

Surface Mount Multilayer Ceramic Chip Capacitor Solutions for Boardflex Sensitive Applications



FEATURES

- Surface mountable. Precious metal technology, wet build process
- OMD-Cap (Open Mode Design) reduce the risk of shorts or low IR because of board flex cracks
- High frequency filtering for switching power supplies
- Available with 100 % voltage condition, process code "5H" is available for 630 V and lower. Contact mlcc.specials@vishay.com for higher voltages
- Available with polymer termination for increase resistance to board flex cracking
- Protective surface coating high voltage capacitors maybe required to prevent surface arcing.

**RoHS**
COMPLIANT

APPLICATIONS

- Input filter capacitors
- Output filter capacitors
- Snubber capacitors reduce MOSFET voltage spikes
- Lighting Ballasts

ELECTRICAL SPECIFICATIONS

Note: Electrical characteristics at + 25 °C unless otherwise stated.
Protective surface coating of high voltage capacitors maybe required to prevent surface arcing.

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

Capacitance Range: 10 pF to 47 nF

Voltage Rating: 50 Vdc to 3000 Vdc

Temperature Coefficient of Capacitance (TCC):

C0G: 0 ± 30 ppm/°C from - 55 °C to + 125 °C

Aging Rate: 0 % maximum per decade

Dissipation Factor:

0.1 % max. at 1.0 V_{rms} and 1 MHz for values ≤ 1000 pF

0.1 % max. at 1.0 V_{rms} and 1 kHz for values > 1000 pF

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 Withstanding Voltage (DWV):

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

≤ 200 Vdc: DWV at 250 % of rated voltage

500 Vdc: DWV at 200 % of rated voltage

630 Vdc: DWV at 150 % of rated voltage

1000 Vdc: DWV at 150 % of rated voltage

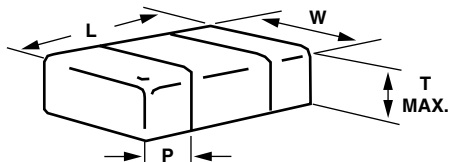
1500 Vdc: DWV at 120 % of rated voltage

2000 Vdc: DWV at 120 % of rated voltage

3000 Vdc: DWV at 120 % of rated voltage



DIMENSIONS in inches [millimeters]



PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
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]
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 ± 0.010 [4.57 ± 0.25]	0.080 ± 0.010 [2.03 ± 0.25]	0.086 [2.18]	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]
VJ1825	0.177 ± 0.010 [4.50 ± 0.25]	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]

ORDERING INFORMATION

VJ1206	A	101	J	X	B	A	T	## (2)
CASE SIZE	DIELECTRIC	CAPACITANCE CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING (1)	MARKING	PACKAGING	PROCESS CODE
1206 1210 1808 1812 1825 2220 2225	A = C0G (NP0)	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Example: 101 = 100 pF	F = ± 1 % G = ± 2 % H = ± 3 % J = ± 5 % K = ± 10 % M = ± 20 %	X = Ni barrier 100 % Tin plate matte finish F = AgPd B = Polymer 100 % Tinplate matte finish	A = 50 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" Reels R = 11 1/4" Reels B = Bulk W = Waffle tray	4X = OMD Cap 5H = OMD Cap 100 % Voltage condition

Notes:

(1) DC voltage rating should not be exceeded in application

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

- Polymer plus termination "B" termination part number code length dimensions positive tolerances (including bandwidth) above are allowed to increase by the following amounts.
1206 and smaller case sizes: Length 0.002" (0.05 mm)
1210 and larger case sizes: Length 0.004" (0.1 mm)

OMD - C0G (NP0) CAPACITANCE RANGE																												
EIA CODE		VJ1206 ⁽¹⁾							VJ1210 ⁽¹⁾							VJ1808 ⁽¹⁾												
VOLTAGE (Vdc)		50	100	200	500	630	1000	1500	50	100	200	500	630	1000	1500	2000	50	100	200	500	630	1000	1500	2000	3000			
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	1000 pF	•	•	•	•	•			•	•	•	•					•	•	•	•	•	•	•					
122	1200 pF	•	•	•					•	•	•	•					•	•	•	•								
152	1500 pF	•	•	•					•	•	•						•	•	•	•								
182	1800 pF	•	•	•					•	•	•						•	•	•									
222	2200 pF	•	•	•					•	•	•						•	•	•									
272	2700 pF	•	•						•	•	•						•	•	•									
332	3300 pF	•	•						•	•	•						•	•	•									
392	3900 pF	•							•	•	•						•	•	•									
472	4700 pF	•							•	•	•						•	•	•									
562	5600 pF								•								•	•	•									
682	6800 pF								•								•	•										
822	8200 pF								•								•											
103	0.010 μF																											
123	0.012 μF																											
153	0.015 μF																											
183	0.018 μF																											
223	0.022 μF																											
273	0.027 μF																											
333	0.033 μF																											
393	0.039 μF																											
473	0.047 μF																											
563	0.056 μF																											
683	0.068 μF																											
823	0.082 μF																											
104	0.1 μF																											

