

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	Added an approved source and updated.	3 February 2014	Michael A. Radecki

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

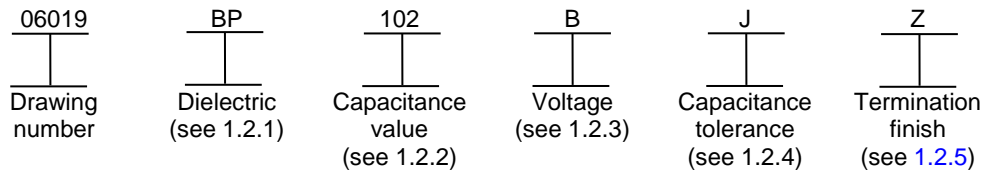
Prepared in accordance with [ASME Y14.100](#)

REV STATUS OF PAGES	REV	A	A	A	A	A	A	A	A	A								
	PAGES	1	2	3	4	5	6	7	8	9								
PMIC N/A	PREPARED BY	Patrick Kyne										DESIGN ACTIVITY DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH						
Original date of drawing 12 July 2006	CHECKED BY	Kenneth A. Bernier										TITLE CAPACITORS, FIXED, CERAMIC, CHIP, HIGH FREQUENCY						
	APPROVED BY	Michael A. Radecki																
	SIZE	CODE IDENT. NO.										DWG NO.  <b>06019</b>						
	A	037Z3																
	REV	A										PAGE 1 OF 9						

1. SCOPE

1.1 Scope. This drawing and [MIL-PRF-123](#) describe the requirements for high frequency ceramic chip capacitors.

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 or BG.

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 [table IV](#) 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)
A	50
K	150

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
B	.10 pF
C	.25 pF
D	.50 pF
F	±1 percent
G	±2 percent
J	±5 percent
K	±10 percent
M	±20 percent

<b>DEFENSE SUPPLY CENTER, COLUMBUS</b> <b>COLUMBUS, OHIO</b>	<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>037Z3</b>	<b>DWG NO.</b> <b>06019</b>
		<b>REV A</b>	<b>PAGE 2</b>

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
N	Silver-nickel-gold
U	Base metallization-barrier metal-solder coated (tin/lead alloy, with a minimum of 4 percent lead). Solder has a melting point of +200°C or less. Solder coat thickness is a minimum of 60 microinches.
Z	Base metallization-barrier metal-tinned (tin/lead alloy, with a minimum of 4 percent lead)

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 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, 4, and 5 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 (see 6.2).

#### DEPARTMENT OF DEFENSE SPECIFICATIONS

- [MIL-PRF-123](#) - Capacitors, Fixed, Ceramic Dielectric, (Temperature Stable and General Purpose), High Reliability, General Specification For
- [MIL-PRF-55681](#) - Capacitor, Chip, Multiple Layer, Fixed, Unencapsulated, Ceramic Dielectric, Established Reliability and Non-Established Reliability, General Specification For
- [MIL-PRF-55681/4](#) - Capacitor, Chip, Multiple Layer, Fixed, Ceramic Dielectric, Established Reliability and Non-Established Reliability, Styles CDR11, CDR12, CDR13, and CDR14 (High Frequency)

#### DEPARTMENT OF DEFENSE STANDARDS

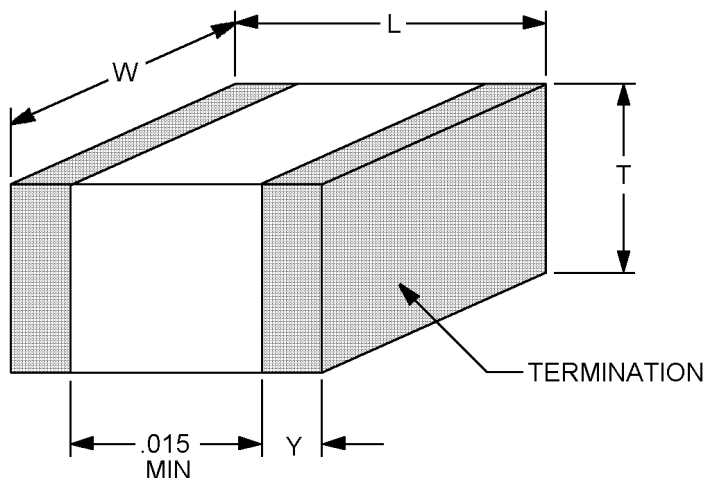
- [MIL-STD-202](#) - Test Methods for Electronic and Electrical Component Parts.

(Copies of these documents are available online at <http://quicksearch.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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.

