

REVISIONS			
LT	DESCRIPTION	DATE	APPROVED
A	Changes in accordance with NOR 5905-R008-94.	1994-09-08	D. Moore
B	Changes in accordance with NOR 5905-R011-95.	1995-10-30	D. Moore
C	Changes to paragraphs 3.3.2, 3.3.3, 3.3.10, and 4.8. Deleted paragraph 3.3.6 Voltage rating. Editorial changes throughout.	1997-07-08	D. Moore
D	Changes in accordance with NOR 5905-R003-98.	1998-04-03	D. Moore
E	Update and validation of drawing. Editorial changes throughout.	2003-12-03	K. Cottongim
F	Add thermoplastic encapsulation. Add pure tin prohibition paragraph. Editorial changes throughout.	2006-10-30	M. Radecki
G	The epoxy encapsulation is obsolete and is superseded by thermoplastic encapsulation with cap to lead frame. Editorial changes throughout.	2010-01-14	M. Radecki
H	Change marking paragraph. Add QR code. Editorial changes throughout.	2018-07-03	M. Radecki

Epoxy encapsulation is obsolete and is superseded by thermoplastic encapsulation with cap to lead frame

CURRENT DESIGN ACTIVITY CAGE CODE 037Z3
 DEFENSE LOGISTICS AGENCY
 DEFENSE SUPPLY CENTER, COLUMBUS
 COLUMBUS, OHIO 43218-3990



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

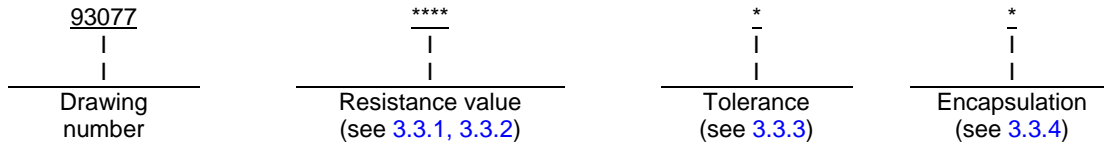
Selected item drawing

REV STATUS OF PAGES	REV	H	H	H	H	H	H										
	PAGES	1	2	3	4	5	6										
PMIC N/A	PREPARED BY HERALDINE JOHNSON							DEDIGN ACTIVITY: DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO 45444-5000									
Original date of drawing 11 July 1994	CHECKED BY ANDREW ERNST							TITLE RESISTOR, FIXED, WIREWOUND, SURFACE MOUNT, POWER TYPE (2 WATT)									
	APPROVED BY DAVID E. MOORE																
	SIZE A	CAGE CODE 14933						DWG NO. 93077									
	REV H							PAGE 1 OF 6									

1. SCOPE

1.1 Scope. This drawing describes the requirements for a 2 watt, fixed, surface mounted, wirewound, power type 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, 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-39007 - Resistor, Fixed, Wirewound (Power Type), Nonestablished Reliability, Established Reliability, and Space Level, General Specification for.

* DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-202-107 - Test Method Standard Method 107, Thermal Shock
- MIL-STD-202-208 - Test Method Standard Method 208, Solderability
- MIL-STD-690 - Failure Rate Sampling Plans and Procedures
- MIL-STD-790 - Established Reliability and High Reliability Qualified Products List (QPL) Systems for Electrical, Electronic, and Fiber Optic Parts Specifications
- MIL-STD-1285 - Marking of Electrical and Electronic Parts

* (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, the text of this document takes precedence. 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 in accordance with MIL-PRF-39007 and as specified herein.

