

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Added "J" tolerance ($\pm 5\%$) to all BR and BX capacitors. Added paragraph 6.4. Revised tables VI, VII, and VIII.	08-04-21	Michael A. Radecki
B	Added vendor D.	10-03-12	Michael A. Radecki
C	Changed address of vendor C	10-07-01	Michael A. Radecki
D	Updated tables VII and VIII for vendor C.	10-11-09	Michael A. Radecki
E	Added K and M tolerance to BP capacitors. Specified the life test sample size. Updated tables VI, VII, and VIII.	11-10-13	Michael A. Radecki
F	Updated vendor information and updated table III to be consistent with MIL-PRF-55681.	19-07-03	RADECKI.MICHAEL.A.1230152051 <small>Digitally signed by RADECKI.MICHAEL.A.1230152051 Date: 2019.07.03 06:57:21 -0400</small>

CURRENT DESIGN ACTIVITY CAGE CODE 037Z3
HAS CHANGED NAMES TO:
DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990



Prepared in accordance with [ASME Y14.100](#)

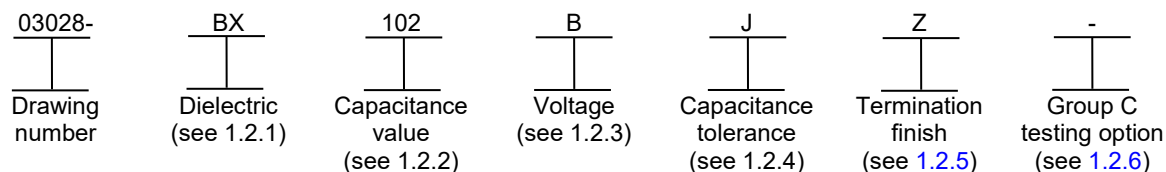
Selected item drawing

REV STATUS OF PAGES	REV	F	F	F	F	F	F	F	F	F	F						
	PAGES	1	2	3	4	5	6	7	8	9	10						
PMIC N/A	PREPARED BY MICHAEL A. RADECKI						DESIGN ACTIVITY DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH										
Original date of drawing 04-10-01	CHECKED BY PATRICK G. KYNE						TITLE CAPACITOR, FIXED, CERAMIC, CHIP, 0603										
	APPROVED BY KENDALL A. COTTONGIM																
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1. SCOPE

1.1 Scope. This drawing and [MIL-PRF-55681](#) describe the requirements for ceramic, chip.

1.2 Part or Identifying Number (PIN) The complete PIN is as follows:



1.2.1 Dielectric. The dielectric type is identified by the following 2 letters as defined in [3.3.1](#): BP, BR, BX.

1.2.2 Capacitance value. The nominal capacitance value, expressed in picofarads (pF) is identified by a three digit number; the first two digits represent significant figures and the last digit specifies the number of zeros to follow. When the nominal value is less than 10 pF, the letter "R" is used to indicate the decimal point and the succeeding digit(s) of the group represent significant figure(s). 1R0 indicates 1.0 pF; R75 indicates .75 pF; and 0R5 indicates 0.5 pF. See tables [VI](#), [VII](#), and [VIII](#) for values.

1.2.3 Voltage. The rated voltage for continuous operation at +125°C is identified by a single letter as shown in [table I](#).

TABLE I. Rated voltage.

Symbol	Rated voltage (volts, dc)
W	6.3
X	10
Y	16
Z	25
A	50
B	100
C	200

1.2.4 Capacitance tolerance. The capacitance tolerance is identified by a single letter in accordance with [table II](#).

TABLE II. Capacitance tolerance.

Symbol	Capacitance tolerance (±)	Tolerance applicability
C	.25 pF	BP < 10 pF
D	.50 pF	BP < 10 pF
F	1 percent	BP ≥ 10 pF
G	2 percent	BP ≥ 10 pF
J	5 percent	BP ≥ 10 pF, BX, BR
K	10 percent	BP ≥ 10 pF, BX, BR
M	20 percent	BP ≥ 10 pF, BX, BR

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1.2.5 Termination finish. Termination finish is identified by a single letter as shown in [table III](#).

