

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	Part number addition	1 Nov 2007	M. Radecki
B	Vendor recommended changes. Current DoD requirements. Editorial requirements throughout	15 Sept 2009	M. Radecki
C	Vendor address change. Editorial changes throughout.	13 Sept 2012	M. Radecki
D	Change vendor's CAGE code. Add QR code. Editorial changes throughout.	12 Feb 2016	M. Radecki

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



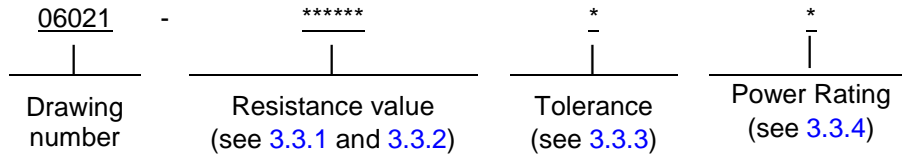
Prepared in accordance with [ASME Y14.100](#)

REV STATUS OF PAGES	REV	D	D	D	D	D	D	D	D										
	PAGES	1	2	3	4	5	6	7	8										
PMIC N/A	PREPARED BY Jesus V. Garcia III									DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH									
Original date of drawing  17 July 2006	CHECKED BY Andrew R. Ernst									TITLE  RESISTOR, FIXED, BULK METAL FOIL, HIGH PRECISION, SURFACE MOUNT, MOLDED 0.6/.4 WATTS									
	APPROVED BY Michael A. Radecki																		
	SIZE A	CODE IDENT. NO. <b>037Z3</b>									DWG NO. <b>06021</b>								
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1. SCOPE

1.1 Scope. This drawing describes the requirements for a molded, surface mounted bulk metal foil, high precision, 0.6/.4 watts resistor.

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



2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. 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 listed in the cited in the solicitation or contract (see 6.2).

DEPARTMENT OF DEFENSE SPECIFICATION

[MIL-PRF-55182](#) - Resistor, Fixed, Film, Nonestablished Reliability, Established Reliability, and Space Level, General Specification for

DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-690](#) - Failure Rate Sampling Plans and Procedures.  
[MIL-STD-790](#) - Standard Practice for Established Reliability and High Reliability Qualified Products List (QPL) Systems for Electrical, Electronic, and Fiber Optic Parts Specifications.

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

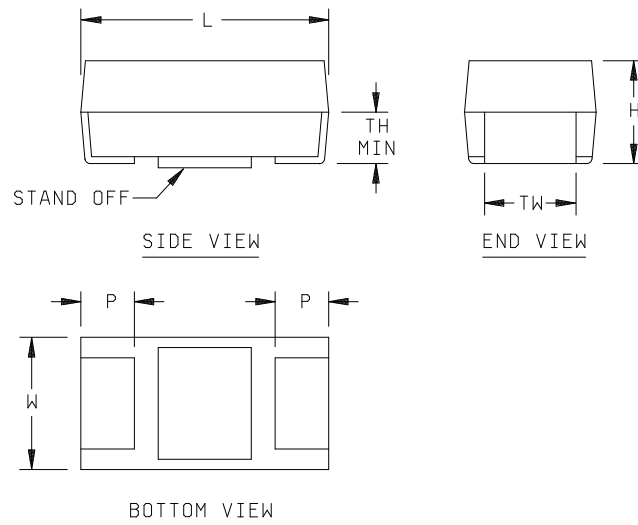
2.2 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence unless otherwise noted. Nothing in this document,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

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be as specified herein.

3.2 Interface and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-55182](#) and herein (see [figure 1](#)). Passivation is not applicable, however, a protective coating over the element shall be provided.

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L	W	H	P	TH	TW
.287 ±.012 (7.30 ±0.30)	.170 ±.012 (4.30 ±0.300)	.110 ±.012 (2.80 ±0.300)	.051 ±.012 (1.30 ±0.30)	.039 MIN (1.00 MIN)	.095 ±.004 (2.40 ±0.10)

**NOTES:**

1. Dimensions are in Inches. Metric equivalents are given for general information only.
2. The pictorial view of the styles above is given as representative of the envelope of the item. Slight deviations from the outline shown, which are contained within the envelope and do not alter the functional aspects of the device, are acceptable.

FIGURE 1. Bulk metal foil resistor.

