# 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

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

## 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 | 100 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<br>CDR02<br>CDR03<br>CDR04<br>CDR06<br>CDR31<br>CDR32<br>CDR33<br>CDR34<br>CDR35<br>CDR36<br>CDR37 | BP<br>BR<br>BX | Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. Examples:<br>102 = 1000 pF<br>1R8 = 1.8 pF | W = 6.3 V<br>X = 10 V<br>Y = 16 V<br>Z = 25 V<br>A = 50 V<br>B = 100 V | C = ± 0.25 pF<br>D = ± 0.5 pF<br>F = ± 1 %<br>G = ± 2 %<br>J = ± 5 %<br>K = ± 10 %<br>M = ± 20 % | M = silver palladium (3)<br>Y = Ni barrier with 100 % tin<br>W, Z = Ni barrier with tin / lead plate min. 4 % lead<br>U = Ni barrier solder coated (min. of 4 % lead) | M = 1.0 %<br>P = 0.1 %<br>R = 0.01 %<br>S = 0.001 %<br>Consult factory for failure rate status | A = unmarked | T = 7" reel / plastic tape<br>J = 7" reel (low quantity)<br>C = 7" reel / paper tape<br>R = 11 1/4" / 13" reel / plastic tape<br>P = 11 1/4" / 13" reel / paper tape<br>B = bulk |

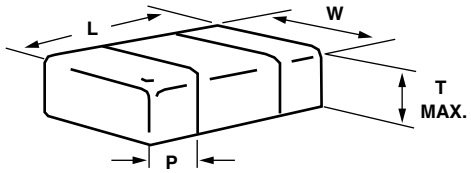
**Notes**

(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

## 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

## 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) | | | | | | | |

**Notes**

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

Not RoHS-compliant

| 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) | | |

**Notes**

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

Not RoHS-compliant

## 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 | • (J, K, M) | • (J, K, M) | • (J, K, M) | | | | | | | | | |
| 823 | 82 000 | • (J, K, M) | • (J, K, M) | • (J, K, M) | | | | | | | | | |
| 104 | 100 000 | • (J, K, M) | • (J, K, M) | • (J, K, M) | | | | | | | | | |

**Notes**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

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**

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

Not RoHS-compliant

| 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) | |

**Notes**

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

Not RoHS-compliant

## 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 | | | | | | | |

**Notes**

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

Not RoHS-compliant

| 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**

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

Not RoHS-compliant

| 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**

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

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**

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

Not RoHS-compliant

## 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:

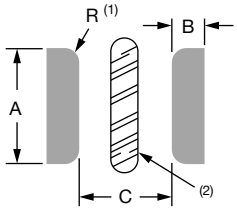
a. Do not store products in an environment containing corrosive elements, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. This may cause corrosion or oxidization of the terminations, which can easily lead to poor soldering

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

# 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 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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