

Surface Mount Multilayer Ceramic Chip Capacitors

DSCC Qualified Type 05007



FEATURES

- US defense supply center approved
- Federal stock control number, CAGE CODE 2770A
- 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



Available
RoHS*
Available
**HALOGEN
FREE**

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

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: 1.0 pF to 6.8 nF

BR: 820 pF to 560 nF

BX: 820 pF to 470 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

QUICK REFERENCE DATA

DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
BP	1206	200	1.0 pF	6.8 nF
BR	1206	100	820 pF	470 nF
BX	1206	100	820 pF	470 nF

Note

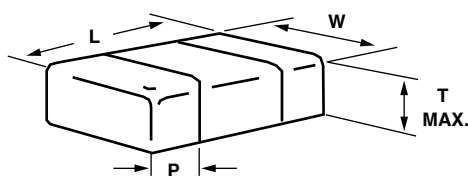
- Detail ratings see "Selection Chart"

ORDERING INFORMATION

05007- DSCC NUMBER	BP DIELECTRIC	101 CAPACITANCE NOMINAL CODE	B DC VOLTAGE RATING ⁽¹⁾	J CAPACITANCE TOLERANCE	Z TERMINATION	- GROUP TESTING OPTION ⁽²⁾	T PACKAGING
Case code 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, K, M ≥ 10 pF (BP) J, K, M (BR, BX)	M = silver palladium Z = Ni barrier with tin / lead plate min. 4 % lead U = Ni barrier solder coated (min. of 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 J = 7" reel (low quantity) R = 11 1/4" reel / plastic tape B = bulk

Notes

- DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: mlcc@vishay.com
- To receive data package, add "P" to the end of the part number. For example, 05007-BP101BJZCTP. Group C will be completed and data included with shipment.

DIMENSIONS in inches (millimeters)


PART ORDERING NUMBER	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
				MINIMUM	MAXIMUM
05007-	0.125 \pm 0.008 (3.18 \pm 0.20)	0.062 \pm 0.008 (1.57 \pm 0.20)	0.059 (1.50)	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														
CASE 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.															
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						•	•	•	•	•	•	•	•	•	+

Notes

• RoHS-compliant except when supplied with lead (Pb)-containing terminations, codes "Z" and "U"

• Not RoHS-compliant

+ Use MIL-PRF-55681 (CDR) instead, part numbers removed from DSCC listing



SELECTION CHART																
DIELECTRIC		BP					BR					BX				
STYLE		05007														
CASE 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 ⁽¹⁾						•	•	•			•	•			
394	390 nF ⁽¹⁾						•	•				•	•			
474	470 nF ⁽¹⁾						•	•				•	•			
564	560 nF															
684	680 nF															
824	820 nF															
105	1.0 μF															

Notes

RoHS-compliant except when supplied with lead (Pb)-containing terminations, codes "Z" and "U"

Not RoHS-compliant

+ Use MIL-PRF-55681 (CDR) instead, part numbers removed from DSCC listing

⁽¹⁾ These part numbers exceed maximum dimensions established by MIL spec.

For these values, the maximum length is 3.45 mm and maximum thickness is 1.55 mm

DSCC PACKAGING QUANTITIES ⁽¹⁾					
CASE CODE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	
		PACKAGING CODE		PACKAGING CODE	
		"T"	"J"	"R"	"B"
1206 ⁽²⁾	8 mm	3000 / 2500	1000	10 000 / 9000	100

Notes

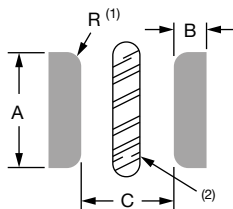
⁽¹⁾ Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"

⁽²⁾ Packaging quantities can depend from product thickness

STORAGE AND HANDLING CONDITIONS
(1) Store the components at 5 °C to +40 °C ambient temperature and ≤ 70 % relative humidity conditions.
(2) The product is recommended to be used within a time-frame of 2 years after shipment. Check solderability in case extended shelf life beyond the expiry date is needed.
Precautions:
a. Do not store products in an environment containing corrosive elements, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. This may cause corrosion or oxidization of the terminations, which can easily lead to poor soldering.
b. Store products on the shelf and avoid exposure to moisture or dust.
c. Do not expose products to excessive shock, vibration, direct sunlight and so on.

