, J, K	BP	100
CDR34BP272B_ _ _	272	2700	F, J, K	BP	100
CDR34BP302B_ _ _	302	3000	F, J, K	BP	100
CDR34BP332B_ _ _	332	3300	F, J, K	BP	100
CDR34BP362B_ _ _	362	3600	F, J, K	BP	100
CDR34BP392B_ _ _	392	3900	F, J, K	BP	100
CDR34BP432B_ _ _	432	4300	F, J, K	BP	100
CDR34BP472B_ _ _	472	4700	F, J, K	BP	100
CDR34BP512A_ _ _	512	5100	F, J, K	BP	50
CDR34BP562A_ _ _	562	5600	F, J, K	BP	50
CDR34BP622A_ _ _	622	6200	F, J, K	BP	50
CDR34BP682A_ _ _	682	6800	F, J, K	BP	50
CDR34BP752A_ _ _	752	7500	F, J, K	BP	50
CDR34BP822A_ _ _	822	8200	F, J, K	BP	50
CDR34BP912A_ _ _	912	9100	F, J, K	BP	50
CDR34BP103A_ _ _	103	10 000	F, J, K	BP	50
CDR34BX					
CDR34BX273B_ _ _	273	27 000	K, M	BX	100
CDR34BX333B_ _ _	333	33 000	K, M	BX	100
CDR34BX393B_ _ _	393	39 000	K, M	BX	100
CDR34BX473B_ _ _	473	47 000	K, M	BX	100
CDR34BX563B_ _ _	563	56 000	K, M	BX	100
CDR34BX104A_ _ _	104	100 000	K, M	BX	50
CDR34BX124A_ _ _	124	120 000	K, M	BX	50
CDR34BX154A_ _ _	154	150 000	K, M	BX	50
CDR34BX184A_ _ _	184	180 000	K, M	BX	50
CDR35BP					
CDR35BP472B_ _ _	472	4700	F, J, K	BP	100
CDR35BP512B_ _ _	512	5100	F, J, K	BP	100
CDR35BP562B_ _ _	562	5600	F, J, K	BP	100
CDR35BP622B_ _ _	622	6200	F, J, K	BP	100
CDR35BP682B_ _ _	682	6800	F, J, K	BP	100
CDR35BP752B_ _ _	752	7500	F, J, K	BP	100
CDR35BP822B_ _ _	822	8200	F, J, K	BP	100
CDR35BP912B_ _ _	912	9100	F, J, K	BP	100
CDR35BP103B_ _ _	103	10 000	F, J, K	BP	100
CDR35BP113A_ _ _	113	11 000	F, J, K	BP	50
CDR35BP123A_ _ _	123	12 000	F, J, K	BP	50
CDR35BP133A_ _ _	133	13 000	F, J, K	BP	50
CDR35BP153A_ _ _	153	15 000	F, J, K	BP	50
CDR35BP163A_ _ _	163	16 000	F, J, K	BP	50
CDR35BP183A_ _ _	183	18 000	F, J, K	BP	50
CDR35BP203A_ _ _	203	20 000	F, J, K	BP	50
CDR35BP223A_ _ _	223	22 000	F, J, K	BP	50



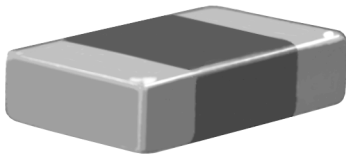
MIL-C-55681 QUALIFIED, TYPE CDR					
MILITARY TYPE DESIGNATION	CAPACITANCE CODE	CAPACITANCE (pF)	CAPACITANCE TOLERANCE	RATED TEMP. AND VOLTAGE TEMP. LIMITS	VOLTAGE (DC)
CDR35BX					
CDR35BX563B_ _ _	563	56 000	K, M	BX	100
CDR35BX683B_ _ _	683	68 000	K, M	BX	100
CDR35BX823B_ _ _	823	82 000	K, M	BX	100
CDR35BX104B_ _ _	104	100 000	K, M	BX	100
CDR35BX124B_ _ _	124	120 000	K, M	BX	100
CDR35BX154B_ _ _	154	150 000	K, M	BX	100
CDR35BX184A_ _ _	184	180 000	K, M	BX	50
CDR35BX224A_ _ _	224	220 000	K, M	BX	50
CDR35BX274A_ _ _	274	270 000	K, M	BX	50
CDR35BX334A_ _ _	334	330 000	K, M	BX	50
CDR35BX394A_ _ _	394	390 000	K, M	BX	50
CDR35BX474A_ _ _	474	470 000	K, M	BX	50

TAPE AND REEL QUANTITIES (1)(2)(3)								
STYLES	BODY SIZE	TAPE SIZE	7" REEL QUANTITIES			11 1/4" AND 13" REEL QUANTITIES		BULK
			PACKAGING CODE			PACKAGING CODE		
			"C"	"T"	"J"	"P"	"R"	
CDR01, CDR31	0805	8 mm	3000	3000	1000	10 000	10 000	100
CDR32	1206	8 mm	N/A	3000	1000	N/A	10 000	100
CDR33	1210	8 mm	N/A	3000	1000	N/A	10 000	100
CDR02	1805	12 mm	N/A	3000	500	N/A	10 000	100
CDR03	1808	12 mm	N/A	2000	500	N/A	10 000	100
CDR04, CDR34	1812	12 mm	N/A	1000	500	N/A	4000	100
CDR35	1825	12 mm	N/A	1000	500	N/A	4000	100
CDR06	2225	12 mm	N/A	1000	500	N/A	4000	100

Notes

- (1) Vishay Vitramon uses embossed plastic carrier tape and punched paper carrier tape
- (2) Paper tape is not available for case sizes > 1206 or for component thickness > 0.035" (0.89 mm)
- (3) DC voltage rating should not be exceeded in application

Surface Mount Multilayer Ceramic Chip Capacitors DSCC Qualified Type 03029



FEATURES

- US defense supply center approved
- Federal stock control number, CAGE CODE SHV71
- Small case size (0402)
- Stable BP, BR and BX dielectrics
- Excellent aging characteristics
- Lead (Pb)-free termination code “M”
- Tin/lead termination code “Z”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Made with a combination of design, materials and tight process control to achieve very high field reliability
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



Available
RoHS*
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Broadband wireless communication
- Satellite communication
- WiFi (802.11) and WiMax (802.16)
- Subscriber based wireless devices
- Microwave systems

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range:

BP: 0.5 pF to 180 pF

BR: 100 pF to 10 nF

BX: 100 pF to 8.2 nF

Voltage Range: 6.3 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):

BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C
with zero (0) V_{DC} applied

BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C
with 100 % rated V_{DC} applied

BR: ± 15 % from - 55 °C to + 125 °C
with zero (0) V_{DC} applied

BR: + 15 %, - 40 % from - 55 °C to + 125 °C
with 100 % rated V_{DC} applied

BX: ± 15 % from - 55 °C to + 125 °C
with zero (0) V_{DC} applied

BX: + 15 %, - 25 % from - 55 °C to + 125 °C
with 100 % rated V_{DC} applied

Dissipation Factor (DF):

BP:

0.15 % max. at 1.0 V_{RMS} and 1 MHz for values ≤ 1000 pF

0.15 % max. at 1.0 V_{RMS} and 1 kHz for values > 1000 pF

BR, BX:

≤ 25 V: ± 3.5 % max. at 1.0 V_{RMS} and 1 kHz

≥ 50 V: ± 2.5 % max. at 1.0 V_{RMS} and 1 kHz

Aging Rate:

BP: 0 % maximum per decade

BR, BX: 1 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 MΩ minimum or 1000 ΩF, whichever is less

At + 125 °C and rated voltage 10 000 MΩ minimum or 100 ΩF, whichever is less

Dielectric Strength Test:

Performed per method 103 of EIA-198-2-E.

