Surface Mount Multilayer Ceramic Chip Capacitors MIL Qualified, Type CDR

FEATURES

- Military qualified products
- Federal stock control number, CAGE CODE 2770A
- High reliability tested per MIL-PRF-55681
- Tin / lead termination codes “W”, “Z”, and “U”
- Lead (Pb)-free termination codes “Y” and “M”
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

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

BR: ± 15 % from -55 °C to +125 °C, with 0 V_{DC} applied
+15 %, -40 % -55 °C to +125 °C, with 100 % rated V_{DC} applied

Dissipation Factor (DF):

BP: 0.15 % maximum
BX: 2.50 % maximum
BR:≤ 25 V: 3.5 % maximum
> 25 V: 2.5 % maximum
Test frequency:
1 MHz ± 50 kHz for BP capacitors ≤ 1000 pF and for BX capacitors < 100 pF
All other BP, BX, and BR at 1 kHz ± 50 Hz

Aging Rate:

BP: 0 % maximum per decade
BX, BR: 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

For technical questions, contact: mlcc@vishay.com
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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	CDR35 (1825)	100	56 nF	470 nF
BP	CDR36 (0603)	100	51 pF	1000 pF
BX	CDR36 (0603)	100	100 pF	56 nF
BR	CDR36 (0603)	100	100 pF	56 nF
BP	CDR37 (0402)	100	22 pF	150 pF
BX	CDR37 (0402)	50	100 pF	8.2 nF
BR	CDR37 (0402)	50	100 pF	10 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 CDR36 CDR37	BP BR BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples: 102 = 1000 pF 1R8 = 1.8 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 %	M = silver palladium (3) Y = Ni barrier with 100 % tin W, Z = Ni barrier with tin / lead plate min. 4 % lead U = Ni barrier solder coated (min. of 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 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) M termination not available for CDR36 and CDR37 parts

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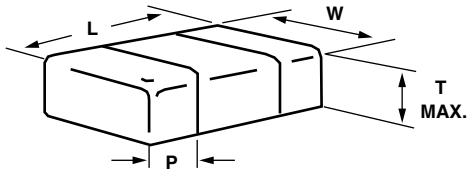
DIMENSIONS in inches (millimeters)



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 (0.75)
	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 (0.75)
	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 (0.75)
	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 (0.75)
/3	CDR06	0.225 ± 0.020 (5.72 ± 0.51)	0.250 ± 0.020 (6.35 ± 0.51)	0.080 (2.03)	0.010 (0.25)	0.030 (0.75)
/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)	0.049 (1.25)	0.010 (0.25)	0.030 (0.75)
/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 (0.75)
/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)
/12	CDR36	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)
/13	CDR37	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)

SELECTION CHART

DIELECTRIC		BP				
STYLE		CDR37				
SLASH SHEET		/13				
CASE CODE		0402				
VOLTAGE (V_{DC})		10	16	25	50	100
VOLTAGE CODE		X	Y	Z	A	B
CAP. CODE	CAPACITANCE					
220	22	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
240	24	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
270	27	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
300	30	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
330	33	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
360	36	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
390	39	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
430	43	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
470	47	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
510	51	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
560	56	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
620	62	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
680	68	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
750	75	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
820	82	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
910	91	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
101	100	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
121	120	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
151	150	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)

Notes

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

Not RoHS-compliant

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SELECTION CHART

DIELECTRIC		BR					BX				
STYLE		CDR37					CDR37				
SLASH SHEET		/13					/13				
CASE CODE		0402					0402				
VOLTAGE (V_{DC})		6.3	10	16	25	50	6.3	10	16	25	50
VOLTAGE CODE		W	X	Y	Z	A	W	X	Y	Z	A
CAP. CODE	CAP.										
101	100	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
121	120	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
151	150	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
181	180	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
221	220	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
271	270	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
331	330	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
391	390	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
471	470	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
561	560	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
681	680	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
821	820	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
102	1000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
122	1200	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
152	1500	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
182	1800	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
222	2200	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
272	2700	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
332	3300	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
392	3900	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
472	4700	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)		
562	5600	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)		
682	6800	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)		
822	8200	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)		
103	10 000	• (J, K, M)	• (J, K, M)	• (J, K, M)							

