

# Surface Mount Multilayer Ceramic Chip Capacitors

## DSCC Approved 03029 (BR/BX Dielectrics)

### Overview

KEMET is approved to DSCC (Defense Supply Center, Columbus) drawing no. 03029 for surface mount EIA 0402 case size multilayer ceramic capacitors (MLCCs) in BR and BX dielectrics.

DSCC MLCC control drawings are managed by the Defense Logistics Agency (DLA) and represent devices with case sizes, voltage ratings, and capacitance offerings not currently referenced in a valid military specification. Approved devices must meet the stringent requirements, specifications and standards outlined by DSCC.

DSCC drawing no. 03029 was developed in response to the growing need and demand within the defense and aerospace industries for EIA 0402 case size MLCCs not currently offered in MIL-PRF-55681. KEMET's DSCC approved capacitors meet the requirements, specifications and standards outlined in drawing no. 03029 as well as all referenced provisions per MIL-PRF-55681.

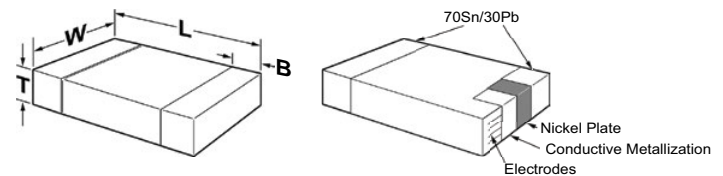
### Benefits

- EIA 0402 case size
- Defense Supply Center, Columbus approved
- Federal Stock Control Number, Cage Code 31433
- Meets US Department of Defense (USDoD) specifications per MIL-PRF-55681
- Meets USDoD standards per MIL-STD 202 & MIL-STD-1285
- High reliability
- Surface mount device
- Non-polar

### Applications

Typical applications include decoupling, bypass, filtering, blocking and energy storage for use in military and aerospace applications.

### Outline Drawing



### Dimensions - Millimeters (Inches)

EIA SIZE CODE	METRIC SIZE CODE	L LENGTH <sup>^</sup>	W WIDTH <sup>^</sup>	B BANDWIDTH	T THICKNESS Maximum
0402	1005	1.02 (.040) ± 0.10 (.004)	0.51 (.020) ± 0.10 (.004)	0.25 (.010) ± 0.15 (.006)	0.61 (.024)

<sup>^</sup>For symbol "U" termination add .20 inches (0.51mm) to the positive length tolerance and .015 inches (0.38mm) to the positive width and thickness tolerances.

### Ordering Information

03029	BX	222	Z	J	Z	C	7189
DSCC Drawing Number	Dielectric	Capacitance Code (pF)	Voltage	Capacitance Tolerance	End Metallization <sup>^</sup>	Group C Testing Option	Packaging/Grade (C-Spec) <sup>*</sup>
03029 (0402 case size)	BR BX	2 Sig. Digits + Number of Zeros	W = 6.3V X = 10V Y = 16V Z = 25V A = 50V B = 100V C = 200V	J = ±5% K = ±10% M = ±20%	U = SnPb (4%min) Z = SnPb (4%min)	Blank = No group C testing C = Full group C L = 2,000 hour life test only M = 1,000 hour life test only H = Low voltage humidity only	Blank = Bulk Bag 7246 = Anti-Static Bulk Bag 7292 = Waffle Pack 7189 = 7" Reel Marked

<sup>^</sup> "U" = Base metallization-barrier metal-solder coated (tin/lead alloy, with a min of 4% lead). Melting point is +200°C or less. Metallization thickness is ≥ 60μ-inches.

<sup>^</sup> "Z" = Base metallization-barrier metal-tinned (tin/lead alloy, with a min of 4% lead).

<sup>\*</sup> Additional reeling or packaging options may be available. Contact KEMET for details.

Additional termination options may be available. Contact KEMET for details.

## DSCC Approved 03029 (BR/BX Dielectrics)

### Electrical Parameters/Characteristics: BR Dielectric

Operating Temperature Range	-55°C to +125°C
Capacitance Change with Reference to +25°C and 0 Vdc Applied:	±15%
Capacitance Change with Reference to +25°C and 100% Rated Vdc Applied:	+15%, -40%
Aging Rate (Max % Cap Loss/Decade Hour)	1%
Dielectric Withstanding Voltage	250%
Dissipation Factor (DF%) Maximum Limits @ 25°C	5% (10V), 3.5% (16V & 25V) and 2.5% (50V to 200V)
Insulation Resistance (IR) Limit @ 25°C	1000 megohm microfarads (minimum) or 100GΩ
Insulation Resistance (IR) Limit @ 125°C	100 megohm microfarads (minimum) or 10GΩ

To obtain the IR limit, divide MΩ-μF value by the capacitance and compare to GΩ limit. Select the lower of the two limits.

