

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	Vendor requested changes to RTC and high temperature exposure	28 Aug 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



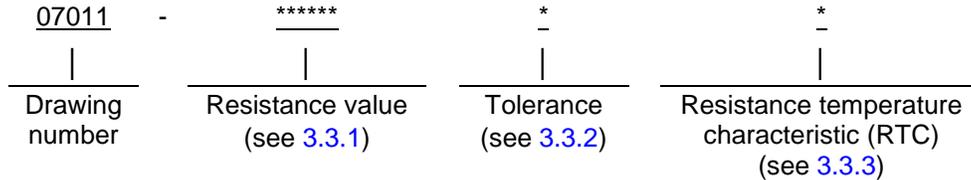
Prepared in accordance with [ASME Y14.100](#)

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 09 August 2007	CHECKED BY Andrew R. Ernst							TITLE RESISTOR, FIXED, CURRENT SENSING, METAL STRIP, HIGH PRECISION, SURFACE MOUNT, STYLE 2512										
	APPROVED BY Michael A. Radecki																	
	SIZE A	CODE IDENT. NO. 037Z3							DWG NO. 07011									
	REV D							PAGE 1 OF 8										

1. SCOPE

1.1 Scope. This drawing describes the requirements for a metal strip, high precision, surface mount, current sensing, resistor, style 2512.

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-49465](#) - Resistor, Fixed, Metal Element (Power Type), Very Low Resistance Values, General Specification for.

* DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-202](#) - Test Method Standard, Electronic and Electrical Component Parts.
[MIL-STD-202-304](#) - Test Method Standard Method 304, Resistance-Temperature Characteristic.

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

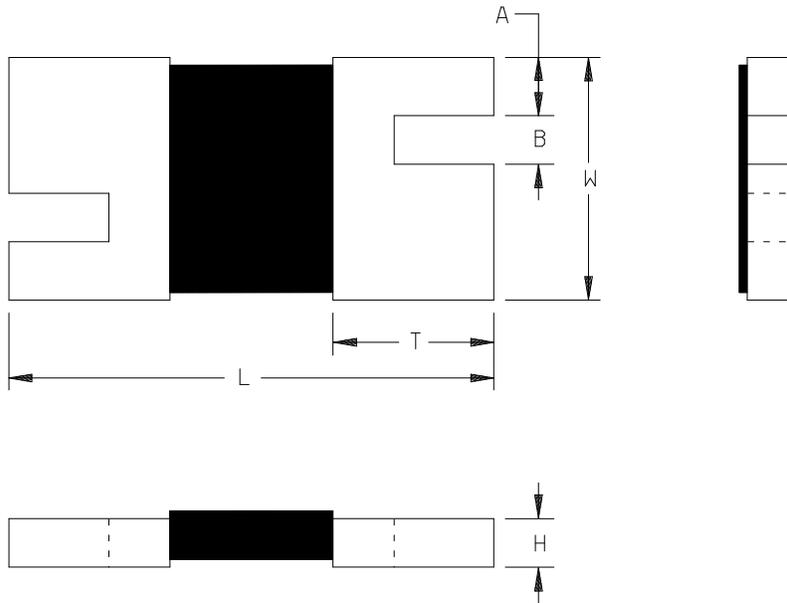
2.2 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence unless otherwise noted. Nothing in this document, 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-49465](#) and herein (see [figure 1](#)). Passivation is not applicable, however, a protective coating over the element shall be provided.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 2



Resistance range	Dimensions (mm)					
	T	L	W	H	A ^{1/}	B ^{1/}
.003 to <.005	0.083 (2.11)	0.25 (6.4)	0.125 (3.18)	0.025 (0.64)	0.030 (0.76)	0.025 (0.64)
.005 to <.007	0.047 (1.19)					
.007 to .200	0.032 (0.81)					

^{1/} Tolerance ± 0.015 (0.38)

NOTES:

1. Dimensions are in Inches. Metric equivalents are given for general information only.
2. Tolerance is ± 0.010 (0.25mm), unless otherwise noted.
3. 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. Current sensing resistor.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 3

3.3 Electrical characteristics

3.3.1 Resistance. The nominal resistance expressed in ohms is identified by five digits. The letter “R” is substituted for one of the significant digits to represent the decimal point. The succeeding digits of the group represent the significant figures in table I.

TABLE I. Designation of resistance values.

Designation	Resistance (in ohms)
0R0030 to 0R2000 incl.	.003 to .200 Incl.

3.3.1.1 Minimum and maximum resistance value. The minimum and maximum resistance values are as specified below.

Minimum - .003 ohms
 Maximum - .200 ohms

3.3.2 Resistance tolerance. Resistors are available in resistance tolerances as specified in table II.

TABLE II. Resistance tolerance.

Symbol	Resistance tolerance percent
B ^{1/}	± 0.1
C ^{1/}	± 0.25
D	± 0.5
F	± 1.0

^{1/} Inactive for new design

3.3.3 Resistance temperature characteristic. The resistance temperature characteristic as specified in table III (see 4.4).

TABLE III. Resistance temperature characteristic (RTC).