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SELECTION CHART						
DIELECTRIC		BP				
STYLE		CDR36				
SLASH SHEET		/12				
CASE CODE		0603				
VOLTAGE (V_{DC})		10	16	25	50	100
VOLTAGE CODE		X	Y	Z	A	B
CAP. CODE	CAPACITANCE					
510	51	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
560	56	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
620	62	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
680	68	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
750	75	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
820	82	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
910	91	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
101	100	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
121	120	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
151	150	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
181	180	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
221	220	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
271	270	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
331	330	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)
391	390	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	
471	470	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	
561	560	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	
681	680	• (F, G, J)	• (F, G, J)	• (F, G, J)	• (F, G, J)	
821	820	• (F, G, J)	• (F, G, J)	• (F, G, J)		
102	1000	• (F, G, J)	• (F, G, J)	• (F, G, J)		

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SELECTION CHART

DIELECTRIC		BR						BX					
STYLE		CDR36						CDR36					
SLASH SHEET		/12						/12					
CASE CODE		0603						0603					
VOLTAGE (V_{DC})		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
CAP. CODE	CAP.												
101	100	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
121	120	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
151	150	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
181	180	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
221	220	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
271	270	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
331	330	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
391	390	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
471	470	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
561	560	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
681	680	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
821	820	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
102	1000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
122	1200	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
152	1500	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
182	1800	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
222	2200	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
272	2700	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)
332	3300	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
392	3900	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
472	4700	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
562	5600	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
682	6800	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
822	8200	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
103	10 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	
123	12 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		
153	15 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		
183	18 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		
223	22 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		
273	27 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)		
333	33 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)			
393	39 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)			
473	47 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)			
563	56 000	• (J, K, M)	• (J, K, M)	• (J, K, M)	• (J, K, M)			• (J, K, M)	• (J, K, M)	• (J, K, M)			
683	68 000												
823	82 000												
104	100 000												

Notes

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SELECTION CHART				
DIELECTRIC		BP		
STYLE		CDR31	CDR01	CDR31
SLASH SHEET		/7	/1	/7
CASE CODE		0805	0805	0805
VOLTAGE (V_{DC})		50	100	100
VOLTAGE CODE		A	B	B
CAP. CODE	CAPACITANCE			
1R0	1			• (C)
1R1	1.1			• (C)
1R2	1.2			• (C)
1R3	1.3			• (C)
1R5	1.5			• (C)
1R6	1.6			• (C)
1R8	1.8			• (C)
2R0	2			• (C)
2R2	2.2			• (C)
2R4	2.4			• (C)
2R7	2.7			• (C, D)
3R0	3			• (C, D)
3R3	3.3			• (C, D)
3R6	3.6			• (C, D)
3R9	3.9			• (C, D)
4R3	4.3			• (C, D)
4R7	4.7			• (C, D)
5R1	5.1			• (C, D)
5R6	5.6			• (C, D)
6R2	6.2			• (C, D)
6R8	6.8			• (C, D)
7R5	7.5			• (C, D)
8R2	8.2			• (C, D)
9R1	9.1			• (C, D)
100	10		• (J, K)	• (F, J, K)
110	11			• (F, J, K)
120	12		• (J)	• (F, J, K)
130	13			• (F, J, K)
150	15		• (J, K)	• (F, J, K)
160	16			• (F, J, K)
180	18		• (J)	• (F, J, K)
200	20			• (F, J, K)
220	22		• (J, K)	• (F, J, K)
240	24			• (F, J, K)
270	27		• (J)	• (F, J, K)
300	30			• (F, J, K)
330	33		• (J, K)	• (F, J, K)
360	36			• (F, J, K)
390	39		• (J)	• (F, J, K)
430	43			• (F, J, K)
470	47		• (J, K)	• (F, J, K)
510	51			• (F, J, K)
560	56		• (J)	• (F, J, K)
620	62			• (F, J, K)
680	68		• (J, K)	• (F, J, K)
750	75			• (F, J, K)
820	82		• (J)	• (F, J, K)
910	91			• (F, J, K)

Notes

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SELECTION CHART				
DIELECTRIC		BP		
STYLE		CDR31	CDR01	CDR31
SLASH SHEET		/7	/1	/7
CASE CODE		0805	0805	0805
VOLTAGE (V_{DC})		50	100	100
VOLTAGE CODE		A	B	B
CAP. CODE	CAPACITANCE			
101	100		• (J, K)	• (F, J, K)
111	110			• (F, J, K)
121	120		• (J, K)	• (F, J, K)
131	130			• (F, J, K)
151	150		• (J, K)	• (F, J, K)
161	160			• (F, J, K)
181	180		• (J, K)	• (F, J, K)
201	200			• (F, J, K)
221	220			• (F, J, K)
241	240			• (F, J, K)
271	270			• (F, J, K)
301	300			• (F, J, K)
331	330			• (F, J, K)
361	360			• (F, J, K)
391	390			• (F, J, K)
431	430			• (F, J, K)
471	470			• (F, J, K)
511	510	• (F, J, K)		
561	560	• (F, J, K)		
621	620	• (F, J, K)		
681	680	• (F, J, K)		