Note:

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

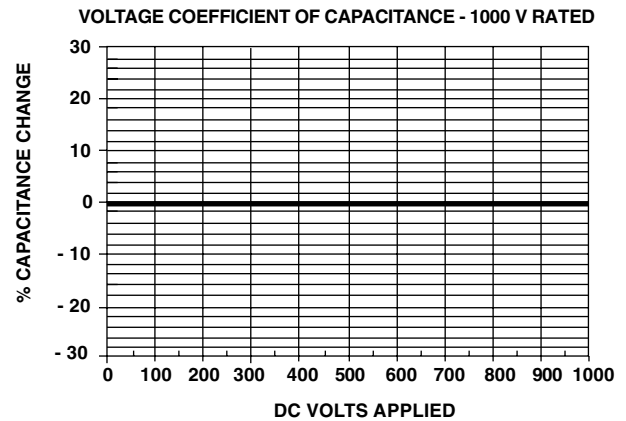
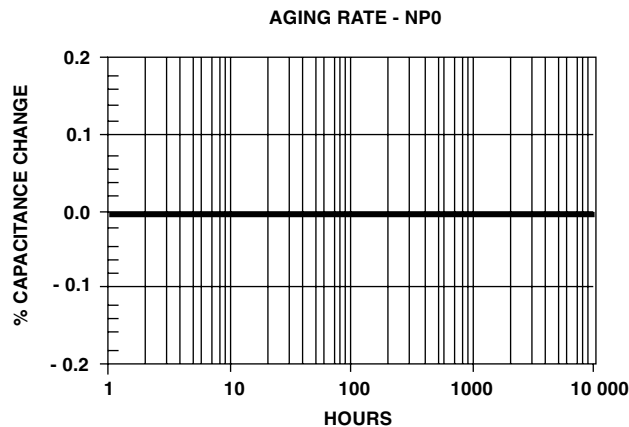
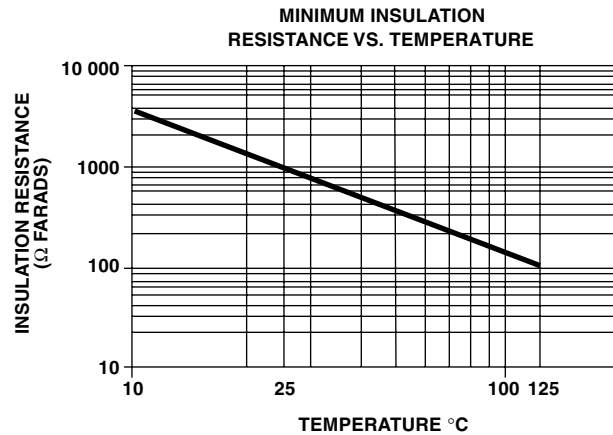
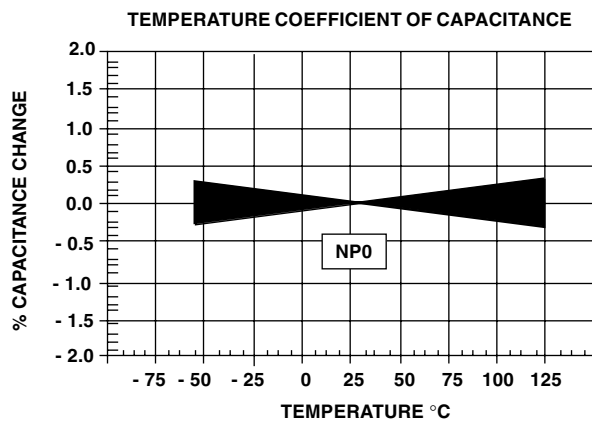