Capacitance and Dissipation Factor (DF) measured under the following conditions:

1kHz ± 50Hz and 1.0 ± 0.2 Vrms

### Electrical Parameters/Characteristics: BX Dielectric

Operating Temperature Range	-55°C to +125°C
Capacitance Change with Reference to +25°C and 0 Vdc Applied:	±15%
Capacitance Change with Reference to +25°C and 100% Rated Vdc Applied:	+15%, -25%
Aging Rate (Max % Cap Loss/Decade Hour)	1%
Dielectric Withstanding Voltage	250%
Dissipation Factor (DF%) Maximum Limits @ 25°C	5% (10V), 3.5% (16V & 25V) and 2.5% (50V to 200V)
Insulation Resistance (IR) Limit @ 25°C	1000 megohm microfarads (minimum) or 100GΩ
Insulation Resistance (IR) Limit @ 125°C	100 megohm microfarads (minimum) or 10GΩ

To obtain the IR limit, divide MΩ-μF value by the capacitance and compare to GΩ limit. Select the lower of the two limits.

Capacitance and Dissipation Factor (DF) measured under the following conditions:

1kHz ± 50Hz and 1.0 ± 0.2 Vrms

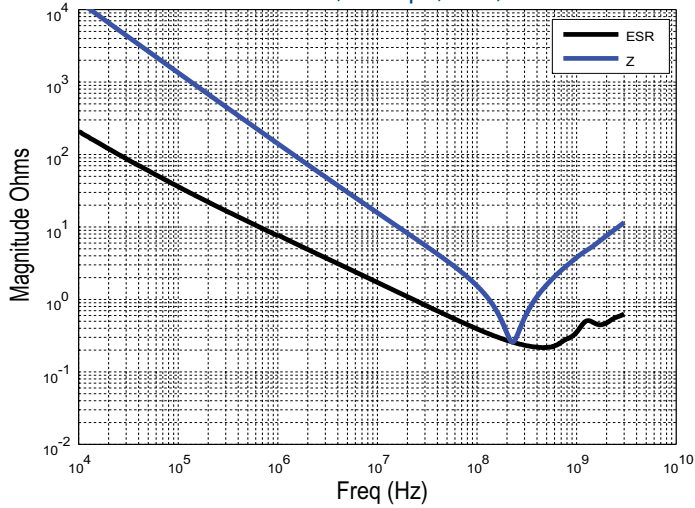
## Qualification/Certification

### Qualification Inspection per MIL-PRF-55681

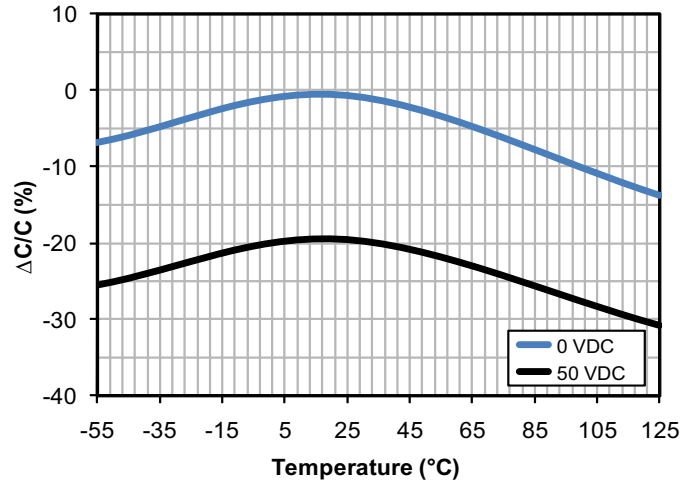
Inspection	Test method paragraph
<b>Group I</b>	
Voltage conditioning	4.8.3
DWV	4.8.9
IR (elevated temperature)	4.8.6
Capacitance	4.8.4
Dissipation factor	4.8.5
IR	4.8.6
DWV	4.8.9
Visual and mechanical examination	4.8.2
<b>Group II</b>	
Solderability	4.8.10
<b>Group III</b>	
Voltage-temperature limits	4.8.11
Thermal shock and immersion	4.8.12
<b>Group IV</b>	
Resistance to soldering heat	4.8.13
Moisture resistance	4.8.14
<b>Group V</b>	
Life (at elevated ambient temperature)	4.8.16
<b>Group VIII</b>	
Humidity, steady state, low voltage	4.8.15