Notes

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SELECTION CHART					
DIELECTRIC		BX			
STYLE		CDR01	CDR31	CDR01	CDR31
SLASH SHEET		/1	/7	/1	/7
CASE CODE		0805	0805	0805	0805
VOLTAGE (V_{DC})		50	50	100	100
VOLTAGE CODE		A	A	B	B
CAP. CODE	CAPACITANCE				
121	120			• (J, K)	
151	150			• (J, K)	
181	180			• (J, K)	
221	220			• (K, M)	
271	270			• (K)	
331	330			• (K, M)	
391	390			• (K)	
471	470			• (K, M)	• (K, M)
561	560			• (K)	• (K, M)
681	680			• (K, M)	• (K, M)
821	820			• (K)	• (K, M)
102	1000			• (K, M)	• (K, M)
122	1200			• (K)	• (K, M)
152	1500			• (K, M)	• (K, M)

Notes

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SELECTION CHART					
DIELECTRIC		BX			
STYLE		CDR01	CDR31	CDR01	CDR31
SLASH SHEET		/1	/7	/1	/7
CASE CODE		0805	0805	0805	0805
VOLTAGE (V_{DC})		50	50	100	100
VOLTAGE CODE		A	A	B	B
CAP. CODE	CAPACITANCE				
182	1800			• (K)	• (K, M)
222	2200			• (K, M)	• (K, M)
272	2700			• (K)	• (K, M)
332	3300			• (K, M)	• (K, M)
392	3900	• (K)			• (K, M)
472	4700	• (K, M)			• (K, M)
562	5600		• (K, M)		
682	6800		• (K, M)		
822	8200		• (K, M)		
103	10 000		• (K, M)		
123	12 000		• (K, M)		
153	15 000		• (K, M)		
183	18 000		• (K, M)		

Notes

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SELECTION CHART			
DIELECTRIC		BP	
STYLE		CDR32	
SLASH SHEET		/8	
CASE CODE		1206	
VOLTAGE (V_{DC})		50	100
VOLTAGE CODE		A	B
CAP. CODE	CAPACITANCE		
1R0	1		• (C)
1R1	1.1		• (C)
1R2	1.2		• (C)
1R3	1.3		• (C)
1R5	1.5		• (C)
1R6	1.6		• (C)
1R8	1.8		• (C)
2R0	2		• (C)
2R2	2.2		• (C)
2R4	2.4		• (C)
2R7	2.7		• (C, D)
3R0	3		• (C, D)
3R3	3.3		• (C, D)
3R6	3.6		• (C, D)
3R9	3.9		• (C, D)
4R3	4.3		• (C, D)
4R7	4.7		• (C, D)
5R1	5.1		• (C, D)
5R6	5.6		• (C, D)
6R2	6.2		• (C, D)
6R8	6.8		• (C, D)
7R5	7.5		• (C, D)

Notes

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SELECTION CHART			
DIELECTRIC		BP	
STYLE		CDR32	
SLASH SHEET		/8	
CASE CODE		1206	
VOLTAGE (V_{DC})		50	100
VOLTAGE CODE		A	B
CAP. CODE	CAPACITANCE		
8R2	8.2		• (C, D)
9R1	9.1		• (C, D)
100	10		• (F, J, K)
110	11		• (F, J, K)
120	12		• (F, J, K)
150	15		• (F, J, K)
160	16		• (F, J, K)
180	18		• (F, J, K)
200	20		• (F, J, K)
220	22		• (F, J, K)
240	24		• (F, J, K)
270	27		• (F, J, K)
300	30		• (F, J, K)
330	33		• (F, J, K)
360	36		• (F, J, K)
390	39		• (F, J, K)
430	43		• (F, J, K)
470	47		• (F, J, K)
510	51		• (F, J, K)
560	56		• (F, J, K)
620	62		• (F, J, K)
680	68		• (F, J, K)
750	75		• (F, J, K)
820	82		• (F, J, K)
910	91		• (F, J, K)
101	100		• (F, J, K)
111	110		• (F, J, K)
121	120		• (F, J, K)
131	130		• (F, J, K)
151	150		• (F, J, K)
161	160		• (F, J, K)
181	180		• (F, J, K)
201	200		• (F, J, K)
221	220		• (F, J, K)
241	240		• (F, J, K)
271	270		• (F, J, K)
301	300		• (F, J, K)
331	330		• (F, J, K)
361	360		• (F, J, K)
391	390		• (F, J, K)
431	430		• (F, J, K)
471	470		• (F, J, K)
511	510		• (F, J, K)
561	560		• (F, J, K)
621	620		• (F, J, K)
681	680		• (F, J, K)
751	750		• (F, J, K)
821	820		• (F, J, K)
911	910		• (F, J, K)
102	1000		• (F, J, K)