Applied test voltages

≤ 200 V_{DC}-rated: 250 % of rated voltage

* Pb containing terminations are not RoHS compliant, exemptions may apply

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
BP	0402	100	0.5 pF	180 pF
BR	0402	50	100 pF	10 nF
BX	0402	50	100 pF	8.2 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
03029-	BX	102	B	J	Z	-	T
DSCC NUMBER	DIELECTRIC	CAPACITANCE NOMINAL CODE	DC VOLTAGE RATING ⁽¹⁾	CAPACITANCE TOLERANCE	TERMINATION	GROUP C TESTING OPTION	PACKAGING
CASE SIZE 0402	BP BR BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples: 1R8 = 1.8 pF 101 = 100 pF	W = 6.3 V X = 10 V Y = 16 V Z = 25 V A = 50 V B = 100 V	C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note: C, D < 10 pF (BP) F, G, J ≥ 10 pF (BP) J, K, M (BR, BX)	M = Silver Palladium Z = Ni barrier with tin/lead plate min. 4 % lead	C = Full group C L = 2000 h life test only M = 1000 h life test only H = Low voltage humidity test only - = Group A test only	
						C = 7" reel/paper tape O = 7" reel/flamed paper tape J = 7" reel (low quantity) P = 11 1/4"/13" reel/paper tape I = 11 1/4"/13" reel/flamed paper tape B = Bulk Note: "I" and "O" are used for "M" termination code	

Note

- ⁽¹⁾ DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com

DIMENSIONS in inches (millimeters)					
PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
03029-	0.040 ± 0.004 (1.02 ± 0.10)	0.020 ± 0.004 (0.51 ± 0.10)	0.024 (0.61)	0.004 (0.10)	0.016 (0.41)

Note

- Metric equivalents are given for general information only



SELECTION CHART																	
DIELECTRIC		BP					BR					BX					
STYLE		03029															
EIA CODE		0402															
VOLTAGE (V _{DC})		6.3	10	16	25	50	100	6.3	10	16	25	50	6.3	10	16	25	50
VOLTAGE CODE		W	X	Y	Z	A	B	W	X	Y	Z	A	W	X	Y	Z	A
CAP. CODE	CAP.																
0R5	0.5 pF	•	•	•	•	•	•										
R75	0.75 pF	•	•	•	•	•	•										
1R0	1.0 pF	•	•	•	•	•	•										
1R2	1.2 pF	•	•	•	•	•	•										
1R5	1.5 pF	•	•	•	•	•	•										
1R8	1.8 pF	•	•	•	•	•	•										
2R2	2.2 pF	•	•	•	•	•	•										
2R4	2.4 pF	•	•	•	•	•	•										
2R7	2.7 pF	•	•	•	•	•	•										
3R0	3.0 pF	•	•	•	•	•	•										
3R3	3.3 pF	•	•	•	•	•	•										
3R6	3.6 pF	•	•	•	•	•	•										
3R9	3.9 pF	•	•	•	•	•	•										
4R7	4.7 pF	•	•	•	•	•	•										
5R1	5.1 pF	•	•	•	•	•	•										
5R6	5.6 pF	•	•	•	•	•	•										
6R2	6.2 pF	•	•	•	•	•	•										
6R8	6.8 pF	•	•	•	•	•	•										
7R5	7.5 pF	•	•	•	•	•	•										
8R2	8.2 pF	•	•	•	•	•	•										
9R1	9.1 pF	•	•	•	•	•	•										
100	10 pF	•	•	•	•	•	•										
110	11 pF	•	•	•	•	•	•										
120	12 pF	•	•	•	•	•	•										
130	13 pF	•	•	•	•	•	•										
150	15 pF	•	•	•	•	•	•										
160	16 pF	•	•	•	•	•	•										
180	18 pF	•	•	•	•	•	•										
200	20 pF	•	•	•	•	•	•										
220	22 pF	•	•	•	•	•	•										
240	24 pF	•	•	•	•	•	•										
270	27 pF	•	•	•	•	•	•										
300	30 pF	•	•	•	•	•	•										
330	33 pF	•	•	•	•	•	•										
360	36 pF	•	•	•	•	•	•										
390	39 pF	•	•	•	•	•	•										
430	43 pF	•	•	•	•	•	•										
470	47 pF	•	•	•	•	•	•										
510	51 pF	•	•	•	•	•	•										
560	56 pF	•	•	•	•	•	•										
620	62 pF	•	•	•	•	•	•										
680	68 pF	•	•	•	•	•	•										
750	75 pF	•	•	•	•	•	•										
820	82 pF	•	•	•	•	•	•										
910	91 pF	•	•	•	•	•	•										



SELECTION CHART																	
DIELECTRIC		BP					BR					BX					
STYLE		03029															
EIA CODE		0402															
VOLTAGE (V _{DC})		6.3	10	16	25	50	100	6.3	10	16	25	50	6.3	10	16	25	50
VOLTAGE CODE		W	X	Y	Z	A	B	W	X	Y	Z	A	W	X	Y	Z	A
CAP. CODE	CAP.																
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							•	•	•	•	•	•	•	•	•	•

Note

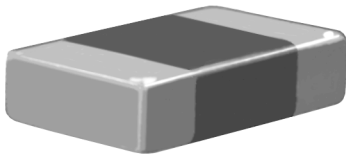
- See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

DSCC PACKAGING QUANTITIES ⁽¹⁾						
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES		BULK
		PACKAGING CODE		PACKAGING CODE		VIAL PACKAGING CODE
		"C"/"O"	"J"	"P"/"I"		"B"
0402	8 mm	5000	1000	10 000		100

Note

⁽¹⁾ Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"

Surface Mount Multilayer Ceramic Chip Capacitors DSCC Qualified Type 03028



FEATURES

- US defense supply center approved
- Federal stock control number, CAGE CODE SHV71
- Small case size (0603)
- Stable BP, BR and BX dielectrics
- Excellent aging characteristics
- Lead (Pb)-free termination code “M”
- Tin/lead termination code “Z”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Made with a combination of design, materials and tight process control to achieve very high field reliability
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



Available
RoHS*
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Broadband wireless communication
- Satellite communication
- WiFi (802.11) and WiMax (802.16)
- Subscriber based wireless devices
- Microwave systems

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range:

BP: 0.5 pF to 1.0 nF
BR: 100 pF to 100 nF
BX: 100 pF to 100 nF

Voltage Range: 6.3 V_{DC} to 100 V_{DC}

Temperature Coefficient of Capacitance (TCC):

BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C with 100 % rated V_{DC} applied
BR: ± 15 % from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BR: + 15 %, - 40 % from - 55 °C to + 125 °C with 100 % rated V_{DC} applied
BX: ± 15 % from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BX: + 15 %, - 25 % from - 55 °C to + 125 °C with 100 % rated V_{DC} applied

Dissipation Factor (DF):

BP:
0.15 % max. at 1.0 V_{RMS} and 1 MHz for values ≤ 1000 pF
0.15 % max. at 1.0 V_{RMS} and 1 kHz for values > 1000 pF
BR, BX:
≤ 25 V: ± 3.5 % max. at 1.0 V_{RMS} and 1 kHz
≥ 50 V: ± 2.5 % max. at 1.0 V_{RMS} and 1 kHz

Aging Rate:

BP: 0 % maximum per decade
BR, BX: 1 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 MΩ minimum or 1000 ΩF, whichever is less
At + 125 °C and rated voltage 10 000 MΩ minimum or 100 ΩF, whichever is less

Dielectric Strength Test:

Performed per method 103 of EIA-198-2-E.
Applied test voltages
≤ 200 V_{DC}-rated: 250 % of rated voltage

* Pb containing terminations are not RoHS compliant, exemptions may apply

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
BP	0603	100	0.5 pF	1.0 nF
BR	0603	100	100 pF	100 nF
BX	0603	100	100 pF	100 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
03028- DSCC NUMBER	BX DIELECTRIC	102 CAPACITANCE NOMINAL CODE	B DC VOLTAGE RATING ⁽¹⁾	J CAPACITANCE TOLERANCE	Z TERMINATION	- GROUP C TESTING OPTION	T PACKAGING
CASE SIZE 0603	BP BR BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples: 1R8 = 1.8 pF 101 = 100 pF	W = 6.3 V X = 10 V Y = 16 V Z = 25 V A = 50 V B = 100 V	C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note: C, D < 10 pF (BP) F, G, J ≥ 10 pF (BP) J, K, M (BR, BX)	M = Silver Palladium Z = Ni barrier with tin/lead plate min. 4 % lead	C = Full group C L = 2000 h life test only M = 1000 h life test only H = Low voltage humidity test only - = No group C testing	T = 7" reel/plastic tape C = 7" reel/paper tape O = 7" reel/flamed paper tape J = 7" reel (low quantity) R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape I = 11 1/4"/13" reel/flamed paper tape B = Bulk Note: "I" and "O" are used for "M" termination code