**3.3 Electrical characteristics**

3.3.1 Resistance. The nominal resistance expressed in ohms is identified by six characters, consisting of five digits and a letter. the letter is used simultaneously as a decimal point and as a multiplier. For resistance values:

- a. Greater than or equal to 1 ohm but less than 1,000 ohms, the letter "R" is used to represent a decimal point.
- b. Greater than or equal to 1,000 ohms but less than 1 megohm, the letter "K" is used to denote that a decimal point is located three places to the right

All digits preceding and following the letters (R or K) of the group represent significant figures. The resistance value designations are shown in [Table I](#). Minimum and maximum resistance values shall be as specified in [3.3.2](#).

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TABLE I. Designation of resistance values.

Designation		Resistance ohms		
5R0000	to 99R999 incl.	5	to 99.999	incl.
100R00	to 999R99 incl.	100	to 999.99	incl.
1K0000	to 9K9999 incl.	1,000	to 9,999.9	incl.
10K000	to 65K000 incl.	10,000	to 65,000	incl.

3.3.2 Resistance range and resistance temperature characteristic. The resistance range shall be from 5 ohms to 65 kilohms. The corresponding resistance temperature characteristic is specified in table II.

TABLE II. Resistance range and resistance temperature characteristic.

Resistance range (in ohms)	Resistance Temperature Characteristic (RTC) in ppm/ <sup>o</sup> C	Power rating (see 3.3.4)	Voltage rating (in volts, maximum) (see 3.3.5)
50 - 80K 20 - < 50 10 - < 20 5 - < 10	± 5 ± 6 ± 8 ± 10	Blank <sup>1/</sup>	180 <sup>1/</sup>
50 - 80K 20 - < 50 10 - < 20 5 - < 10	± 2 ± 3 ± 5 ± 7	A <sup>1/</sup>	
50 - 65K 20 - < 50 10 - < 20 5 - < 10	± 5 ± 6 ± 8 ± 10	B	161
50 - 65K 20 - < 50 10 - < 20 5 - < 10	± 2 ± 3 ± 5 ± 7	C	

<sup>1/</sup> Inactive for new design with corresponding resistance range and RTC.

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3.3.3 Resistance tolerance. Resistors are available in resistance tolerances as specified in table III.

TABLE III. Resistance tolerance.

Symbol	Resistance tolerance percent	Available resistance range (in ohms)
T 1/	± 0.01	50 - 80K
Q	± 0.02	
A	± 0.05	20 - 65K
B	± 0.1	10 - 65K
C	± 0.25	5 - 65K
D	± 0.5	
F	± 1.0	

1/ Inactive for new design

3.3.4 Power rating. The power ratings are at 70°C and 125°C derated to +175°C at zero power (see figure 2) and are specified in table IV.

TABLE IV. Power rating and resistance temperature characteristic.

Symbol	Resistance range (in ohms)	Power rating at 70°C (Watts)	Power rating at 125°C (Watts)
B	5 to 30K	.6	.3
C	30K and above	.4	.2

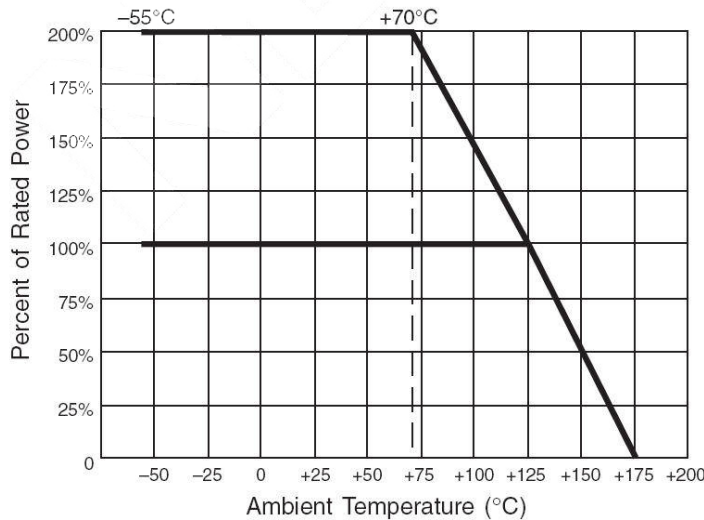


FIGURE 2. Derating curve.

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3.3.5 Voltage rating. The maximum continuous working voltage shall not exceed 161 volts.

3.3.6 Termination. The termination material shall be in accordance with MIL-PRF-55182.

3.3.6.1 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of resistor components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.3).

3.4 Thermal shock. When resistors are tested as specified in MIL-PRF-55182 for thermal shock the change in resistance shall not exceed  $\pm 0.01$  percent +0.01 ohm.