Notes

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SELECTION CHART			
DIELECTRIC		BP	
STYLE		CDR32	
SLASH SHEET		/8	
CASE CODE		1206	
VOLTAGE (V_{DC})		50	100
VOLTAGE CODE		A	B
CAP. CODE	CAPACITANCE		
112	1100	• (F, J, K)	
122	1200	• (F, J, K)	
132	1300	• (F, J, K)	
152	1500	• (F, J, K)	
162	1600	• (F, J, K)	
182	1800	• (F, J, K)	
202	2000	• (F, J, K)	
222	2200	• (F, J, K)	

Notes

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Not RoHS-compliant

SELECTION CHART			
DIELECTRIC		BX	
STYLE		CDR32	
SLASH SHEET		/8	
CASE CODE		1206	
VOLTAGE (V_{DC})		50	100
VOLTAGE CODE		A	B
CAP. CODE	CAPACITANCE		
472	4700		• (K, M)
562	5600		• (K, M)
682	6800		• (K, M)
822	8200		• (K, M)
103	10 000		• (K, M)
123	12 000		• (K, M)
153	15 000		• (K, M)
183	18 000	• (K, M)	
223	22 000	• (K, M)	
273	27 000	• (K, M)	
333	33 000	• (K, M)	
393	39 000	• (K, M)	

Notes

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SELECTION CHART			
DIELECTRIC		BP	
STYLE		CDR33	
SLASH SHEET		/9	
CASE CODE		1210	
VOLTAGE (V_{DC})		50	100
VOLTAGE CODE		A	B
CAP. CODE	CAPACITANCE		
102	1000		• (F, J, K)
112	1100		• (F, J, K)
122	1200		• (F, J, K)
132	1300		• (F, J, K)
152	1500		• (F, J, K)
162	1600		• (F, J, K)
182	1800		• (F, J, K)
202	2000		• (F, J, K)
222	2200		• (F, J, K)
242	2400	• (F, J, K)	
272	2700	• (F, J, K)	
302	3000	• (F, J, K)	
332	3300	• (F, J, K)	

Notes

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

Not RoHS-compliant

SELECTION CHART			
DIELECTRIC		BX	
STYLE		CDR33	
SLASH SHEET		/9	
CASE CODE		1210	
VOLTAGE (V_{DC})		50	100
VOLTAGE CODE		A	B
CAP. CODE	CAPACITANCE		
153	15 000		• (K, M)
183	18 000		• (K, M)
223	22 000		• (K, M)
273	27 000		• (K, M)
333	33 000		
393	39 000	• (K, M)	
473	47 000	• (K, M)	
563	56 000	• (K, M)	
683	68 000	• (K, M)	
823	82 000	• (K, M)	
104	100 000	• (K, M)	

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SELECTION CHART								
DIELECTRIC		BP			BX			
STYLE		CDR34	CDR04	CDR34	CDR04	CDR34	CDR04	CDR34
SLASH SHEET		/10	/1	/10	/1	/10	/1	/10
CASE CODE		1812	1812	1812	1812	1812	1812	1812
VOLTAGE (V_{DC})		50	100	100	50	50	100	100
VOLTAGE CODE		A	B	B	A	A	B	B
CAP. CODE	CAPACITANCE							
122	1200		• (J)					
152	1500		• (J, K)					
182	1800		• (J)					
222	2200		• (J, K)	• (F, J, K)				
242	2400			• (F, J, K)				
272	2700		• (J)	• (F, J, K)				
302	3000			• (F, J, K)				
332	3300		• (J, K)	• (F, J, K)				
362	3600			• (F, J, K)				
392	3900			• (F, J, K)				
432	4300			• (F, J, K)				
472	4700			• (F, J, K)				
512	5100	• (F, J, K)						
562	5600	• (F, J, K)						
622	6200	• (F, J, K)						
682	6800	• (F, J, K)						
752	7500	• (F, J, K)						
822	8200	• (F, J, K)						
912	9100	• (F, J, K)						
103	10 000	• (F, J, K)						
113	11 000							
123	12 000							
133	13 000							
153	15 000							
163	16 000							
183	18 000							
203	20 000							
223	22 000							
273	27 000							• (K, M)
333	33 000							• (K, M)
393	39 000						• (K)	• (K, M)
473	47 000						• (K, M)	• (K, M)
563	56 000						• (K)	• (K, M)
683	68 000							
823	82 000				• (K)			
104	100 000				• (K, M)	• (K, M)		
124	120 000				• (K)	• (K, M)		
154	150 000				• (K, M)	• (K, M)		
184	180 000				• (K)	• (K, M)		
224	220 000							
274	270 000							
334	330 000							
394	390 000							
474	470 000							

