

# Surface Mount Multilayer Ceramic Chip Capacitors

## DSCC Qualified Type 03028



### FEATURES

- US defense supply center approved
- Federal stock control number, CAGE CODE 2770A
- Small case size (0603)
- Stable BP, BR and BX dielectrics
- Excellent aging characteristics
- Lead (Pb)-free termination code "M"
- Tin / lead termination code "Z" and "U"
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Made with a combination of design, materials and tight process control to achieve very high field reliability
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://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

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

### ELECTRICAL SPECIFICATIONS

#### Note

- Electrical characteristics at +25 °C unless otherwise specified

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

#### Capacitance Range:

BP: 1.0 pF to 1.0 nF

BR: 100 pF to 100 nF

BX: 100 pF to 100 nF

**Voltage Range:** 6.3 V<sub>DC</sub> to 100 V<sub>DC</sub>

#### Temperature Coefficient of Capacitance (TCC):

BP: 0 ppm/°C ± 30 ppm/°C from -55 °C to +125 °C with zero (0) V<sub>DC</sub> applied

BP: 0 ppm/°C ± 30 ppm/°C from -55 °C to +125 °C with 100 % rated V<sub>DC</sub> applied

BR: ± 15 % from -55 °C to +125 °C with zero (0) V<sub>DC</sub> applied

BR: +15 %, -40 % from -55 °C to +125 °C with 100 % rated V<sub>DC</sub> applied

BX: ± 15 % from -55 °C to +125 °C with zero (0) V<sub>DC</sub> applied

BX: +15 %, -25 % from -55 °C to +125 °C with 100 % rated V<sub>DC</sub> applied

#### Dissipation Factor (DF):

BP:

0.15 % max. at 1.0 V<sub>RMS</sub> and 1 MHz for values ≤ 1000 pF

0.15 % max. at 1.0 V<sub>RMS</sub> and 1 kHz for values > 1000 pF

BR, BX:

≤ 25 V: ± 3.5 % max. at 1.0 V<sub>RMS</sub> and 1 kHz

≥ 50 V: ± 2.5 % max. at 1.0 V<sub>RMS</sub> 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<sub>DC</sub>-rated: 250 % of rated voltage

**QUICK REFERENCE DATA**

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

**Note**

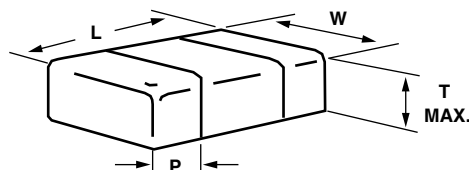
- Detail ratings see "Selection Chart"

**ORDERING INFORMATION**

03028- DSCC NUMBER	BX DIELECTRIC	102 CAPACITANCE NOMINAL CODE	B DC VOLTAGE RATING <sup>(1)</sup>	J CAPACITANCE TOLERANCE	Z TERMINATION	- GROUP C TESTING OPTION <sup>(2)</sup>	T PACKAGING
Case code 0603	BP BR BX	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. An "R" indicates a decimal point. Examples: 1R8 = 1.8 pF 101 = 100 pF	W = 6.3 V X = 10 V Y = 16 V Z = 25 V A = 50 V B = 100 V	C = $\pm 0.25$ pF D = $\pm 0.5$ pF F = $\pm 1$ % G = $\pm 2$ % J = $\pm 5$ % K = $\pm 10$ % M = $\pm 20$ % <b>Note:</b> 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 C = 7" reel / paper tape O = 7" reel / flamed paper tape J = 7" reel (low quantity) R = 11 1/4" / 13" reel / plastic tape P = 11 1/4" / 13" reel / paper tape I = 11 1/4" / 13" reel / flamed paper tape B = bulk <b>Note:</b> "I" and "O" are used for "M" termination code

**Notes**

- DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: [mlcc@vishay.com](mailto:mlcc@vishay.com)
- To receive data package, add "P" to the end of the part number. For example, 03028-BX102BJZCTP. 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
03028-	0.063 $\pm$ 0.006 (1.60 $\pm$ 0.15)	0.032 $\pm$ 0.006 (0.81 $\pm$ 0.15)	0.036 (0.91)	0.008 (0.20)	0.020 (0.51)

**Note**

- Metric equivalents are given for general information only



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

**Notes**

RoHS-compliant except when supplied with lead (Pb)-containing termination, code "Z"

Not RoHS-compliant



SELECTION CHART																			
DIELECTRIC		BP						BR						BX					
STYLE		03028																	
CASE CODE		0603																	
VOLTAGE (V <sub>DC</sub> )		6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	50	100
VOLTAGE CODE		W	X	Y	Z	A	B	W	X	Y	Z	A	B	W	X	Y	Z	A	B
CAP. CODE	CAP.																		
101	100 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
121	120 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
151	150 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
181	180 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
221	220 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
271	270 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
331	330 pF	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
391	390 pF	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
471	470 pF	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
561	560 pF	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
681	680 pF	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
821	820 pF	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
102	1.0 nF	•	•	•	•			•	•	•	•	•	•	•	•	•	•	•	•
122	1.2 nF							•	•	•	•	•	•	•	•	•	•	•	•
152	1.5 nF							•	•	•	•	•	•	•	•	•	•	•	•
182	1.8 nF							•	•	•	•	•	•	•	•	•	•	•	•
222	2.2 nF							•	•	•	•	•	•	•	•	•	•	•	•
272	2.7 nF							•	•	•	•	•	•	•	•	•	•	•	•
332	3.3 nF							•	•	•	•	•	•	•	•	•	•	•	
392	3.9 nF							•	•	•	•	•	•	•	•	•	•	•	
472	4.7 nF							•	•	•	•	•	•	•	•	•	•	•	
562	5.6 nF							•	•	•	•	•	•	•	•	•	•	•	
682	6.8 nF							•	•	•	•	•	•	•	•	•	•	•	
822	8.2 nF							•	•	•	•	•	•	•	•	•	•	•	
103	10 nF							•	•	•	•	•		•	•	•	•	•	
123	12 nF							•	•	•	•	•		•	•	•	•		
153	15 nF							•	•	•	•	•		•	•	•	•		
183	18 nF							•	•	•	•	•		•	•	•	•		
223	22 nF							•	•	•	•	•		•	•	•	•		
273	27 nF							•	•	•	•	•		•	•	•	•		
333	33 nF							•	•	•	•			•	•	•			
393	39 nF							•	•	•	•			•	•	•			
473	47 nF							•	•	•	•			•	•	•			
563	56 nF							•	•	•	•			•	•	•			
683	68 nF							•	•	•				•					
823	82 nF							•	•	•				•					
104	100 nF							•	•	•				•					
124	120 nF																		
154	150 nF																		
184	180 nF																		
224	220 nF																		

**Notes**

- RoHS-compliant except when supplied with lead (Pb)-containing termination, code "Z"
- Not RoHS-compliant

**DSCC PACKAGING QUANTITIES <sup>(1)</sup>**

CASE CODE	TAPE SIZE	7" REEL QUANTITIES		11 1/4" AND 13" REEL QUANTITIES	BULK
		PACKAGING CODE		PACKAGING CODE	VIAL PACKAGING CODE
		"C" / "O" / "T"	"J"	"P" / "I" / "R"	"B"
0603	8 mm	4000	1000	10 000	100

**Note**

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

**STORAGE AND HANDLING CONDITIONS**

(1) Store the components at 5 °C to +40 °C ambient temperature and  $\leq 70$  % 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:**

- 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.
- Store products on the shelf and avoid exposure to moisture or dust.
- Do not expose products to excessive shock, vibration, direct sunlight and so on.



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