OMD - C0G (NP0) CAPACITANCE RANGE																												
EIA CODE		VJ1812 ⁽¹⁾									VJ1825 ⁽¹⁾						VJ2220 ⁽¹⁾						VJ2225 ⁽¹⁾					
VOLTAGE (VDC)		50	100	200	500	630	1000	1500	2000	3000	50	100	200	500	630	1000	50	100	200	500	630	1000	50	100	200	500	630	1000
CAP. CODE	CAP.																											
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	1000 pF	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
122	1200 pF	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
152	1500 pF	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
182	1800 pF	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
222	2200 pF	•	•	•	•	•	•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
272	2700 pF	•	•	•	•						•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
332	3300 pF	•	•	•	•						•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
392	3900 pF	•	•	•	•						•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
472	4700 pF	•	•	•							•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
562	5600 pF	•	•	•							•	•	•	•			•	•	•				•	•	•	•		
682	6800 pF	•	•	•							•	•	•	•			•	•	•				•	•	•	•		
822	8200 pF	•	•	•							•	•	•	•			•	•	•				•	•	•	•		
103	0.010 μF	•	•	•							•	•	•				•	•	•				•	•	•	•		
123	0.012 μF	•	•								•	•	•				•	•	•				•	•	•	•		
153	0.015 μF	•									•	•	•				•	•					•	•	•			
183	0.018 μF	•									•	•	•				•	•					•	•	•			
223	0.022 μF										•	•	•				•	•					•	•	•			
273	0.027 μF										•	•					•	•					•	•	•			
333	0.033 μF										•						•						•	•	•			
393	0.039 μF																•						•	•				
473	0.047 μF																						•					
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104	0.1 μF																											

Note:

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

OMD - C0G (NP0) CAPACITORS - TYPICAL PARAMETERS





BOARDFLEX SENSITIVE APPLICATIONS - SOLUTION:

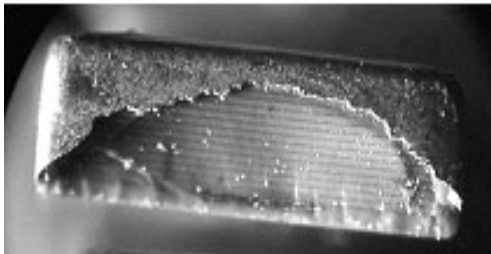
A predominant failure mode in multilayer ceramic chip capacitors is cracking caused by board flexure. Cracks can then create a path for current to pass from one electrode through the dielectric to an opposing electrode or from the terminations at one end of the MLCC through the dielectric to an opposing 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.

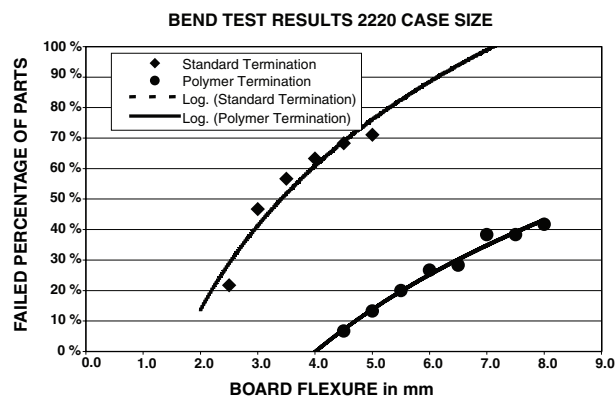
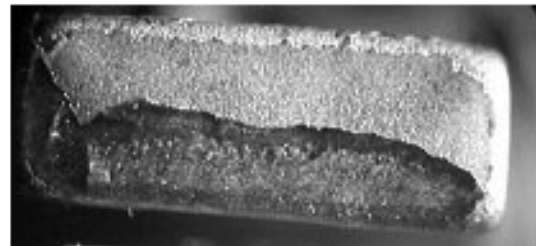
STANDARD TERMINATION

Exposed Electrodes = Electrical short



OMD CAP PLUS POLYMER TERMINATION

No Exposed Electrodes = No Electrical short



STANDARD PACKAGING QUANTITIES ⁽¹⁾⁽²⁾⁽³⁾							
		7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES		BULK QUANTITIES	
BODY SIZE	TAPE SIZE	PAPER TAPE PACKAGING CODE "C"	PLASTIC TAPE PACKAGING CODE "T"	PAPER TAPE PACKAGING CODE "P"	PLASTIC TAPE PACKAGING CODE "R"	VIAL PACKAGING CODE "B"	WAFFLE PACKAGING CODE "W"
1206	8 mm	N/a	3000	N/a	10 000	5000	N/a
1210	8 mm	N/a	3000	N/a	10 000	5000	N/a
1808	12 mm	N/a	3000	N/a	10 000	1000	N/a
1812	12 mm	N/a	1000	N/a	5000	1000	N/a
1825	12 mm	N/a	1000	N/a	5000	1000	1000
2220	12 mm	N/a	1000	N/a	5000	N/a	1000
2225	12 mm	N/a	1000	N/a	5000	N/a	1000

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



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