TABLE III. Termination finish.

Symbol	Termination finish
M	Palladium/silver alloy
U	Base metallization-nickel-solder coated (tin/lead alloy, with a minimum of 3 percent lead). Solder has a melting point of +200°C or less. Solder coat thickness is a minimum of 60 microinches.
Z	Base metallization-nickel-solder plated (tin/lead alloy, with a minimum of 3 percent lead)

1.2.6 Group C testing option. To require [MIL-PRF-55681](#) group C testing, use the appropriate letter from [table IV](#). If group C testing is not desired, leave this location blank. NOTE: Ordering group C options that contain a 2,000 hour life test may extend the processing time by 90 days or more.

TABLE IV. Group C testing option.

Letter	Group C testing option
C	Full group C
L	2,000 hour life test only
M	1,000 hour life test only
H	Low voltage humidity only
N/A	No group C testing.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

[MIL-PRF-55681](#) - Capacitor, Chip, Multiple Layer, Fixed, Unencapsulated, Ceramic Dielectric, Established Reliability and Non-Established Reliability, General Specification For.

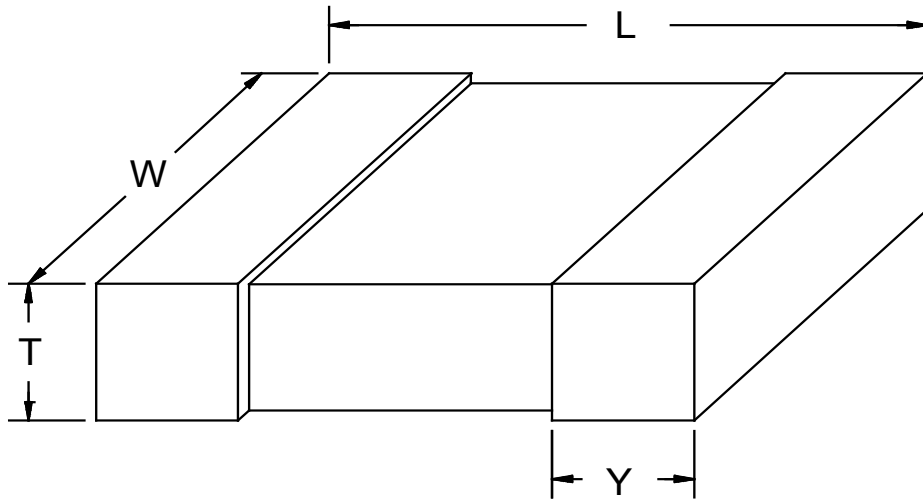
DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-202-305](#) - Method 305, Capacitance
[MIL-STD-1285](#) - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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Dimensions			
L	W	T	Y
± .006	± .006	Max	± .006
.063	.032	.036	.014

Inches	mm
.006	0.15
.014	0.36
.032	0.81
.036	0.91
.063	1.60

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions and tolerances are for bare chips. For solder coated terminations (symbol U), add .020 inch (0.51 mm) to the positive length tolerance and .015 inch (0.38 mm) to the positive width and thickness tolerances.

FIGURE 1. Case dimensions and configuration.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with [MIL-PRF-55681](#), and as specified herein. Unless otherwise stated, these capacitors shall be capable of meeting all electrical, environmental, and mechanical requirements of [MIL-PRF-55681](#).

3.2 Interface and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-55681](#) and herein (see [figure 1](#)).

3.2.1 Tin plated finishes. Tin plating is prohibited as a final finish or as an undercoat. Tin-lead (Sn-Pb) finishes are acceptable provided that the minimum lead content is 3 percent (see [6.4](#)).

3.3 Electrical characteristics.

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3.3.1 Dielectric type. The dielectric type shall be BP (± 30 ppm/ $^{\circ}$ C), BR (+15, -40 percent) or BX (+15, -25 percent) ceramic in accordance with [MIL-PRF-55681](#).