Note

- ⁽¹⁾ DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com

DIMENSIONS in inches (millimeters)					
PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
03028-	0.063 ± 0.006 (1.60 ± 0.15)	0.032 ± 0.006 (0.81 ± 0.15)	0.036 (0.91)	0.008 (0.20)	0.020 (0.51)

Note

- Metric equivalents are given for general information only



SELECTION CHART																			
DIELECTRIC		BP						BR						BX					
STYLE		03028																	
EIA CODE		0603																	
VOLTAGE (V _{DC})		6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100
VOLTAGE CODE		W	X	Y	Z	A	B	W	X	Y	Z	A	B	W	X	Y	Z	A	B
CAP. CODE	CAP.																		
0R5	0.5 pF	•	•	•	•	•	•												
R75	0.75 pF	•	•	•	•	•	•												
1R0	1.0 pF	•	•	•	•	•	•												
1R2	1.2 pF	•	•	•	•	•	•												
1R5	1.5 pF	•	•	•	•	•	•												
1R8	1.8 pF	•	•	•	•	•	•												
2R2	2.2 pF	•	•	•	•	•	•												
2R4	2.4 pF	•	•	•	•	•	•												
2R7	2.7 pF	•	•	•	•	•	•												
3R0	3.0 pF	•	•	•	•	•	•												
3R3	3.3 pF	•	•	•	•	•	•												
3R6	3.6 pF	•	•	•	•	•	•												
3R9	3.9 pF	•	•	•	•	•	•												
4R7	4.7 pF	•	•	•	•	•	•												
5R1	5.1 pF	•	•	•	•	•	•												
5R6	5.6 pF	•	•	•	•	•	•												
6R2	6.2 pF	•	•	•	•	•	•												
6R8	6.8 pF	•	•	•	•	•	•												
7R5	7.5 pF	•	•	•	•	•	•												
8R2	8.2 pF	•	•	•	•	•	•												
9R1	9.1 pF	•	•	•	•	•	•												
100	10 pF	•	•	•	•	•	•												
110	11 pF	•	•	•	•	•	•												
120	12 pF	•	•	•	•	•	•												
130	13 pF	•	•	•	•	•	•												
150	15 pF	•	•	•	•	•	•												
160	16 pF	•	•	•	•	•	•												
180	18 pF	•	•	•	•	•	•												
200	20 pF	•	•	•	•	•	•												
220	22 pF	•	•	•	•	•	•												
240	24 pF	•	•	•	•	•	•												
270	27 pF	•	•	•	•	•	•												
300	30 pF	•	•	•	•	•	•												
330	33 pF	•	•	•	•	•	•												
360	36 pF	•	•	•	•	•	•												
390	39 pF	•	•	•	•	•	•												
430	43 pF	•	•	•	•	•	•												
470	47 pF	•	•	•	•	•	•												
510	51 pF	•	•	•	•	•	•												
560	56 pF	•	•	•	•	•	•												
620	62 pF	•	•	•	•	•	•												
680	68 pF	•	•	•	•	•	•												
750	75 pF	•	•	•	•	•	•												
820	82 pF	•	•	•	•	•	•												
910	91 pF	•	•	•	•	•	•												



SELECTION CHART																			
DIELECTRIC		BP						BR						BX					
STYLE		03028																	
EIA CODE		0603																	
VOLTAGE (V _{DC})		6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100
VOLTAGE CODE		W	X	Y	Z	A	B	W	X	Y	Z	A	B	W	X	Y	Z	A	B
CAP. CODE	CAP.																		
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							*	*	*	*	*	*	*	*	*	*	*	*
683	68 nF							*	*	*	*	*	*	*	*	*	*	*	*
823	82 nF							*	*	*	*	*	*	*	*	*	*	*	*
104	100 nF							*	*	*	*	*	*	*	*	*	*	*	*
124	120 nF																		
154	150 nF																		
184	180 nF																		
224	220 nF																		

Note

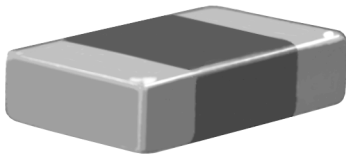
- See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

DSCC PACKAGING QUANTITIES (1)					
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	BULK
		PACKAGING CODE		PACKAGING CODE	VIAL PACKAGING CODE
		"C"/"O"/"T"	"J"	"P"/"I"/"R"	"B"
0603	8 mm	5000	1000	10 000	100

Note

(1) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"

Surface Mount Multilayer Ceramic Chip Capacitors DSCC Qualified Type 05006



FEATURES

- US defense supply center approved
- Federal stock control number, CAGE CODE SHV71
- Case size 0805
- Stable BP, BR and BX dielectrics
- Excellent aging characteristics
- Lead (Pb)-free termination code “M”
- Tin/lead termination code “Z” and “U”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Made with a combination of design, materials and tight process control to achieve very high field reliability
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



Available
RoHS*
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Avionic application
- Sonar applications
- Satellite systems
- Missiles applications
- Geographical information systems
- Global positioning systems

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range:

BP: 0.5 pF to 3.3 nF
BR: 100 pF to 220 nF
BX: 100 pF to 180 nF

Voltage Range: 10 V_{DC} to 200 V_{DC}

Temperature Coefficient of Capacitance (TCC):

BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C with 100 % rated V_{DC} applied
BR: ± 15 % from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BR: + 15 %, - 40 % from - 55 °C to + 125 °C with 100 % rated V_{DC} applied
BX: ± 15 % from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BX: + 15 %, - 25 % from - 55 °C to + 125 °C with 100 % rated V_{DC} applied

Dissipation Factor (DF):

BP:
0.15 % max. at 1.0 V_{RMS} and 1 MHz for values ≤ 1000 pF
0.15 % max. at 1.0 V_{RMS} and 1 kHz for values > 1000 pF
BR and BX:
≤ 25 V: 3.5 % max. at 1.0 V_{RMS} and 1 kHz
≥ 50 V: 2.5 % max. at 1.0 V_{RMS} and 1 kHz

Aging Rate:

BP: 0 % maximum per decade
BR, BX: 1 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 MΩ minimum or 1000 ΩF, whichever is less
At + 125 °C and rated voltage 10 000 MΩ minimum or 100 ΩF, whichever is less

Dielectric Strength Test:

Performed per method 103 of EIA-198-2-E.
Applied test voltages
≤ 200 V_{DC}-rated: 250 % of rated voltage

* Pb containing terminations are not RoHS compliant, exemptions may apply

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
BP	0805	200	0.5 pF	3.3 nF
BR	0805	100	100 pF	220 nF
BX	0805	100	100 pF	180 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
05006- DSCC NUMBER	BP DIELECTRIC	101 CAPACITANCE NOMINAL CODE	B DC VOLTAGE RATING ⁽¹⁾	J CAPACITANCE TOLERANCE	X TERMINATION	- GROUP C TESTING OPTION ⁽²⁾	T PACKAGING
Case size 0805	BP BR BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples: 1R8 = 1.8 pF 101 = 100 pF	X = 10 V Y = 16 V Z = 25 V A = 50 V B = 100 V C = 200 V	C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note: C, D < 10 pF (BP) F, G, J ≥ 10 pF (BP) J, K, M (BR, BX)	M = Silver Palladium Z = Ni barrier with tin/lead plate min. 4 % lead U ⁽²⁾ = hot solder dipped (min. 4 % lead)	C = Full group C L = 2000 h life test only M = 1000 h life test only H = Low voltage humidity test only - = Group A test only	T = 7" reel/plastic tape C = 7" reel/paper tape O = 7" reel/flamed paper tape J = 7" reel (low quantity) R = 11 1/4"/13" reel/plastic tape P = 11 1/4"/13" reel/paper tape I = 11 1/4"/13" reel/flamed paper tape B = Bulk Note: "I" and "O" are used for "M" termination code

Notes

- DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com
- "U" Termination part number code for DSCC product length, width and thickness dimensions positive tolerances (including bandwidth) above are allowed to increase by the following amounts: Length 0.020" (0.51 mm), width/thickness 0.015" (0.38 mm)

DIMENSIONS in inches (millimeters)					
PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
05006-	0.080 ± 0.008 (2.03 ± 0.20)	0.050 ± 0.008 (1.27 ± 0.20)	0.055 (1.40)	0.012 (0.30)	0.028 (0.71)