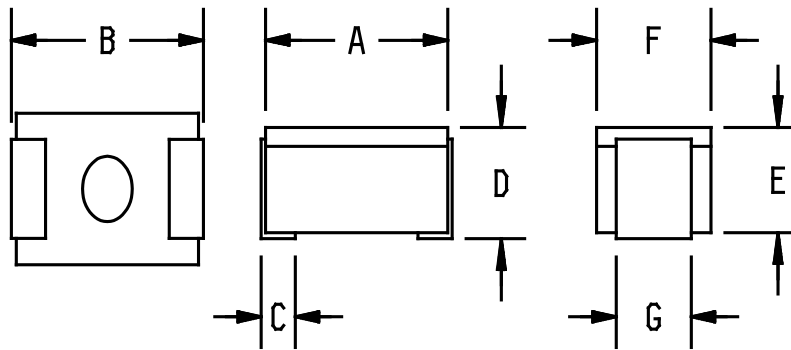
3.2 Interface and physical dimensions. Resistors shall meet the interface and physical dimensions as specified in MIL-PRF-39007 and herein (see figure 1).

3.3 Electrical characteristics.

3.3.1 Resistance value designation. Resistance value designations shall be in accordance with MIL-PRF-39007.

3.3.2 Resistance. The resistance range shall be .1 ohm to 4.92 kilohms.

DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO	SIZE A	CAGE CODE 14933	DWG NO: 93077
		REV H	PAGE 2



Dimensions						
A	B	C	D	E	F	G
(11.0 ±.127)	(11.30 ±.813)	(2.54 ±.254)	(4.11 ±.381)	(3.96 ±.127)	(6.98 ±.127)	(5.46 ±.127)
.433 ±.005	.445 ±.032	.100 ±.010	.162 ±.015	.156 ±.005	.275 ±.005	.215 ±.005

NOTES:

1. Dimensions are in inches, millimeters are in parentheses.
2. Inch equivalents are given for general information only.

FIGURE 1. Resistor, fixed, wirewound, surface mount.

3.3.3 Resistance tolerance. Resistance tolerances are available in (D) ±0.5 percent (for values above 1 ohm), (F) ±1 percent, (H) ±3 percent, and (J) ±5 percent.

* 3.3.4 Encapsulation. The encapsulation shall be in accordance with table I.

TABLE I. Encapsulation.

Style	Encapsulation
(blank) 1/ A	Thermoplastic with cap to lead frame Thermoplastic with lead to lead frame

3.3.5 Power rating. The power rating shall be 2 watt at +70°C. For operation at temperatures greater than +70°C, derate in accordance with figure 2.

* 3.3.6 Resistance temperature coefficient. The resistance temperature coefficient shall be in accordance with table II.

TABLE II. Resistance temperature coefficient.

Style (blank) (cap to lead frame) encapsulation		Style A (lead to lead frame) encapsulation	
0.1 ohm to 0.99 ohm	±90 ppm/°C	0.1 ohm to 0.3 ohm	±150 ppm/°C
1.0 ohm to 9.9 ohm	±50 ppm/°C	0.31 ohm to 0.99 ohm	±90 ppm/°C
10 ohms and over	±20 ppm/°C	1.0 ohm to 9.9 ohms	±50 ppm/°C
		10 ohms and over	±20 ppm/°C

3.3.7 Thermal shock. When resistors are tested as specified in 4.6, there shall be no evidence of mechanical damage. The maximum change in resistance shall not exceed ± (0.2 percent +0.05 ohm).

3.3.8 Load life. When resistors are tested as specified in 4.7, there shall be no evidence of mechanical damage. The maximum change in resistance shall not exceed ± (0.5 percent +0.05 ohm).

DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO	SIZE A	CAGE CODE 14933	DWG NO: 93077
		REV H	PAGE 3

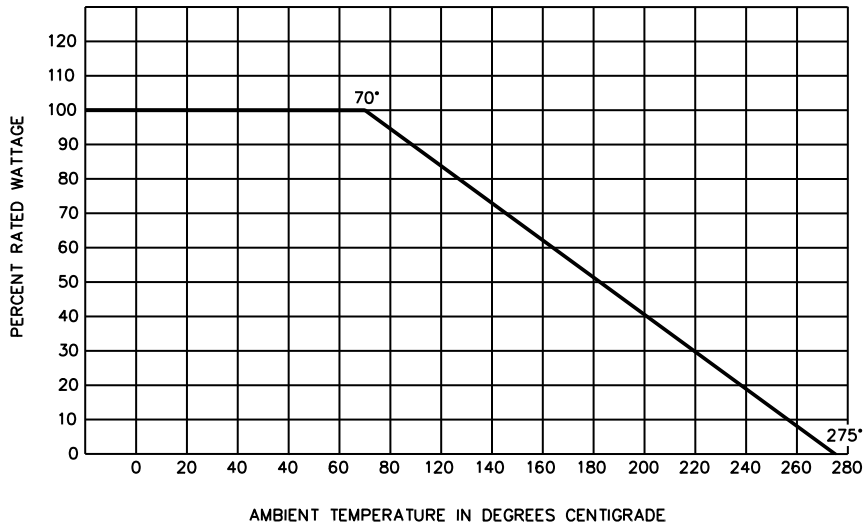


FIGURE 2. Derating curves for high ambient temperatures.

3.3.9 Overload. When resistors are tested as specified in 4.8, there shall be no evidence of electrical or mechanical damage. The maximum change in resistance shall not exceed $\pm (0.2 \text{ percent} + 0.005 \text{ ohm})$.

3.3.10 Solderability. The total surface area of the dipped part of the termination is at least 95 percent covered by a continuous new solder coating. Pin holes, voids, porosity, nonwetting, or dewetting shall not be concentrated in one area and shall not exceed 5 percent of the total termination area. The area of the surface to be tested shall include the total metallized areas of both terminations within .3125 inch (7.938 mm) of the bottom contact point of the "J" bend. In case of a dispute, the percentage of coverage with pinholes or voids shall be determined by actual measurement of these areas, as compared to the total area.

3.3.11 High temperature exposure. When resistors are tested as specified in 4.10, there shall be no evidence of mechanical damage. The maximum change in resistance shall not exceed $\pm (0.5 \text{ percent} + 0.05 \text{ ohm})$.

* 3.4 Marking. Marking shall be as shown:

- 93077 (DLA Land and Maritime drawing number)
- 1R00FA (resistance value, tolerance and encapsulation)
- XXXXX (CAGE code)

Marking of the individual resistors is not required; however, each unit package shall be marked in accordance with MIL-STD-1285 and include the PIN as specified herein (see 1.2), the manufacturer's name or Commercial and Government Entity (CAGE) code, and date lot codes.

3.5 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).

* 3.6 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.

* 3.7 Manufacturer eligibility. To be eligible for being added as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-39007 Qualified Products List for at least one part, or perform the group A and group B inspections specified herein on a sample agreed upon by the manufacturer and DLA Land and Maritime-VAT.

* 3.7.1 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be listed as an approved source of supply.

DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO	SIZE A	CAGE CODE 14933	DWG NO: 93077
		REV H	PAGE 4

3.8 Workmanship. The resistor shall be uniform in quality and free from any defects that will affect life, serviceability, or appearance.

4. VERIFICATION

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

4.2 Reliability assurance program. The reliability assurance program specified in MIL-PRF-39007 and maintained in accordance with MIL-STD-790 is not applicable to this document.

4.3 Failure rate qualification. Failure rate qualification specified in MIL-PRF-39007 and MIL-STD-690 is not applicable to this document.

4.4 Conformance inspection. Conformance inspection shall consist of group A (ER level) and group B inspections of MIL-PRF-39007. Group A, subgroup 1 conditioning will not be performed.

4.4.1 Certification. The activity, at its discretion, may accept a certificate of compliance with group B requirements in lieu of performing group B tests (see 6.2d).