TABLE V. Voltage-temperature limits.

Symbol	Capacitance change with reference to +25 $^{\circ}$ C		
	Step A through step D of MIL-PRF-55681 table XIII	Percent rated voltage	Step E through step G of MIL-PRF-55681 table XIII
BP	0 \pm 30 ppm/ $^{\circ}$ C	100	0 \pm 30 ppm/ $^{\circ}$ C
BR	\pm 15 percent	100	+15, -40 percent
BX	\pm 15 percent	100	+15, -25 percent

3.3.2 Capacitance. Capacitance shall be in accordance with tables [VI](#), [VII](#), and [VIII](#) when measured in accordance with [MIL-STD-202-305](#). The following conditions shall apply:

- a. Test frequency: 1 MHz \pm 50kHz (for all BP characteristic capacitors \leq 1,000 pF); or 1kHz \pm 50Hz for all other capacitors.
- b. Test voltage: 1.0 volt \pm 0.2 volt rms.

3.3.3 Dissipation factor (+25 $^{\circ}$ C). The dissipation factor shall not exceed 0.15 percent for BP characteristic capacitors, 5.0 percent for 6.3V to 10V BR and BX characteristic capacitors, 3.5 percent for 16V to 25V BR and BX characteristic capacitors, and 2.5 percent for 50V to 200V BR and BX characteristic capacitors.

3.3.4 Insulation resistance. At +25 $^{\circ}$ C: minimum of 100,000 megohms or 1,000 megohm-microfarads, whichever is less.
At +125 $^{\circ}$ C: minimum of 10,000 megohms or 100 megohm-microfarads, whichever is less for BR and BX dielectrics; and minimum of 1,000 megohms or 10 megohm-microfarads, whichever is less for BP dielectric.

3.4 Solderability. In accordance with [MIL-PRF-55681](#), except the sample size shall be 5 pieces with zero defectives permitted.

3.5 Moisture resistance. In accordance with [MIL-PRF-55681](#), with the following exceptions:

- a. Polarizing voltage shall be rated voltage.
- b. Testing may be performed on chips with a larger width and/or length as long as they are cut from the same wafer(s) as those used for production.

3.6 Marking. As a minimum, marking shall be on the package due to the small size of the chips. The package marking shall be in accordance with [MIL-STD-1285](#), except the PIN shall be as specified in paragraph 1.2 with manufacturer's name or CAGE code and date code. The manufacturer may, at their option, mark some information on the chips.

3.7 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed in the [MIL-PRF-55681 Qualified Products Database](#) for at least one part, or perform the group A and group C inspections specified in [MIL-PRF-55681](#) on a sample of parts agreed upon by the manufacturer and DLA Land and Maritime-VAT.

3.8 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be an approved source of supply.

3.9 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.10 Workmanship. In accordance with [MIL-PRF-55681](#).

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4. VERIFICATION

4.1 Qualification inspection. Qualification inspection is not required.

4.2 Conformance inspection.

4.2.1 Inspection of product for delivery. Inspection of product for delivery shall consist of all tests specified in group A of MIL-PRF-55681. ESR testing and PPM testing and calculation are not applicable. When optional group C testing is requested, terminal strength and series resonance are not applicable. In addition, the life test sample shall be 25 with one defective permitted.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Capacitors conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. This drawing is intended exclusively to prevent the proliferation of unnecessary duplicate specifications, drawings, and stock catalog listings. When a military specification exists and the product covered by this drawing has been qualified for listing, this drawing becomes obsolete and will not be used for new design.

6.2 Ordering data. The contract or purchase order should specify the following:

- a. Complete PIN (see 1.2).
- b. Requirements for delivery of one copy of the conformance inspection data or certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.
- c. Requirements for notification of change of product to acquiring activity, if applicable.
- d. Requirements for packaging and packing.

6.3 Replaceability. Capacitors covered by this drawing will replace the same commercial device covered by a contractor-prepared specification or drawing.