Note

- Metric equivalents are given for general information only

SELECTION CHART																	
DIELECTRIC		BP						BR					BX				
STYLE		05006															
EIA CODE		0805															
VOLTAGE (V _{DC})		10	16	25	50	100	200	10	16	25	50	100	10	16	25	50	100
VOLTAGE CODE		X	Y	Z	A	B	C	X	Y	Z	A	B	X	Y	Z	A	B
CAP. CODE	CAP.																
0R5	0.5 pF	•	•	•	•	•	•										
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



SELECTION CHART																	
DIELECTRIC		BP						BR					BX				
STYLE		05006															
EIA CODE		0805															
VOLTAGE (V _{DC})		10	16	25	50	100	200	10	16	25	50	100	10	16	25	50	100
VOLTAGE CODE		X	Y	Z	A	B	C	X	Y	Z	A	B	X	Y	Z	A	B
CAP. CODE	CAP.																
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	380 nF																
394	390 nF																
474	470 nF																
564	560 nF																
684	680 nF																
824	820 nF																
105	1.0 μF																

Note

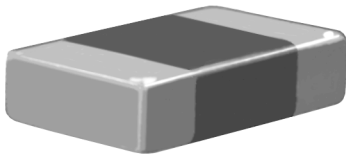
- See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

DSCC PACKAGING QUANTITIES (1)(2)						
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES		BULK
		PACKAGING CODE		PACKAGING CODE		VIAL PACKAGING CODE
		"C"/"O"/"T"	"J"	"P"/"I"/"R"		"B"
0805	8 mm	3000	1000	10 000		100

Notes

- (1) Vishay Vitramon uses embossed plastic carrier tape and punch paper carrier tape
 (2) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"

Surface Mount Multilayer Ceramic Chip Capacitors DSCC Qualified Type 05007



FEATURES

- US defense supply center approved
- Federal stock control number, CAGE CODE SHV71
- Case size 1206
- Stable BP, BR and BX dielectrics
- Excellent aging characteristics
- Tin/lead termination code “Z” and “U”
- Lead (Pb)-free termination code “M”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Made with a combination of design, materials and tight process control to achieve very high field reliability
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



Available
RoHS*
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- Avionic application
- Sonar applications
- Satellite systems
- Missiles applications
- Geographical information systems
- Global positioning systems

ELECTRICAL SPECIFICATIONS

Note

- Electrical characteristics at + 25 °C unless otherwise specified

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

Capacitance Range:

BP: 0.5 pF to 6.8 nF
BR: 820 pF to 470 nF
BX: 820 pF to 390 nF

Voltage Range: 16 V_{DC} to 200 V_{DC}

Temperature Coefficient of Capacitance (TCC):

BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BP: 0 ppm/°C ± 30 ppm/°C from - 55 °C to + 125 °C with 100 % rated V_{DC} applied
BR: ± 15 % from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BR: + 15 %, - 40 % from - 55 °C to + 125 °C with 100 % rated V_{DC} applied
BX: ± 15 % from - 55 °C to + 125 °C with zero (0) V_{DC} applied
BX: + 15 %, - 25 % from - 55 °C to + 125 °C with 100 % rated V_{DC} applied

Dissipation Factor (DF):

BP:

0.15 % max. at 1.0 V_{RMS} and 1 MHz for values ≤ 1000 pF
0.15 % max. at 1.0 V_{RMS} and 1 kHz for values > 1000 pF
BR and BX:
≤ 25 V: 3.5 % max. at 1.0 V_{RMS} and 1 kHz
≥ 50 V: 2.5 % max. at 1.0 V_{RMS} and 1 kHz

Aging Rate

BP: 0 % maximum per decade
BR, BX: 1 % maximum per decade

Insulation Resistance (IR):

At + 25 °C and rated voltage 100 000 MΩ minimum or 1000 ΩF, whichever is less
At + 125 °C and rated voltage 10 000 MΩ minimum or 100 ΩF, whichever is less

Dielectric Strength Test:

Performed per method 103 of EIA-198-2-E.
Applied test voltages
≤ 200 V_{DC}-rated: 250 % of rated voltage

* Pb containing terminations are not RoHS compliant, exemptions may apply

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
BP	1206	200	0.5 pF	6.8 nF
BR	1206	100	820 pF	470 nF
BX	1206	100	820 pF	390 nF

Note

- Detail ratings see selection chart

ORDERING INFORMATION							
05007- DSCC NUMBER	BP DIELECTRIC	101 CAPACITANCE NOMINAL CODE	B DC VOLTAGE RATING (1)	J CAPACITANCE TOLERANCE	X TERMINATION	- GROUP C TESTING OPTION (2)	T PACKAGING
Case size 1206	BP BR BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples: 1R8 = 1.8 pF 101 = 100 pF	X = 10 V Y = 16 V Z = 25 V A = 50 V B = 100 V C = 200 V	C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % Note: C, D < 10 pF (BP) F, G, J ≥ 10 pF (BP) J, K, M (BR, BX)	M = Silver Palladium Z = Ni barrier with tin/lead plate min. 4 % lead U (2) = hot solder dipped (min. 4 % lead)	C = Full group C L = 2000 h life test only M = 1000 h life test only H = Low voltage humidity test only - = Group A test only	T = 7" reel/plastic tape J = 7" reel (low quantity) R = 11 1/4" reel/plastic tape B = Bulk

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
- (2) "U" Termination part number code for DSCC product length, width and thickness dimensions positive tolerances (including bandwidth) above are allowed to increase by the following amounts: Length 0.025" (0.64 mm), width/thickness 0.015" (0.38 mm)

DIMENSIONS in inches (millimeters)					
PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
05007-	0.125 ± 0.008 (3.18 ± 0.20)	0.062 ± 0.008 (1.57 ± 0.20)	0.051 (1.30)	0.010 (0.25)	0.030 (0.76)

Note

- Metric equivalents are given for general information only



SELECTION CHART																
DIELECTRIC		BP					BR					BX				
STYLE		05007														
EIA CODE		1206														
VOLTAGE (V _{DC})		16	25	50	100	200	10	16	25	50	100	10	16	25	50	100
VOLTAGE CODE		Y	Z	A	B	C	X	Y	Z	A	B	X	Y	Z	A	B
CAP. CODE	CAP.															
0R5	0.5 pF	•	•	•	•	•										
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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



SELECTION CHART																
DIELECTRIC		BP					BR					BX				
STYLE		05007														
EIA CODE		1206														
VOLTAGE (V _{DC})		16	25	50	100	200	10	16	25	50	100	10	16	25	50	100
VOLTAGE CODE		Y	Z	A	B	C	X	Y	Z	A	B	X	Y	Z	A	B
CAP. CODE	CAP.															
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						•	•	•	•	•	•	•	•	•	
204	200 nF						•	•	•	•	•	•	•	•	•	
224	220 nF						•	•	•	•	•	•	•	•	•	
254	250 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															

DSCC PACKAGING QUANTITIES (1)					
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	BULK
		PACKAGING CODE		PACKAGING CODE	VIAL PACKAGING CODE
		"T"	"J"	"R"	"B"
1206	8 mm	3000	1000	10 000	100

Note

(1) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"





Technical Documents

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Surface Mount Multilayer Ceramic Chip Capacitors

SOLDERING RECOMMENDATIONS

1. Termination Selection ⁽¹⁾

- The termination selected depends on the assembly method to be used and the requirements of the application.
- Reflow solder assembly: select termination code "X". For CDR-MIL-PRF 55681 product, select termination code "W" or "Y".
- Wave solder assembly: select termination code "X". For CDR-MIL-PRF 55681 product, select termination code "W" or "Y".
- Additional board flex protection: select the polymer termination code "B".
- Conductive epoxy assembly: select termination code "F" and "E" ⁽²⁾. For CDR-MIL-PRF 55681 and DSCC product, select termination code "M".
- Non-magnetic requirements: select termination code "N".
- Lead-bearing requirements: select termination code "L". For CDR-MIL-PRF 55681 and DSCC product, select termination code "Z" or "U".

Notes

⁽¹⁾ Where applicable, see datasheets

⁽²⁾ Termination code "E" is for conductive epoxy assembly, contact mlcc@vishay.com for availability.

2. Chip Size vs. Solder Profile

- A.** 0402, 0603, 0805 1206 and 1210 (thickness ≤ 0.049 ", 1.24 mm) can be used in all three solder systems shown on the following page.
1210 (thickness > 0.049 ", 1.24 mm) and case size ≥ 1808 should only be used in reflow or vapor phase soldering.
- B.** Solder profiles should be properly controlled to minimize any thermal shock to the capacitor(s).