3.5 Low temperature operation. When resistors are tested as specified in MIL-PRF-55182 for low temperature operation the change in resistance shall not exceed  $\pm 0.02$  percent +0.01 ohm.

3.6 Short time overload. When resistors are tested as specified in MIL-PRF-55182 for short time overload the change in resistance shall not exceed  $\pm 0.01$  percent +0.01 ohm.

3.7 High temperature exposure. When resistors are tested as specified in MIL-PRF-55182 for high temperature exposure the change in resistance shall not exceed  $\pm 0.1$  percent +0.01 ohm.

3.8 Moisture resistance. When resistors are tested as specified in MIL-PRF-55182 for moisture resistance the change in resistance shall not exceed  $\pm 0.02$  percent +0.01 ohm.

3.9 Life. When resistors are tested as specified in MIL-PRF-55182 for life the change in resistance shall not exceed  $\pm 0.05$  percent +0.01 ohm.

3.10 Resistance temperature characteristic. When resistors are tested as specified in MIL-PRF-55182 (except that temperature range shall be  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ ) the RTC shall not exceed the values specified (see 3.3.2).

3.11 Marking. Marking is not required on this resistor; however, each waffle pack and each unit package shall be marked with the PIN assigned herein (see 1.2), the manufacturer's identification code, the date code, and the lot code. At the option of the manufacturer, the resistor may be marked (i.e., laser, color dot, etc.). The marking shall remain legible after all tests.

3.12 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-55182 Qualified Product List for at least one part, or perform the group A and group B inspections specified herein on a sample of parts agreed upon by the manufacturer and DLA Land and Maritime-VAT.

3.12.1 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be listed as approved sources of supply.

\* 3.13 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 materials meet or exceed the operational and maintenance requirements, and promote economically advantageous life cycle costs.

3.14 Workmanship. Resistors shall be processed in such a manner as to be uniform in quality and be free from defects that will affect life, serviceability, or appearance.

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#### 4. VERIFICATION

4.1 Product assurance program. The product assurance program specified in MIL-PRF-55182 and maintained in accordance with [MIL-STD-790](#) is not applicable to this document.

4.2 Qualification inspection. Qualification inspection is not applicable to this document.

4.3 Product level qualification. The product level qualification specified in MIL-PRF-55182 and [MIL-STD-690](#) is not applicable to this document.

4.4 Conformance inspection.

4.4.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection (ER level only) and group B inspection of [MIL-PRF-55182](#).

4.4.1.1 Certification. The procuring activity may accept a certificate of compliance in lieu of Group B inspection.

#### 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 requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's Services System Command. 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. Chip resistors are intended to be used in thick or thin film circuits where microcircuitry is intended, also, for use in surface mounting application.

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

- a. Complete PIN (see [1.2](#)).
- b. Requirements for delivery: One copy of the conformance inspection data or a certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.
- c. Packaging requirements (see 5.1). (i.e. Electrostatic discharge sensitive packaging).
- d. Whether the manufacturer performs the group B tests or provides certificate of compliance with group B (see [4.4.1.1](#)).

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).

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6.4 Tolerance caution. Soldering temperature used during installation may cause resistance to shift up to 0.05 %.

6.5 Pulse applications. Designers are CAUTIONED on using these resistors in high power pulse applications. Since they have not been qualified nor tested for such applications, damage and premature failure are possible. This resistor only sees a one hour overload (see paragraph 4.8.3 of MIL-PRF-55182) as part of the group A inspection of this specification.

6.6 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 on-line at [resistor@dla.mil](mailto:resistor@dla.mil) or in writing to: DLA Land and Maritime, ATTN: VAT, P.O. Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-8754 or DSN 850-8754.

\* 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 on on-line at [resistor@dla.mil](mailto:resistor@dla.mil) or contact DLA Land and Maritime, ATTN: VAT, P.O. Box 3990, Columbus, OH 43218-3990, or by telephone (614) 692-8754 or DSN 850-8754.

DLA Land and Maritime drawing PIN	Vendor similar designation or type number <u>1/</u>	Vendor CAGE	Vendor name and address
06021-***** <u>2/</u>			Vishay Precision Group, Inc. 3 Great Valley Parkway Suite 150 Malvern, PA 19355
06021-*****A <u>2/</u>	SMR3D*****B	0066A	
06021-*****B	SMR3DZ*****B		<u>Plants:</u> Vishay Advanced Technologies, Ltd. 2 Dr. Felix Zandman Street Holon 58125, Israel
06021-*****C			

1/ Parts must be purchased to the DLA Land and Maritime PIN to assure that all performance requirements and test are met.

2/ Inactive for new design.

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