<b>DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO</b>	<b>SIZE A</b>	<b>CODE IDENT NO. 037Z3</b>	<b>DWG NO. 06019</b>
		<b>REV A</b>	<b>PAGE 3</b>

Inches	mm
.005	0.13
.010	0.25
.015	0.38
.020	0.51
.025	0.64
.030	0.76
.035	0.89
.055	1.40
.057	1.45
.102	2.59
.110	2.79



Dimensions				
L 3/	W	T		Y
		Min	Max	
.055 ±.015	.055 ±.015	.020	.057	.010 -.005 +.010

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimension L tolerance shall be ±.025 when termination finish U or Z is specified.

FIGURE 1. Dimensions and configuration.

<b>DEFENSE SUPPLY CENTER, COLUMBUS</b> <b>COLUMBUS, OHIO</b>	<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>037Z3</b>	<b>DWG NO.</b> <b>06019</b>
		<b>REV A</b>	<b>PAGE 4</b>

### 3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-123 including those for deliverables, data, production lot definition, and traceability, and as specified herein. These capacitors shall be capable of meeting all design, electrical, environmental, and mechanical requirements of MIL-PRF-123, unless otherwise stated.

3.2 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-123 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 4 percent (see 6.3).

#### 3.3 Electrical characteristics.

3.3.1 Dielectric type. The dielectric type shall be BG (90 ±20ppm/°C), or BP (0 ±30 ppm/°C) ceramic in accordance with MIL-PRF-123.

Symbol	Capacitance change with reference to +25°C		
	Step A through step D of MIL-PRF-123 table XVIII	Percent rated voltage	Step E through step G of MIL-PRF-123 table XVIII
BG	90 ± 20 ppm/°C	100	90 ± 20 ppm/°C
BP	0 ± 30 ppm/°C	100	0 ± 30 ppm/°C

3.3.2 Capacitance. Capacitance shall be in accordance with table IV when measured in accordance with method 305 of MIL-STD-202. The following conditions shall apply:

≤ 1,000 pF	1 MHz ± 50 kHz 1 V rms ± .2 V rms
> 1,000 pF	1 kHz ± 50 Hz 1 V rms ± .2 V rms

3.3.3 Dissipation factor (+25°C). The dissipation factor shall be as follows:

BP	BG
All capacitance values: ≤ 0.15%	All capacitance values: ≤ 0.05%

3.3.4 Insulation resistance. At +25°C: 10<sup>6</sup> megohms, minimum  
At +125°C: 10<sup>5</sup> megohms, minimum

3.3.5 Equivalent series resistance. In accordance with MIL-PRF-55681.

3.3.6 Series Resonance. In accordance with MIL-PRF-55681.

3.4 Marking. Marking shall be as specified in MIL-PRF-123. In addition, these capacitors shall be marked with a contrasting color dot placed on the side of the capacitor to indicate the vertical plate orientation to that side. When laser marked, the marking shall be on the surface which is parallel to the plane of the embedded electrodes (this is the larger area which is normally the imprint area). If the capacitor is so marked, the vertical plane orientation is defined; therefore the contrasting color dot on the capacitor to indicate vertical plate orientation to that side is optional. Packaging shall be marked as specified in MIL-PRF-123 except the PIN shall be as specified in 1.2 and the “JAN” brand is not applicable.

3.5 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-55681/4 Qualified Products List for “S” failure rate level.

<b>DEFENSE SUPPLY CENTER, COLUMBUS</b> <b>COLUMBUS, OHIO</b>	<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>037Z3</b>	<b>DWG NO.</b> <b>06019</b>
		<b>REV A</b>	<b>PAGE 5</b>

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

3.7 Changes to product. Any changes in material or processes that alter the form, fit, or function such that it no longer meets the requirements specified in this drawing will require approval prior to implementation.

3.8 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable 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.

3.9 Workmanship. In accordance with [MIL-PRF-123](#).

#### 4. VERIFICATION

4.1 Qualification inspection. Qualification inspection is not required.

4.2 In-process inspection. In-process inspection shall be in accordance with [MIL-PRF-123](#).

4.3 Conformance inspection.

4.3.1 Inspection of product for delivery. Inspection of product for delivery shall consist of groups A and B inspections of [MIL-PRF-123](#). In addition, the following tests and sampling requirements shall be included in group B inspection as subgroup 4 and subgroup 5:

Subgroup 4

Solderability; 6 samples, accept/reject is 0.

Subgroup 5

ESR (UHF and RF) and Resonance frequency; 6 samples, accept/reject is 0.

The remaining group C inspection requirements of [MIL-PRF-123](#) shall be satisfied by the continued qualification of the supplier to the "S" failure rate for the equivalent MIL-PRF-55681/4 capacitors.