(See recommended solder profiles on the following page.)

3. Soldering Flux

Use mildly activated rosin flux RMA or RA types or low residue liquid fluxes (no-clean flux). Flux residues from no-clean flux can be removed with aqueous cleaners. During wave soldering ensure that the majority of solvents are removed at preheat.

4. Solder Type

Both, lead containing solders, such as Sn60, Sn62 or Sn63 and lead free solders, such as SnAgCu, can be used with our MLCCs.

5. Soldering Techniques

Generalized soldering curves shown on next page.

6. Soldering with a Solder Iron

Attachment by soldering iron is not recommended. A heat shock may cause a crack in the MLCC chip capacitors, however, if solder iron is used, the following precautions should be taken:

- A.** Preheat the chip capacitor to + 150 °C minimum. Use hot plate or hot air flow for preheat.
- B.** Use a low wattage, temperature controlled iron.
- C.** Tip temperature setting ≤ 280 °C and a maximum soldering time of 5 s.
- D.** Use a soldering tip no greater than 0.120" (3.0 mm) in diameter. Apply the transmission of heat through the soldering material.
- E.** When removal of chip capacitor is necessary, a hot air pencil is the preferred tool.

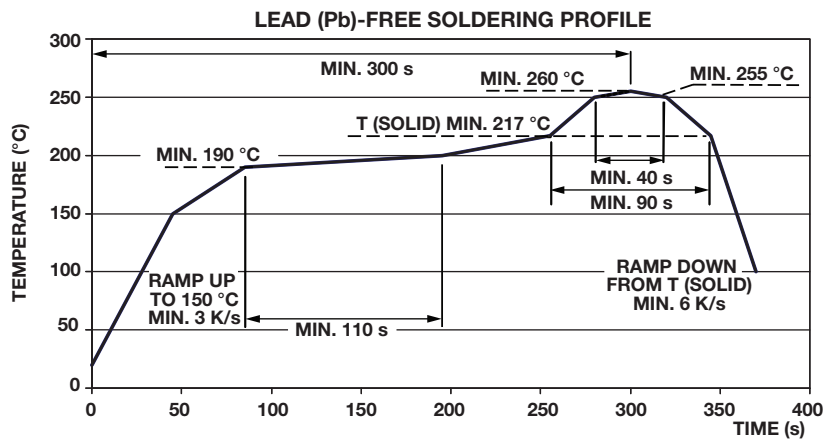
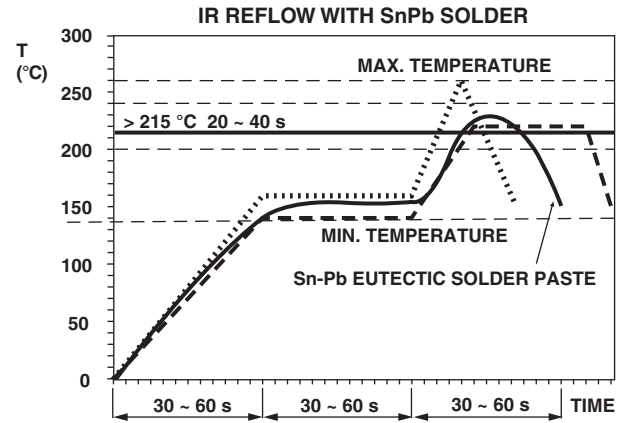
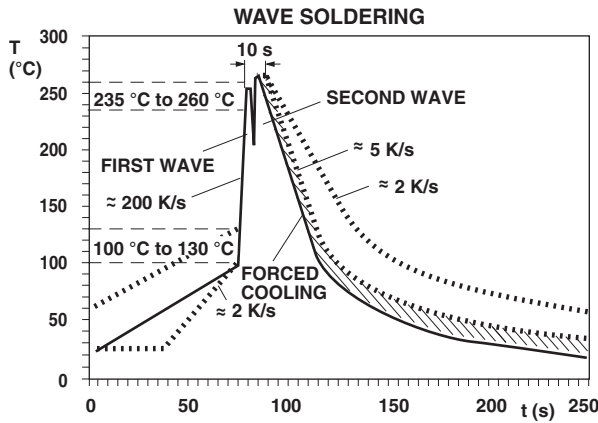
7. Cool Down

After soldering, allow the chip to cool at room ambient conditions. Using forced cool air or refrigerated air for expediting the cooling process is not recommended and can create thermal shock cracks and may facilitate board bend stresses.

8. Cleaning

Selection of an appropriate cleaning solvent is dependent upon the type of flux used. Cleaning in alcohol, water, hydrocarbons or any of the common, halogenated degreaser solvents is not detrimental to Vishay chip capacitors.

WAVE AND REFLOW SOLDERING GRAPHS



WAVE AND REFLOW SOLDERING

WAVE SOLDERING

Vishay offers the following recommendations:

Set dwell time in the solder wave 2 s to 3 s. Solder pot set at + 240 °C to + 260 °C. Belt speed at 3 feet/min to 5 feet/min.

1. Adjust flux station (foam, spray or wave) topside preheat at + 80 °C to + 105 °C.
2. Set preheat \approx + 160 °C below the solder wave temperature. Usually maximum underside PC board temperature at last preheat zone is + 150 °C. Preheat rate should be 1.5 °C/s to 2.5 °C/s.
3. Do not force cool the PC board. Maintain a uniform profile.
4. Finally check that the delta difference between the solder temperature and the temperature as the PC board leaves the last preheat zone is + 160 °C or less. Chip size and mass make some types more prone to thermal shocking during the soldering operation, leading to insulation resistance (IR) failures in use.

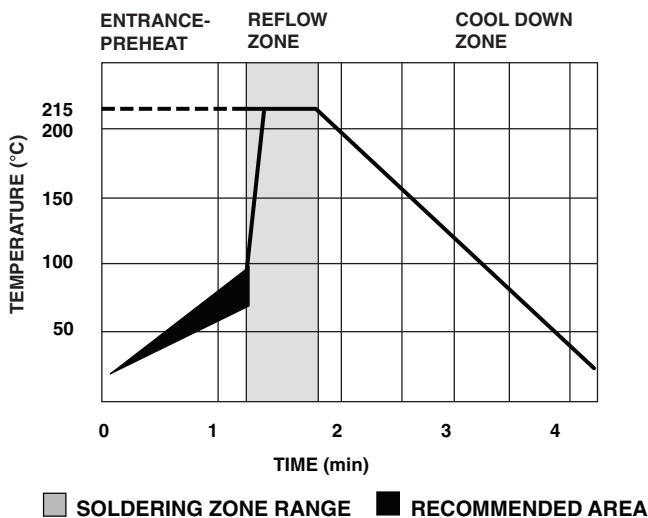
Vishay does not recommend wave soldering for chip size 1210 (thickness \geq 0.049", 1.24 mm) and case size \geq 1808

REFLOW SOLDERING (SnPb - Solder)

The reflow soldering process using no-clean solder paste for mounting ceramic chip capacitors has wide acceptance. Chip capacitors may develop thermally induced cracks if the temperature changes in reflow process are not controlled. Vishay offers the following recommendations:

1. Set peak reflow temperature at + 215 °C to + 260 °C based on paste melting point.
2. First preheat zone temperature elevation at + 150 °C \pm 10 °C, ramp rate 3 °C/s.
3. Second preheat zone temperature + 150 °C \pm 10 °C, ramp rate of 0.1 °C/s. Set preheat for \leq 60 s. Long preheat times could cause solder balls near the capacitor/other components.
4. Adjust reflow zone temperatures to + 150 °C \pm 10 °C to + 225 °C \pm 5 °C at ramp of 4 °C/s to 5 °C/s. Total time at reflow over + 200 °C should not exceed 15 s to 20 s.
5. Use natural cooling at the final cooling zone. Maintain a uniform profile no more than - 3 °C/s.

VAPOR PHASE REFLOW



With vapor phase reflow, heat reaches the product uniformly and quickly because of vapor condensation heating. During condensation heating a dense vapor condenses on all exposed surfaces. Due to the inherent low boiling point (+ 215 °C) for liquids used in vapor phase, ceramic chips can be reflowed without thermal shock damage. Vishay offers the following recommendations:

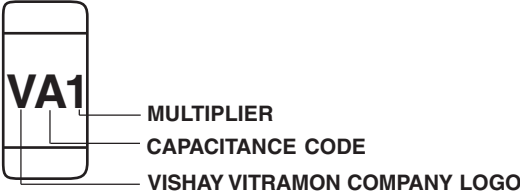
1. Preheat or pre-bake zone duration should be about 1.5 min to 2 min. Infrared heating can be used for preheat sections.
2. Vapor phase zone maximum temperature is + 215 °C with typical settings at + 210 °C.
3. Total duration is typically 4 min to 5 min, use natural cooling at the final cooling zone.