Solder Pad Dimensions for Vishay Surface-Mount Multilayer Ceramic Chip Capacitors

DIMENSIONS in millimeters



CASE CODE	A	B	C
0402	0.50	0.50	0.40
0505	1.35	1.00	0.60
0603	0.90	1.00	1.00 ⁽³⁾
0805	1.30	1.20	1.00
1111	2.90	1.30	1.75
1206	1.80	1.20	2.10
1210	2.80	1.30	1.90
1808	2.40	1.50	3.00
1812	3.60	1.50	3.00
1825	6.50	1.50	3.00
2008	2.70	1.50	4.08
2220	5.50 ⁽⁴⁾	1.50	4.20
2225	6.50	1.50	4.20
2525	6.60	1.50	4.50
3040	10.80	2.00	5.50
3640	10.80	2.00	7.00
3838	10.20	2.00	7.50
4044	12.30	2.00	8.00

Notes

- ⁽¹⁾ For safety capacitors and voltages above 3000 V, corner rounding (R) of 0.5 mm is recommended to suppress arcing
- ⁽²⁾ Add a 1 mm slot in PCB between pads to allow cleaning and coating under MLCC
- ⁽³⁾ For VJ HiFREQ Series, this dimension is 0.6 mm
- ⁽⁴⁾ For safety capacitors, the A dimension should be 5.80 mm



PRINTED CIRCUIT BOARD PCB DESIGN CONSIDERATIONS FOR HIGH VOLTAGE SURFACE-MOUNT MLCCS

Special assembly process and design considerations should be employed for today's high voltage rating MLCCs. As case sizes remain the same and voltage ratings increase, MLCC manufacturers must design, evaluate, and qualify their capacitors using methods that reduce the occurrence of corona discharge and arcover events. To meet similar capability in high voltage applications, users should employ similar cautionary design and assembly methods.

MLCC PAD LAYOUT

A capacitor's arcover inception point can degrade due to factors such as the MLCC termination, PCB pad design, PCB cleanliness, solder flux residue, surface contamination / deposits and environmental conditions. PCB pads and their design affect the air gap distance between the opposing polarities of the MLCC termination. For voltage rating greater than 1500 V_{DC} add a corner radius to the inward facing edge of the MLCC pads and as large a gap as possible between the pads. Too small of a pad gap distance will reduce the capacitor's own arcover inception voltage level. Refer to the Figure and Table Figure 1.0, MLCC Pad Layout and Table 1.0, Vishay MLCC Solder Pad Dimensions for the recommended MLCC solder pad dimensions.

SLOT OR TRENCH BETWEEN PADS

PCB assembly can deposit dust, trap solder balls, or flux residue underneath the capacitors. These contaminants will reduce conductive clearances and the arcover inception level. Assembly methods must include a final PCB cleaning process. A slot or trench can be cut into the PCB in between the pads to allow cleaners to penetrate underneath the MLCC. The slot will also allow conformal or epoxy coatings to flow underneath the MLCC and build an insulative barrier between pads. Refer to Figure 1.0 MLCC Pad Layout for slot reference location.

COATING PRINTED CIRCUIT BOARD

Coating a printed circuit board with materials such as acrylic, silicone and urethane resins provide a protective dielectric barrier that is non-conductive and will enhance the resistance to arcing. Various processes exist which include dipping, brushing, and spraying. Optimal performance will come from coating the MLCC on all sides, top and bottom. The PCB slot in between the pads should extend slightly beyond the width of the MLCC. Refer to Figure 1.0 MLCC Pad Layout for slot reference location.



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