4.4 Methods of inspection. Methods of inspection shall be as specified in [MIL-PRF-123](#) and [MIL-PRF-55681](#) for ESR and Resonance Frequency.

#### 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.

<b>DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO</b>	<b>SIZE A</b>	<b>CODE IDENT NO. 037Z3</b>	<b>DWG NO. 06019</b>
		<b>REV A</b>	<b>PAGE 6</b>

TABLE IV. Capacitor characteristics.

DSCC drawing PIN 06019 - <u>1/</u>	Capacitance (pF)	Capacitance tolerance	Rated temperature and voltage- temperature limits	Rated voltage (V dc)
B - 0R1 - B -	0.1	B	BG, BP	50, 150
B - 0R2 - B -	0.2	B	BG, BP	50, 150
B - 0R3 ---	0.3	B, C	BG, BP	50, 150
B - 0R4 ---	0.4	B, C	BG, BP	50, 150
B - 0R5 ---	0.5	B, C, D	BG, BP	50, 150
B - 0R6 ---	0.6	B, C, D	BG, BP	50, 150
B - 0R7 ---	0.7	B, C, D	BG, BP	50, 150
B - 0R8 ---	0.8	B, C, D	BG, BP	50, 150
B - 0R9 ---	0.9	B, C, D	BG, BP	50, 150
B - 1R0 ---	1.0	B, C, D	BG, BP	50, 150
B - 1R1 ---	1.1	B, C, D	BG, BP	50, 150
B - 1R2 ---	1.2	B, C, D	BG, BP	50, 150
B - 1R3 ---	1.3	B, C, D	BG, BP	50, 150
B - 1R4 ---	1.4	B, C, D	BG, BP	50, 150
B - 1R5 ---	1.5	B, C, D	BG, BP	50, 150
B - 1R6 ---	1.6	B, C, D	BG, BP	50, 150
B - 1R7 ---	1.7	B, C, D	BG, BP	50, 150
B - 1R8 ---	1.8	B, C, D	BG, BP	50, 150
B - 1R9 ---	1.9	B, C, D	BG, BP	50, 150
B - 2R0 ---	2.0	B, C, D	BG, BP	50, 150
B - 2R1 ---	2.1	B, C, D	BG, BP	50, 150
B - 2R2 ---	2.2	B, C, D	BG, BP	50, 150
B - 2R4 ---	2.4	B, C, D	BG, BP	50, 150
B - 2R7 ---	2.7	B, C, D	BG, BP	50, 150
B - 3R0 ---	3.0	B, C, D	BG, BP	50, 150
B - 3R3 ---	3.3	B, C, D	BG, BP	50, 150
B - 3R6 ---	3.6	B, C, D	BG, BP	50, 150
B - 3R9 ---	3.9	B, C, D	BG, BP	50, 150
B - 4R3 ---	4.3	B, C, D	BG, BP	50, 150
B - 4R7 ---	4.7	B, C, D	BG, BP	50, 150
B - 5R1 ---	5.1	B, C, D	BG, BP	50, 150
B - 5R6 ---	5.6	B, C, D	BG, BP	50, 150
B - 6R2 ---	6.2	B, C, D	BG, BP	50, 150
B - 6R8 ---	6.8	B, C, J, K, M	BG, BP	50, 150
B - 7R5 ---	7.5	B, C, J, K, M	BG, BP	50, 150
B - 8R2 ---	8.2	B, C, J, K, M	BG, BP	50, 150
B - 9R1 ---	9.1	B, C, J, K, M	BG, BP	50, 150
B - 100 ---	10	F, G, J, K, M	BG, BP	50, 150
B - 110 ---	11	F, G, J, K, M	BG, BP	50, 150
B - 120 ---	12	F, G, J, K, M	BG, BP	50, 150
B - 130 ---	13	F, G, J, K, M	BG, BP	50, 150
B - 150 ---	15	F, G, J, K, M	BG, BP	50, 150
B - 160 ---	16	F, G, J, K, M	BG, BP	50, 150
B - 180 ---	18	F, G, J, K, M	BG, BP	50, 150
B - 200 ---	20	F, G, J, K, M	BG, BP	50, 150
B - 220 ---	22	F, G, J, K, M	BG, BP	50, 150
B - 240 ---	24	F, G, J, K, M	BG, BP	50, 150
B - 270 ---	27	F, G, J, K, M	BG, BP	50, 150
B - 390 ---	39	F, G, J, K, M	BG, BP	50, 150
B - 430 ---	43	F, G, J, K, M	BG, BP	50, 150

See footnote at end of table.