Symbol	Resistance temperature characteristic (RTC) in ppm/°C
Blank ^{1/}	±15
A	±20

^{1/} Inactive for new design

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 4

3.3.4 Power rating. The power rating is 1 watt at 70°C derated to +170°C at zero power (see figure 2).

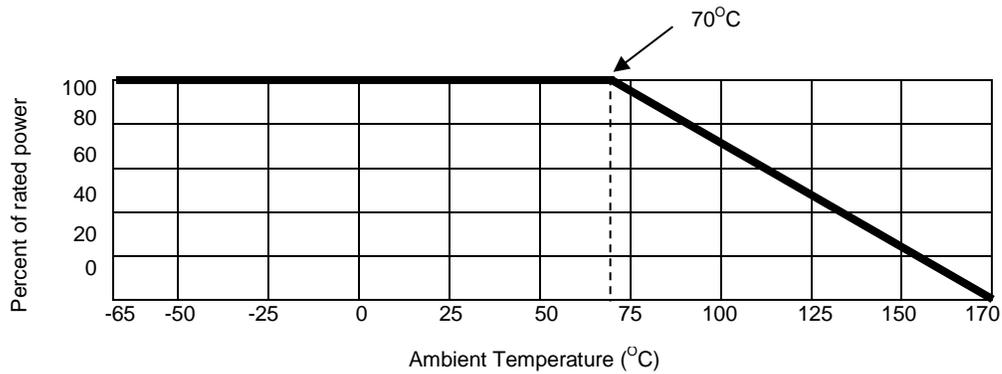


FIGURE 2. Derating curve.

3.3.5 Current rating. The maximum current rating shall not exceed 18 Amps.

3.3.6 Termination. The termination material shall be Tin/Lead (see 3.3.6.1).

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-49465 for thermal shock the change in resistance shall not exceed ± 0.2 percent +0.0005 ohm.

3.5 Resistance temperature characteristic. When resistors are tested as specified in MIL-PRF-49465 the RTC shall not exceed the values specified (see 3.3.3).

3.6 Low temperature storage. When resistors are tested as specified in MIL-PRF-49465 for low temperature operation the change in resistance shall not exceed ± 0.2 percent +0.0005 ohm.

3.7 Short time overload. When resistors are tested as specified in MIL-PRF-49465 for short time overload the change in resistance shall not exceed ± 0.5 percent +0.0005 ohm.

3.8 Moisture resistance. When resistors are tested as specified in MIL-PRF-49465 for moisture resistance the change in resistance shall not exceed ± 0.1 percent +0.0005 ohm.

3.9 Shock, specified pulse. When resistors are tested as specified in MIL-PRF-49465 for shock the change in resistance shall not exceed ± 0.1 percent +0.0005 ohm.

3.10 Vibration, high frequency. When resistors are tested as specified in MIL-PRF-49465 for vibration the change in resistance shall not exceed ± 0.1 percent +0.0005 ohm.

3.11 Life. When resistors are tested as specified in MIL-PRF-49465 for life the change in resistance shall not exceed ± 0.5 percent +0.0005 ohm.

3.12 High temperature exposure. When resistors are tested as specified in MIL-PRF-49465 for high temperature exposure the change in resistance shall not exceed ± 0.3 percent +0.0005 ohm (see 4.5).

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 5

3.13 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.

3.14 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-49465 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.

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

* 3.15 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.

3.16 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.

4. VERIFICATION

4.1 Product assurance program. The product assurance program specified in MIL-PRF-49465 is not applicable to this document.

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

4.3 Conformance inspection.

4.3.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection and group B inspection of MIL-PRF-49465.

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

4.4 Resistance temperature coefficient test temperatures. Resistors shall be tested in accordance with method 304 of MIL-STD-202. The test temperature shall be in accordance with table IV (see 3.3).

4.5 High temperature exposure (see 3.6).

- a. Mounting: Resistors shall be mounted on FR4 substrate.
- b. Initial measurements: DC resistance shall be measured as specified in 4.8.2 of MIL-PRF-49465.
- c. Procedure: Following initial resistance measurements, resistors shall be placed in a chamber maintained at $+170^{\circ}\text{C} \pm 7^{\circ}\text{C}$ for a period of 1000 hours ± 8 hours with no load applied.
- d. Measurements during test: 250 hours +48 hours, -0 hours.
- e. Final measurements: After removal from the test chamber, resistors shall be permitted to stabilize at room temperature and within 6 hours after removal, cleaning of the leads will be allowed and the dc resistance shall be measured as specified in 4.8.2 of MIL-PRF-49465. Resistors shall be examined for evidence of mechanical damage.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 6

TABLE IV. Resistance temperature characteristic test temperatures.

Sequence	Temperature °C ±3°C (Group B) <u>1/</u>
1.	-55
2.	25 <u>2/</u>
3.	125

1/ At the option of the manufacturer, the reverse sequence may be as specified.

2/ This temperature shall be considered the reference temperature for each of the succeeding temperatures.

- | | | | |
|----|-------|------|-----------|
| 1. | 125°C | ±3°C | |
| 2. | 25°C | ±3°C | <u>1/</u> |
| 3. | -55°C | ±3°C | |

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. 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 4.3.1.1).

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 7

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 Tolerance caution. Soldering temperature used during installation may cause resistance to shift up to 0.2 percent.

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 on-line at 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.

* 6.6 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 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
07011-***** <u>2/</u> 07011-*****A	CSM2512*****B	0066A	Vishay Precision Group, Inc. 3 Great Valley Parkway Suite 150 Malvern, PA 19355 <u>Plants:</u> Vishay Advanced Technologies, Ltd. 2 Dr. Felix Zandman Street Holon 58125, Israel

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.

DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO	SIZE A	CODE IDENT NO. 037Z3	DWG NO. 07011
		REV D	PAGE 8