## Electrical Characteristics

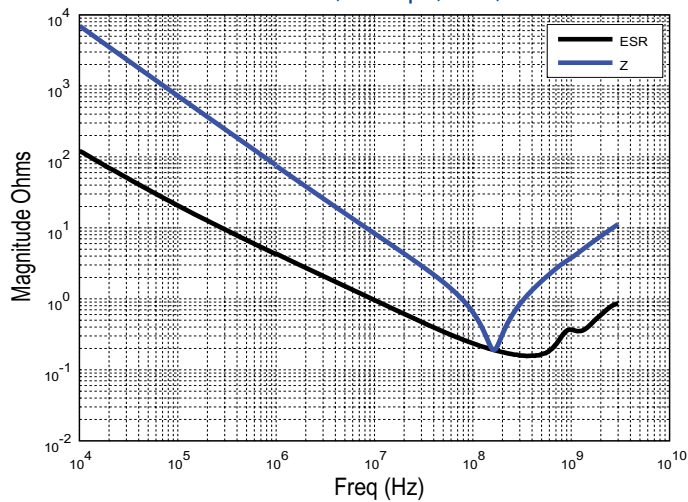
Z & ESR - 0402, 1000pF, 25V, BX



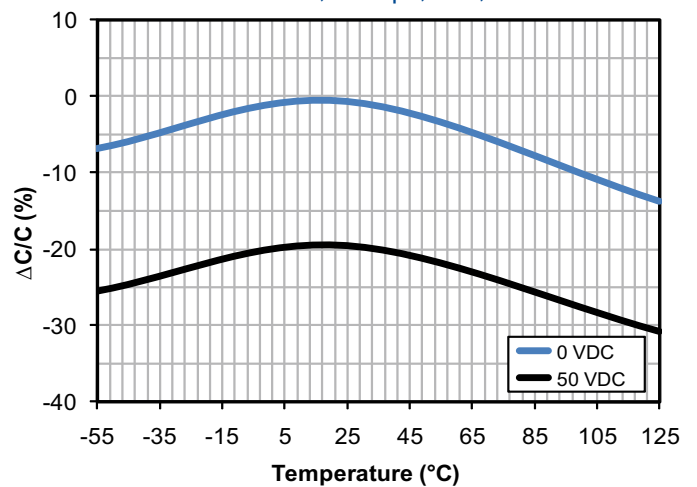
TCVC - 0402, 1000pF, 25V, BX



Z & ESR - 0402, 2200pF, 50V, BR



TCVC - 0402, 2200pF, 50V, BR



## DSCC Approved 03029 (BR/BX Dielectrics)

### DSCC DRAWING NO. 03029

Capacitance pF	Cap Code	DIELECTRIC	BR							BX						
		Voltage	6.3V	10V	16V	25V	50V	100V	200V	6.3V	10V	16V	25V	50V	100V	200V
		Voltage Code	W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C
		Cap Tolerance	EIA 0402 CASE SIZE													
100	101	J K M	•	•	•	•	•	•		•	•	•	•			
120	121	J K M	•	•	•	•	•	•		•	•	•	•			
150	151	J K M	•	•	•	•	•	•		•	•	•	•			
180	181	J K M	•	•	•	•	•	•		•	•	•	•			
220	221	J K M	•	•	•	•	•	•		•	•	•	•			
270	271	J K M	•	•	•	•	•	•		•	•	•	•			
330	331	J K M	•	•	•	•	•	•		•	•	•	•			
390	391	J K M	•	•	•	•	•	•		•	•	•	•			
470	471	J K M	•	•	•	•	•	•		•	•	•	•			
560	561	J K M	•	•	•	•	•	•		•	•	•	•			
680	681	J K M	•	•	•	•	•	•		•	•	•	•			
820	821	J K M	•	•	•	•	•	•		•	•	•	•			
1,000	102	J K M	•	•	•	•	•	•		•	•	•	•			
1,200	122	J K M	•	•	•	•	•	•		•	•	•	•			
1,500	152	J K M	•	•	•	•	•	•		•	•	•	•			
1,800	182	J K M	•	•	•	•	•	•		•	•	•	•			
2,200	222	J K M	•	•	•	•	•	•		•	•	•	•			
2,700	272	J K M														
3,300	332	J K M														
3,900	392	J K M														
4,700	472	J K M														
5,600	562	J K M														
6,800	682	J K M														
8,200	822	J K M														
10,000	103	J K M														
12,000	123	J K M														

## Packaging Quantities

PACKAGING TYPE	LOOSE PACKAGING		SECURE PACKAGING	
	BULK BAG (Default)	ANTI-STATIC BULK BAG	WAFFLE PACK	TAPE AND REEL
Packaging C-Spec <sup>1</sup>	N/A <sup>2</sup>	7246	7292	7189
Quantity	1 Minimum	1 Minimum	100 Maximum / Tray	10,000 Maximum / Reel

<sup>1</sup> A "Packaging C-Spec" is a 4-digit numeric code which identifies the packaging type. When ordering, the proper code must be included in the 15th through 18th character positions of the ordering code. See "Ordering Information" section of this document for further details. Product ordered without a "Packaging C-Spec" will default to our standard "Bulk Bag" packaging.

<sup>2</sup> A "Packaging C-spec" (see note <sup>1</sup> above) is not required for "Bulk Bag" packaging (excluding Anti-Static Bulk Bag). The 15th through 18th character positions of the ordering code should be left blank. All product ordered without a "Packaging C-Spec" will default to our standard "Bulk Bag" packaging.

## Soldering Process

All parts incorporate the standard KEMET barrier layer of pure nickel with a tin-lead (SnPb) finish. Both "U" and "Z" termination finishes contain a minimum of 4% lead.

## Marking

Marking is not available for EIA 0402 case size capacitors. These chips will be supplied unmarked.