Surface Mount Multilayer Ceramic Chip Capacitors Vishay Vitramon Marking Option

Vishay Vitramon can provide on selected MLCC Capacitors a laser marking.
Availability with ordering option "M" acc. datasheets.

E. I. A. MARKING CODES								
LETTER	0	1	2	3	4	5	6	7
A	1	10	100	1000	10 000	100 000	1 000 000	10 000 000
B	1.1	11	110	1100	11 000	110 000	1 100 000	11 000 000
C	1.2	12	120	1200	12 000	120 000	1 200 000	12 000 000
D	1.3	13	130	1300	13 000	130 000	1 300 000	13 000 000
E	1.5	15	150	1500	15 000	150 000	1 500 000	15 000 000
F	1.6	16	160	1600	16 000	160 000	1 600 000	-
G	1.8	18	180	1800	18 000	180 000	1 800 000	-
H	2	20	200	2000	20 000	200 000	2 000 000	-
J	2.2	22	220	2200	22 000	220 000	2 200 000	-
K	2.4	24	240	2400	24 000	240 000	2 400 000	-
L	2.7	27	270	2700	27 000	270 000	2 700 000	-
M	3	30	300	3000	30 000	300 000	3 000 000	-
N	3.3	33	330	3300	33 000	330 000	3 300 000	-
P	3.6	36	360	3600	36 000	360 000	3 600 000	-
Q	3.9	39	390	3900	39 000	390 000	3 900 000	-
R	4.3	43	430	4300	43 000	430 000	4 300 000	-
S	4.7	47	470	4700	47 000	470 000	4 700 000	-
T	5.1	51	510	5100	51 000	510 000	5 100 000	-
U	5.6	56	560	5600	56 000	560 000	5 600 000	-
V	6.2	62	620	6200	62 000	620 000	6 200 000	-
W	6.8	68	680	6800	68 000	680 000	6 800 000	-
X	7.5	75	750	7500	75 000	750 000	7 500 000	-
Y	8.2	82	820	8200	82 000	820 000	8 200 000	-
Z	9.1	91	910	9100	91 000	910 000	9 100 000	-
a	2.5	25	250	2500	25 000	250 000	2 500 000	-
b	3.5	35	350	3500	35 000	350 000	3 500 000	-
d	4	40	400	4000	40 000	400 000	4 000 000	-
e	4.5	45	450	4500	45 000	450 000	4 500 000	-
f	5	50	500	5000	50 000	500 000	5 000 000	-
m	6	60	600	6000	60 000	600 000	6 000 000	-
n	7	70	700	7000	70 000	700 000	7 000 000	-
t	8	80	800	8000	80 000	800 000	8 000 000	-
y	9	90	900	9000	90 000	900 000	9 000 000	-

Marking appears in laser-marked legible contrast. Illustrated is an example of E. I. A. marking VA1, which designates 10 pF capacitance. Chip marking is at customers option. If not specified "no mark" will be provided. Orientation of marking is vendor optional. Reference EIA 198.

E. I. A. MARKING OPTIONS	
	



Vishay Vitramon MLCC End Termination

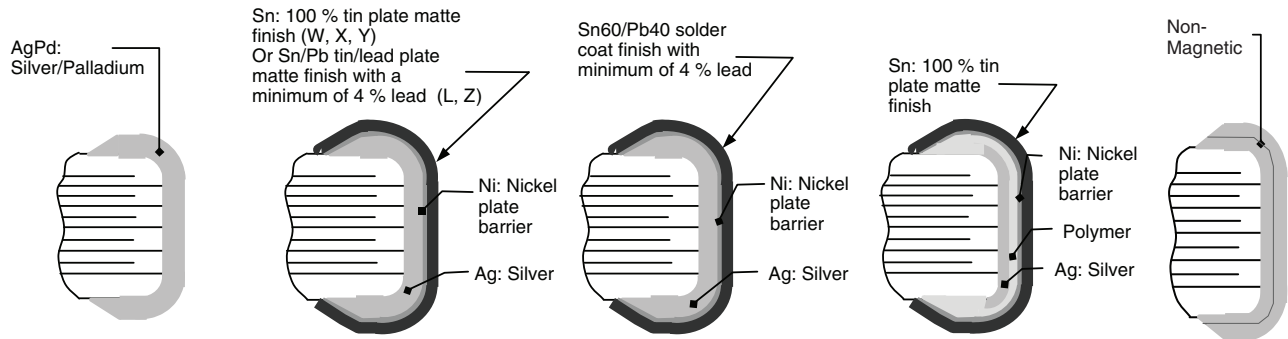


Figure 1:
Termination codes: F, M, E

Figure 2:
Termination codes: L, W, X, Y, Z

Figure 3:
CDR Termination code: U

Figure 4:
Termination code: B

Figure 5:
Termination code: N

TERMINATION CODE FROM PART NUMBERING	TERMINATION DEFINITION	ACCEPTED ASSEMBLY METHODS
F, M ⁽³⁾	Fired, thick film, silver/palladium	Conductive epoxy/reflow solder
E ⁽²⁾	Fired, thick film, silver/palladium	Conductive epoxy
N	Fired, thick film, non magnetic material	Conductive epoxy/reflow solder ⁽⁵⁾
W ⁽³⁾ , X, Y ⁽³⁾	Fired, thick film silver, covered by 100 % nickel barrier plate with an outer layer of 100 % tin plate matte finish for multi-solder mounting	Wave solder ⁽¹⁾ /reflow solder/vapor phase reflow
L, Z ⁽³⁾	Fired, thick film silver, cover by 100 % nickel barrier plate with an outer layer of tin/lead plate matte finish with a minimum of 4 % lead for multi-solder mounting	Wave solder ⁽¹⁾ /reflow solder/vapor phase reflow
U ⁽⁴⁾	Fired, thick film silver, cover by 100 % nickel barrier plate with an outer layer of tin/lead plate finish matte with a minimum of 4 % lead for Sn60/Pb40 solder coat	Wave solder ⁽¹⁾ /reflow solder/vapor phase reflow
B	Fired, thick film silver, cured thick film polymer silver, covered by 100 % nickel barrier plate with an outer layer of 100 % tin plate matte finish for multi-solder mounting	Wave solder ⁽¹⁾ /reflow solder/vapor phase reflow

Notes

- (1) Case sizes 1210 to 1812 with a thickness > 0.049" (1.24 mm) and case sizes 1825 and larger should NOT be wave solder.
- (2) Termination code "E" is for conductive epoxy assembly, contact mlcc@vishay.com for availability
- (3) CDR and DSCC part numbers only.
- (4) CDR "U" termination code: Base metallization-barrier metal-solder coated (tin/lead alloy, with a minimum of 4 % lead). Solder has a melting point of + 200 °C or less. Solder coat thickness is a minimum of 60".
 - Solder iron techniques are not recommended. For more information on soldering visit www.vishay.com/doc?45034
 - Contact mlcc@vishay.com with respect to specific part number requirements.
- (5) Non-magnetic terminations may exhibit high wetting angles and lower filled heights as compared to barrier plate terminations such as X-term.