6.4 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.5 Users of record. Coordination of this document for future revisions is coordinated only with the approved sources of supply and the users of record of this document. Requests to be added as a recorded user of this drawing should be in writing to: DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990, by e-mail to capacitorfilter@dla.mil, or by telephone (614) 692-4709 or DSN 850-4709.

6.6 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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TABLE VII. BR dielectric electrical characteristics – Continued.

DSCC Drawing 03028- <u>1/</u>	Capacitance pF	Available tolerances	AVX <u>2/</u> Vendor A							PRESIDIO <u>2/</u> Vendor B							VISHAY Vendor C							KEMET <u>3/</u> Vendor D												
			Available voltages							Available voltages							Available voltages							Available voltages												
			W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C						
BR223- - - -	22,000	J, K, M	•	•	•	•																														
BR273- - - -	27,000	J, K, M	•	•	•	•																														
BR333- - - -	33,000	J, K, M	•	•	•	•																														
BR393- - - -	39,000	J, K, M	•	•	•	•																														
BR473- - - -	47,000	J, K, M	•	•	•	•																														
BR563- - - -	56,000	J, K, M	•	•	•	•																														
BR683- - - -	68,000	J, K, M	•	•	•	•																														
BR823- - - -	82,000	J, K, M	•	•	•	•																														
BR104- - - -	100,000	J, K, M	•	•	•	•																														
BR124- - - -	120,000	J, K, M																																		
BR154- - - -	150,000	J, K, M																																		
BR184- - - -	180,000	J, K, M																																		
BR224- - - -	220,000	J, K, M																																		

1/ Complete PIN shall include symbols to indicate voltage, capacitance tolerance, termination finish, and group C testing option (see 1.2).

2/ Vendor does not supply tolerance "J" (±5%).

3/ Vendor does not supply termination finish "M".

TABLE VIII. BX dielectric electrical characteristics.

DSCC Drawing 03028- <u>1/</u>	Capacitance pF	Available tolerances	AVX <u>2/</u> Vendor A							PRESIDIO <u>2/</u> Vendor B							VISHAY Vendor C							KEMET <u>3/</u> Vendor D												
			Available voltages							Available voltages							Available voltages							Available voltages												
			W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C	W	X	Y	Z	A	B	C						
BX101- - - -	100	J, K, M	•	•	•	•	•																													
BX121- - - -	120	J, K, M	•	•	•	•	•																													
BX151- - - -	150	J, K, M	•	•	•	•	•																													
BX181- - - -	180	J, K, M	•	•	•	•	•																													
BX221- - - -	220	J, K, M	•	•	•	•	•																													
BX271- - - -	270	J, K, M	•	•	•	•	•																													
BX331- - - -	330	J, K, M	•	•	•	•	•																													
BX391- - - -	390	J, K, M	•	•	•	•	•																													
BX471- - - -	470	J, K, M	•	•	•	•	•																													
BX561- - - -	560	J, K, M	•	•	•	•	•																													
BX681- - - -	680	J, K, M	•	•	•	•	•																													
BX821- - - -	820	J, K, M	•	•	•	•	•																													
BX102- - - -	1,000	J, K, M	•	•	•	•	•																													
BX122- - - -	1,200	J, K, M	•	•	•	•	•																													
BX152- - - -	1,500	J, K, M	•	•	•	•	•																													
BX182- - - -	1,800	J, K, M	•	•	•	•	•																													
BX222- - - -	2,200	J, K, M	•	•	•	•	•																													
BX272- - - -	2,700	J, K, M	•	•	•	•	•																													
BX332- - - -	3,300	J, K, M	•	•	•	•	•																													
BX392- - - -	3,900	J, K, M	•	•	•	•	•																													
BX472- - - -	4,700	J, K, M	•	•	•	•	•																													
BX562- - - -	5,600	J, K, M	•	•	•	•	•																													
BX682- - - -	6,800	J, K, M	•	•	•	•	•																													
BX822- - - -	8,200	J, K, M	•	•	•	•	•																													

See footnote at end of table.

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