<b>DEFENSE SUPPLY CENTER, COLUMBUS</b> <b>COLUMBUS, OHIO</b>	<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>037Z3</b>	<b>DWG NO.</b> <b>06019</b>
		<b>REV A</b>	<b>PAGE 7</b>

TABLE IV. Capacitor characteristics - Continued.

DSCC drawing PIN 06019 - 1/	Capacitance (pF)	Capacitance tolerance	Rated temperature and voltage- temperature limits	Rated voltage (V dc)
B - 470 ---	47	F, G, J, K, M	BG, BP	50, 150
B - 510 ---	51	F, G, J, K, M	BG, BP	50, 150
B - 560 ---	56	F, G, J, K, M	BG, BP	50, 150
B - 620 ---	62	F, G, J, K, M	BG, BP	50, 150
B - 680 ---	68	F, G, J, K, M	BG, BP	50, 150
B - 750 ---	75	F, G, J, K, M	BG, BP	50, 150
B - 820 ---	82	F, G, J, K, M	BG, BP	50, 150
B - 910 ---	91	F, G, J, K, M	BG, BP	50, 150
B - 101 ---	100	F, G, J, K, M	BG, BP	50, 150
BP111A --	110	F, G, J, K, M	BP	50
BP121A --	120	F, G, J, K, M	BP	50
BP131A --	130	F, G, J, K, M	BP	50
BP151A --	150	F, G, J, K, M	BP	50
BP161A --	160	F, G, J, K, M	BP	50
BP181A --	180	F, G, J, K, M	BP	50
BP201A --	200	F, G, J, K, M	BP	50
BP221A --	220	F, G, J, K, M	BP	50
BP241A --	240	F, G, J, K, M	BP	50
BP271A --	270	F, G, J, K, M	BP	50
BP301A --	300	F, G, J, K, M	BP	50
BP331A --	330	F, G, J, K, M	BP	50
BP361A --	360	F, G, J, K, M	BP	50
BP391A --	390	F, G, J, K, M	BP	50
BP431A --	430	F, G, J, K, M	BP	50
BP471A --	470	F, G, J, K, M	BP	50
BP511A --	510	F, G, J, K, M	BP	50
BP561A --	560	F, G, J, K, M	BP	50
BP621A --	620	F, G, J, K, M	BP	50
BP681A --	680	F, G, J, K, M	BP	50
BP751A --	750	F, G, J, K, M	BP	50
BP821A --	820	F, G, J, K, M	BP	50
BP911A --	910	F, G, J, K, M	BP	50
BP102A --	1,000	F, G, J, K, M	BP	50

1/ Complete PIN shall include additional symbols to indicate voltage-temperature limits (where applicable), rated voltage (where applicable), capacitance tolerance (where applicable), and termination finish

6. NOTES

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

6.1 Intended use. This drawing covers high frequency capacitors that are primarily intended for use in resonant circuits with high Q factor and stability of capacitance with respect to temperature (-55°C to +125°C), frequency, and life. The capacitors covered by this drawing are intended for use in high reliability applications. 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.

<b>DEFENSE SUPPLY CENTER, COLUMBUS</b> <b>COLUMBUS, OHIO</b>	<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>037Z3</b>	<b>DWG NO.</b> <b>06019</b>
		<b>REV A</b>	<b>PAGE 8</b>



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

- a. Complete PIN (see 1.2).
- b. Requirements for notification of change of product to acquiring activity, if applicable.
- c. Requirements for packaging and packing.

6.3 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).

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

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 may be achieved online at [capacitorfilter@dla.mil](mailto:capacitorfilter@dla.mil) or if in writing to: DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990, or by telephone (614) 692-4709 or DSN 850-4709.

6.6 Changes from previous issue. The margins of this drawing 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.

6.7 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. Assistance in the use of this drawing may be obtained online at [capacitorfilter@dla.mil](mailto:capacitorfilter@dla.mil), or by contacting DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-4709 or DSN 850-4709.

<u>Vendor CAGE</u>	<u>Vendor name and address</u>	<u>Vendor designation 1/</u>
29990	American Technical Ceramics One Norden Lane Huntington Station, NY 11746-2142	100A (BG) 700A (BP)
04222	AVX Ceramics Corp. P.O. Box 867 801 17 <sup>th</sup> Avenue South Myrtle Beach, SC 29577-0867	AQ12*****H***
60212	Presidio Components Incorporated 7169 Construction Court San Diego, CA 92121-2615	SR0505*****

1/ Parts must be purchased to the DSCC PIN to assure that all performance requirements and tests are met.

<b>DEFENSE SUPPLY CENTER, COLUMBUS</b> <b>COLUMBUS, OHIO</b>	<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>037Z3</b>	<b>DWG NO.</b> <b>06019</b>
		<b>REV A</b>	<b>PAGE 9</b>