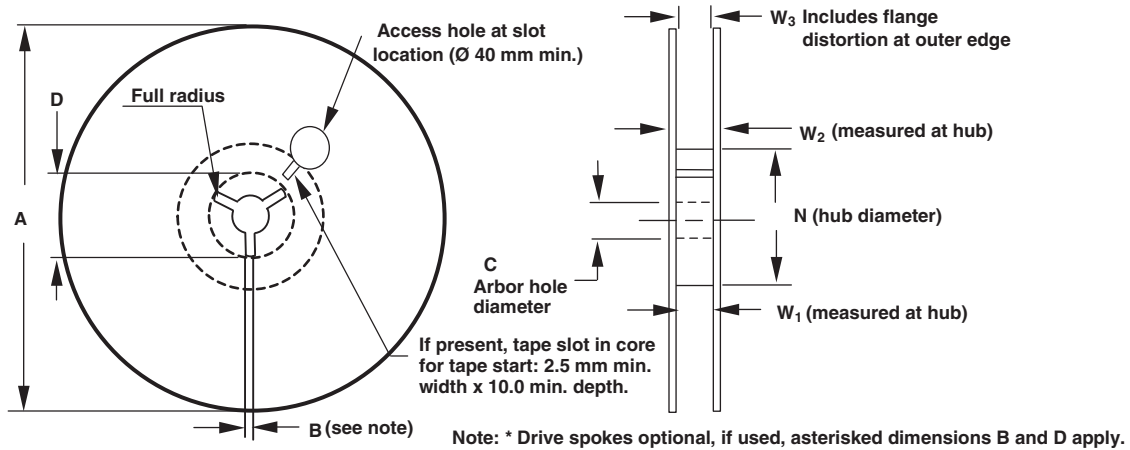
Vishay Vitramon MLCC End Termination

MLCC END TERMINATION PHYSICAL CHARACTERISTICS							
P/N TERM CODE	THICK FILM END TERMINATION		BARRIER TERMINATION	TERMINATION FINISH			
	MATERIAL	THICKNESS (inches)	Ni PLATE THICKNESS (microinches)	Sn PLATE THICKNESS (microinches)	Sn/Pb PLATE THICKNESS (microinches)	Sn/Pb SOLDER COAT THICKNESS (microinches)	CONTENT OF LEAD
F, M	Ag/Pd	0.001 min.	N/A	N/A	N/A	N/A	N/A
E	Ag/Pd	0.001 min.	N/A	N/A	N/A	N/A	N/A
N	Ag/Pd	0.0012 min.	N/A	N/A	N/A	N/A	N/A
W, X, Y	Ag	0.001 min.	50 min.	100 min.	N/A	N/A	N/A
L, Z	Ag	0.001 min.	50 min.	N/A	100 min.	N/A	4 % min.
U	Ag	0.001 min.	50 min.	N/A	N/A	60 min.	4 % min.
B	Polymer	0.003 min.	50 min.	100 min.	N/A	N/A	N/A

Notes

- Element definition: Ag = Silver, Pd = Palladium, Ni = Nickel, Sn = Tin, Pb = Lead
- N/A = Not applicable

Surface Mount Multilayer Ceramic Chip Capacitors



REEL DIMENSIONS in inches (millimeters)								
TAPE SIZE	A MAX.	B MIN.	C	D MIN.	N MIN.	W ₁	W ₂ MAX.	W ₃
8 mm	12.992 (330)	0.059 (1.5)	0.512 + 0.50 - 0.20	0.795 (20.2)	1.969 (50.0)	0.331 + 0.059/- 0.0 (8.4 + 1.5/- 0.0)	0.567 (14.4)	Shall accommodate tape width without interference
12 mm						0.488 + 0.079/- 0.0 (12.4 + 2.0/- 0.0)	0.724 (18.4)	
16 mm			(13.0 + 0.50 - 0.20)		2.401 (61.0)	0.646 + 0.079/- 0.0 (16.4 + 2.0/- 0.0)	0.882 (22.4)	

Notes

- (1) For reels less than 360 mm diameter (A), the most widely used reel diameters are 178 mm \pm 2 mm and 330 mm \pm 2 mm. Reel diameters ranging from 254 mm to 292 mm also exist. Commonly used hub diameters are 80 mm, 100 mm, 150 mm and 178 mm.
- (2) Tape with components must wrap around hub without damage.

STANDARD PACKAGING QUANTITIES (1)(2)(6)					
BODY SIZE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	
		PAPER TAPE PACKAGING CODE "C"/"O" (4)	PLASTIC TAPE PACKAGING CODE "T"/"E" (6)	PAPER TAPE PACKAGING CODE "P"/"I" (4)	PLASTIC TAPE PACKAGING CODE "R"/"M" (6)
0402 (3)	8 mm	5000/10 000	N/A	10 000/30 000	N/A
0603	8 mm	4000	4000	10 000	10 000
0805 (5)	8 mm	3000	3000	10 000	10 000
1206 (5)	8 mm	3000	3000/2500	10 000	10 000/9000
1210 (5)	8 mm	N/A	3000/2500/2000	N/A	10 000/9000
1808 (5)	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) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement" packaging quantities used unless specified in single data sheets
- (2) N/A = Not available, not supported anymore
- (3) Quantity can vary with customer request
- (4) Flamed paper tape code "O" (7" reel) and "I" (11 1/4"/13" reel) for AgPd terminated parts (termination code "F", "E" and size 0402/0603/0805)
- (5) Packaging code "C/P" or "T/R" and lower quantities can depend from product thickness
- (6) Packaging code "E" and "M" used in Automotive series (VJ..31/VJ..34) for size 0603/0805/1206/1210 where applicable.

EMBOSSED 8 mm, 12 mm AND 16 mm CARRIER TAPE

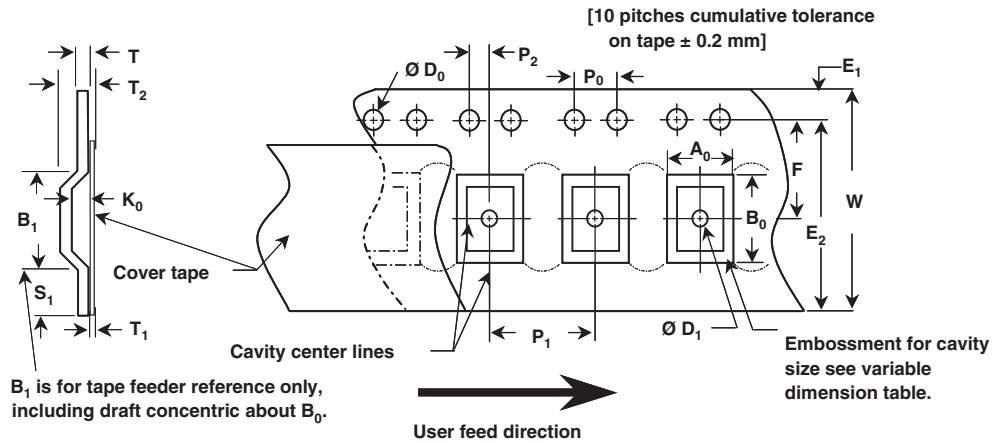


Figure 1

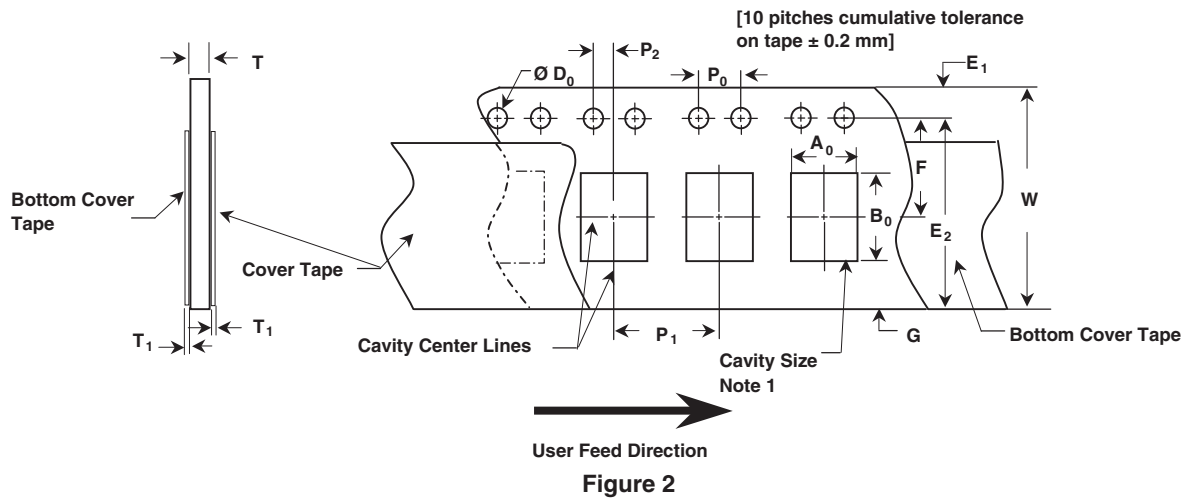
CONSTANT CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)							
TAPE SIZE	D ₀	E ₁	P ₀	P ₂	S ₁ MIN.	T MAX.	T ₁
8 mm and 12 mm	0.059 + 0.004/- 0.0 (1.50 + 0.10/- 0.0)	0.069 + 0.004 (1.75 ± 0.10)	0.175 + 0.004 (4.0 ± 0.10)	0.079 + 0.002 (2.0 ± 0.05)	0.024 (0.60)	0.024 (0.60)	0.004 (0.10) MAX.