4.5 Inspection of packaging. Inspection of packaging shall be in accordance with MIL-PRF-39007.

* 4.6 Thermal shock. Resistors shall be tested in accordance with MIL-PRF-39007 and the following exception shall apply: Mounting of test samples shall be on surface mount test cards, and MIL-STD-202-107, test condition B-3.

4.7 Load life. Resistors shall be tested in accordance with MIL-PRF-39007 and the following exception shall apply: Mounting of test samples shall be on surface mount test cards, and 1,000 hours at maximum load at +25°C.

4.8 Overload. Resistors shall be tested in accordance with MIL-PRF-39007 and the following exception shall apply: Mounting of test samples shall be on surface mount test cards, and Overload testing will be performed at 5 times rated power for 5 seconds.

* 4.9 Solderability. Solderability shall be in accordance with MIL-STD-202-208 and the following details shall apply:

- a. Application of flux: Type R shall be used. Terminations shall be immersed in the flux, which is at room temperature, to the minimum depth necessary to cover the surface to be tested. The terminations shall be completely immersed by individually dipping each termination. The terminations to be tested shall be immersed in the flux for a period of 5 seconds to 10 seconds.
- b. Solder dip: The dross and burned flux shall be skimmed from the surface of the molten solder (may not require separate operation in wave or flow pot). The molten solder shall be maintained at a uniform temperature of +245°C ±5°C. The surface of the molten solder shall be skimmed again prior to immersing the terminations in the solder. The part shall be attached to a dipping device and the flux-covered terminations immersed in molten solder to the depth, and in the same manner specified in 4.9a. After the dipping process, the part shall be allowed to cool in air. Residue flux shall be removed from the terminations by rinsing in a suitable solvent. If necessary, a soft cloth or cotton swab moistened with clean 91 percent isopropyl alcohol shall remove all remaining flux.
- c. Examination of terminations: After each dip-coated termination has been thoroughly cleaned of flux, the terminations shall be examined under a magnification between 10X and 20X.

4.10 High temperature exposure. Resistors shall be tested in accordance with MIL-PRF-39007 and the following exception shall apply: Mounting of test samples shall be on surface mount test cards, and 250 hours at +125°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 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 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.

DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO	SIZE A	CAGE CODE 14933	DWG NO: 93077
		REV H	PAGE 5

6. NOTES

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

6.1 Intended use. Surface mount resistors are used in electronic circuits where space is a major concern.

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

- a. Complete DLA Land and Maritime CAGE CODE and PIN (see 1.2).
- b. Requirements for delivery: One copy of the conformance inspection data or certification of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.
- c. Requirements for packaging and packing.
- d. Whether the manufacturer performs the group B tests or provides certification of compliance with group B requirements (see 4.4.1).

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).

* 6.4 User of record. Coordination of this document for future revisions is coordinated only with the approved source 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 resistor@dla.mil or in writing to: DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-0552 or DSN 850-0552.

* 6.5 Approved source of supply. Approved source of supply is listed herein. Additional sources will be added as they become available. Assistance in the use of this drawing may be obtained online at resistor@dla.mil or contact DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-0552 or DSN 850-0552.

DLA Land and Maritime drawing PIN 93077	Vendors similar designation or type number <u>1/</u>	Vendor CAGE	Vendor's name and address
Encapsulation style Style (blank) (cap to lead frame)	WSC0002	91637	Vishay Dale Electronics, Inc. P.O. Box 609 Columbus, NE 68602-0609 Plant: Electronica Dale de Mexico, S.A. de C.V. Los Bravos Ave De Las Torres 1950 Col Torres Del Sur CP Juarez, Chihuahua Mexico
Style A (lead to lead frame)	WSC4527		

1/ Parts must be purchased to the DLA Land and Maritime CAGE CODE (037Z3) and PIN to assure that all performance requirements and tests are met.

DEFENSE ELECTRONIC SUPPLY CENTER DAYTON, OHIO	SIZE A	CAGE CODE 14933	DWG NO: 93077
		REV H	PAGE 6