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SELECTION CHART					
DIELECTRIC		BP		BX	
STYLE		CDR35		CDR35	
SLASH SHEET		/11		/11	
CASE CODE		1825		1825	
VOLTAGE (V_{DC})		50	100	50	100
VOLTAGE CODE		A	B	A	B
CAP. CODE	CAPACITANCE				
472	4700		• (F, J, K)		
512	5100		• (F, J, K)		
562	5600		• (F, J, K)		
622	6200		• (F, J, K)		
682	6800		• (F, J, K)		
752	7500		• (F, J, K)		
822	8200		• (F, J, K)		
912	9100		• (F, J, K)		
103	10 000		• (F, J, K)		
113	11 000	• (F, J, K)			
123	12 000	• (F, J, K)			
133	13 000	• (F, J, K)			
153	15 000	• (F, J, K)			
163	16 000	• (F, J, K)			
183	18 000	• (F, J, K)			
203	20 000	• (F, J, K)			
223	22 000	• (F, J, K)			
273	27 000				
333	33 000				
393	39 000				
473	47 000				
563	56 000				• (K, M)
683	68 000				• (K, M)
823	82 000				• (K, M)
104	100 000				• (K, M)
124	120 000				• (K, M)
154	150 000				• (K, M)
184	180 000			• (K, M)	
224	220 000			• (K, M)	
274	270 000			• (K, M)	
334	330 000			• (K, M)	
394	390 000			• (K, M)	
474	470 000			• (K, M)	

Notes

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SELECTION CHART				
DIELECTRIC		BP	BX	
STYLE		CDR02	CDR02	
SLASH SHEET		/1	/1	
CASE CODE		1805	1805	
VOLTAGE (V_{DC})		100	50	100
VOLTAGE CODE		B	A	B
CAP. CODE	CAPACITANCE			
221	220	• (J, K)		
271	270	• (J)		
392	3900			• (K)
472	4700			• (K, M)
562	5600			• (K)
682	6800			• (K, M)
822	8200			• (K)
103	10 000			• (K, M)
123	12 000		• (K)	
153	15 000		• (K, M)	
183	18 000		• (K)	
223	22 000		• (K, M)	

Notes

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Not RoHS-compliant

SELECTION CHART					
DIELECTRIC		BP	BX		
STYLE		CDR03	CDR03		CDR06
SLASH SHEET		/1	/1		/3
CASE CODE		1808	1808		2225
VOLTAGE (V_{DC})		100	50	100	50
VOLTAGE CODE		B	A	B	A
CAP. CODE	CAPACITANCE				
331	330	• (J, K)			
391	390	• (J)			
471	470	• (J, K)			
561	560	• (J)			
681	680	• (J, K)			
821	820	• (J)			
102	1000	• (J, K)			
123	12 000			• (K)	
153	15 000			• (K, M)	
183	18 000			• (K)	
223	22 000			• (K, M)	
273	27 000			• (K)	
333	33 000			• (K, M)	
393	39 000		• (K)		
473	47 000		• (K, M)		
563	56 000		• (K)		
683	68 000		• (K, M)		
394	390 000				• (K)
474	470 000				• (K, M)

Notes

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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"	"B"
CDR37	0402	8 mm	5000	n/a	1000	10 000	n/a	100
CDR36	0603	8 mm	4000	n/a	1000	10 000	n/a	100
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	2000	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	500	250	n/a	4000	100
CDR06	2225	12 mm	n/a	500	250	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

STORAGE AND HANDLING CONDITIONS

(1) Store the components at 5 °C to +40 °C ambient temperature and ≤ 70 % related 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

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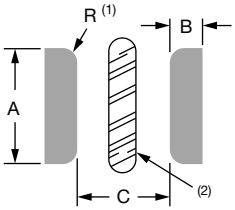
Solder Pad Dimensions for Vishay Surface-Mount Multilayer Ceramic Chip Capacitors

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

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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 spaying. 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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