VARIABLE CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)									
TAPE SIZE	B ₁ MAX.	D ₁ MIN.	E ₂ MIN.	F	P ₁	R MIN.	T ₂	W MAX.	A ₀ , B ₀ AND K ₀
8 mm 2 mm Pitch	0.171 (4.35)	0.177 (0.450)	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.79 ± 0.004 (2.00 ± 0.10)	0.984 (25.0)	0.098 (2.50) max.	0.327 (8.30)	see note 1
8 mm 4 mm Pitch	0.171 (4.35)	0.177 (0.450)	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.157 ± 0.004 (4.00 ± 0.10)	0.984 (25.0)	0.098 (2.50) max.	0.327 (8.30)	see note 1
12 mm 2 mm Pitch	0.323 (8.20)	0.059 (0.150)	0.404 (10.25)	0.217 ± 0.002 (5.50 ± 0.05)	0.157 ± 0.004 (4.00 ± 0.10)	1.181 (30.0)	0.256 (6.50) max.	0.484 (12.30)	see note 1
16 mm 4 mm Pitch	0.476 (12.1)	0.059 (0.150)	0.561 (14.25)	0.295 ± 0.004 (7.50 ± 0.1)	0.157 ± 0.004 (4.00 ± 0.10)	1.181 (30.0)	0.341 (8.0) max.	0.641 (16.3)	see note 1

Note

- (1) The cavity defined by A₀, B₀ and K₀ shall surround the component with sufficient clearance that:
- The component does not protrude above the top surface of the carrier tape.
 - The component can be removed from the cavity in a vertical direction without mechanical restriction, after the cover tape has been removed.
 - Rotation of the component is limited to 20° maximum for 8 mm and 12 mm tapes and 10° maximum for 16 mm figure 3 and 4.
 - Lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape and to 1.0 mm maximum for 16 mm wide tape figure 5.

PAPER 8 mm CARRIER TAPE



CONSTANT CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)							
TAPE SIZE	D ₀	E ₁	P ₀	P ₂	T ₁ MAX.	G MIN.	R REF.
8 mm	0.059 + 0.004/- 0.0 (1.50 + 0.10/- 0.0)	0.069 + 0.004 (1.75 ± 0.10)	0.175 + 0.004 (4.0 ± 0.10)	0.079 + 0.002 (2.0 ± 0.05)	0.024 (0.60)	0.029 (0.75)	0.010 (0.25)

VARIABLE CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)						
TAPE SIZE	E ₂ MIN.	F	P ₁	W MAX.	A ₀ , B ₀ AND K ₀	T
8 mm 2 mm Pitch	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.79 ± 0.004 (2.00 ± 0.10)	0.327 (8.30)	see note 1	1.1 mm maximum for paper base tape
8 mm 4 mm Pitch	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.157 ± 0.004 (4.00 ± 0.10)	0.327 (8.30)	see note 1	1.1 mm maximum for paper base tape

Note

- (1) The cavity defined by A₀, B₀ and K₀ shall surround the component with sufficient clearance that:
- a) The component does not protrude above the top surface of the carrier tape.
 - b) The component can be removed from the cavity in a vertical direction without mechanical restriction, after the cover tape has been removed.
 - c) Rotation of the component is limited to 20° maximum for 8 mm and 12 mm tapes and 10° maximum for 16 mm figure 3 and 4.
 - d) Lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12 mm wide tape and to 1.0 mm maximum for 16 mm wide tape figure 5.

MAXIMUM COMPONENT ROTATION FOR PUNCHED AND EMBOSSED CARRIER

Maximum Lateral Movement Carrier Top View

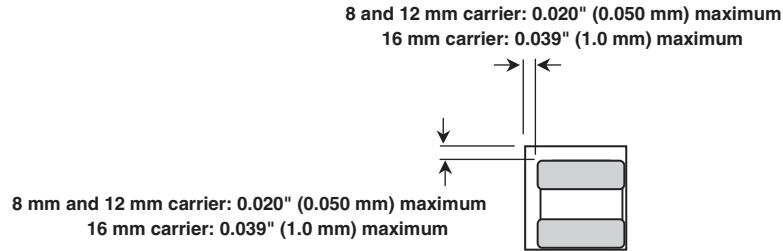
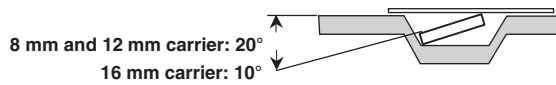


Figure 3

Maximum Component Rotation Embossed Carrier Side View



Maximum Component Rotation Paper Carrier Side View



Figure 4

MAXIMUM LATERAL MOVEMENT FOR PUNCHED AND EMBOSSED CARRIER

Maximum Component Rotation Top View

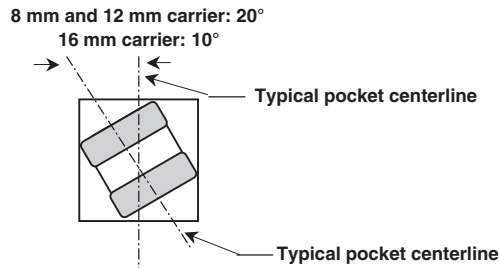


Figure 5

BENDING RADIUS FOR PUNCHED EMBOSSED CARRIER

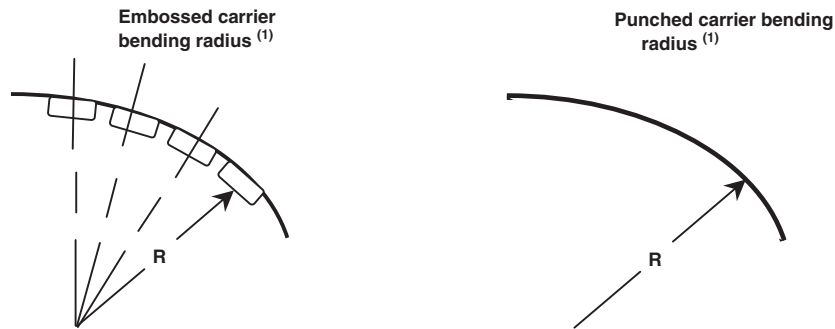


Figure 6

Note

(1) The tape with or without components shall pass without damage round "R", see dimensions table



Links and Promotional Information

Contents

Product Sheets	206
Technical Notes	206
Spice Model	206
Lead (Pb)-Free Information	206



PRODUCT SHEETS

COMMODITY APPLICATIONS:

VJ W1BC NP0 Dielectric:	www.vishay.com/doc?49256
VJ W1BC X5R Dielectric:	www.vishay.com/doc?49254
VJ W1BC X7R Dielectric:	www.vishay.com/doc?49253
VJ W1BC Y5V Dielectric:	www.vishay.com/doc?49255
VJ W1BC High Q:	www.vishay.com/doc?49751
VJ W1BC High Q/LOW ESR:	www.vishay.com/doc?49022
VJ.... W1BC Ultra Small Series :	www.vishay.com/doc?49706
VJ.... W1BC Chip Array:	www.vishay.com/doc?49714

HIGH VOLTAGE APPLICATIONS:

HVArc GUARD® :	www.vishay.com/doc?49667
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BOARDFLEX SENSITIVE APPLICATIONS:

VJ OMD Series:	www.vishay.com/doc?49614
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AUTOMOTIVE APPLICATIONS:

Automotive Instructional Guide:	www.vishay.com/doc?49794
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VISHAY BASIC COMMODITY SERIES:

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Soldering and Footprint:	www.vishay.com/doc?45017

VISHAY VITRAMON:

End Termination:	www.vishay.com/doc?45063
Soldering Recommendations:	www.vishay.com/doc?45034

HVArc GUARD®:

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Low-Power Voltage Multiplier Application:	www.vishay.com/doc?45058
Passive Snubber Application:	www.vishay.com/doc?45059
Light Ballast Application:	www.vishay.com/doc?45060

SPICE MODEL

Spice Model:	www.vishay.com/capacitors/mlcc-list/
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LEAD (Pb)-FREE INFORMATION

How to get Lead (Pb)-Free:	www.vishay.com/how/leadfree
Capacitor Lead (Pb)-Free Matrix:.....	www.vishay.com/docs/49322/capacito.xls



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Discrete Semiconductors and Passive Components

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