REVISIONS

LT	DESCRIPTION	DATE	APPROVED
A	Five year document review. Update to present DoD policy requirements	6 Feb 2004	K. Cottongim
B	Add pure tin, manufacturer eligibility, and high power pulse paragraphs. Editorial changes throughout.	3 Dec 2010	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

Source control drawing

REV STATUS OF PAGES																		
	REV	B	B	B	B	B	B											
	PAGES	1	2	3	4	5	6											

PMIC N/A	**PREPARED BY** Dennis L. Cross	**DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH**
Original date of drawing 23 November 1998	**CHECKED BY** Andrew R. Ernst **APPROVED BY** Andrew R. Ernst	**TITLE** RESISTORS, FIXED, FILM (INSULATED), 1/2 WATT
	SIZE A / **CODE IDENT. NO.** 037Z3	**DWG NO.** **98021**
	REV B	**PAGE** 1 **OF** 6

1. SCOPE

* 1.1 Scope. This drawing describes the requirements for insulated, fixed, film, 1/2 watt resistors available in ±2 percent, ±5 percent, and ±10 percent resistance tolerances. These resistors are capable of full-load operation at an ambient temperature of 70°C. Designers are CAUTIONED on using these resistors in high power pulse applications (see 6.4).

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

98021	-	G	220
Drawing number		Tolerance (see 3.3.1)	Resistance value (see 3.3.2)

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-39017 - Resistors, Fixed, Film (Insulated), Nonestablished Reliability, Established Reliability, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-790 - Standard Practice for 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.

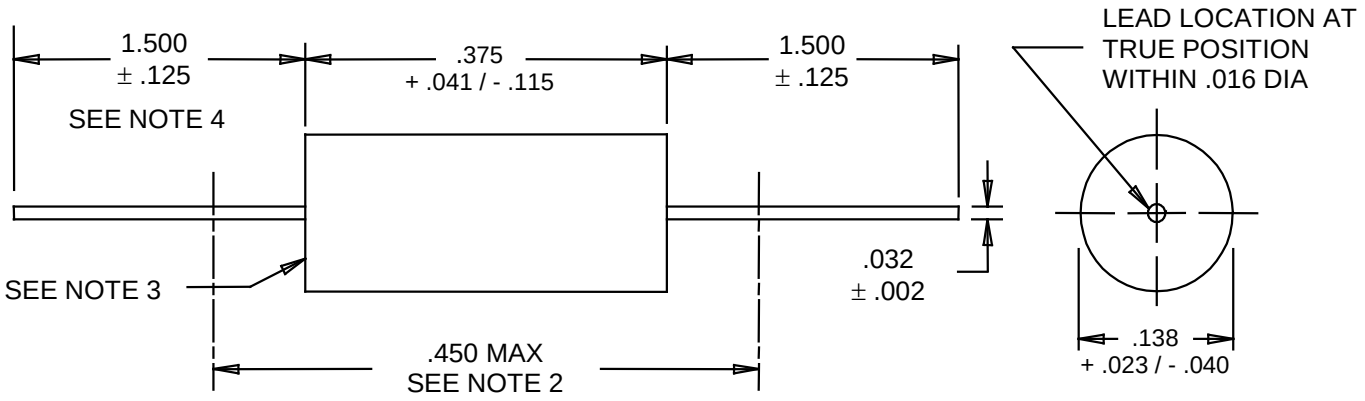
* (Copies of these documents are available online at https://assist.daps.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

* 2.2 Order of precedence. Unless otherwise noted herein or 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. 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-39017, and as specified herein.

3.2 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-39017 and herein (see figure 1).



Inches	mm	Inches	mm
.002	0.05	.125	3.18
.016	0.41	.138	3.51
.023	0.58	.375	9.53
.032	0.81	.450	11.43
.041	1.04	1.500	38.10
.115	2.29		

NOTES:
1. Dimensions are in inches. Metric equivalents are given for general information only.
2. Maximum length is “clean lead” to “clean lead”.
3. The end of the body shall be that point at which the body diameter equals the nearest drill size larger than 250 percent of the nominal lead diameter.
4. Lead length for tape and reel packaging shall be 1 inch (25.4 mm) minimum (see 6.2).
5. The pictorial view of the style above does not depict the actual size and 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. Fixed, film, resistor.

3.3 Electrical characteristics.

3.3.1 Resistance tolerance. The resistance tolerance available shall be (G) ±2 percent, (J) ±5 percent, and (K) ±10 percent.

3.3.2 Resistance. The nominal resistance expressed in ohms is identified by three digits; the first two digits represent significant figures and the last digit specifies the number of zeros to follow. Minimum and maximum resistance values shall be as specified in 3.3.3. Resistance values not listed in the "10 to 100" decade of table I for the appropriate resistance tolerance shall be considered nonconforming to the specification.

TABLE I. Standard resistance values for 10 to 100 decade.

(G) (J)	(K)	(G) (J)	(K)	(G) (J)	(K)
10.0	10.0	22.0	22.0	47.0	47.0
11.0	---	24.0	---	51.0	---
12.0	12.0	27.0	27.0	56.0	56.0
13.0	---	30.0	---	62.0	---
15.0	15.0	33.0	33.0	68.0	68.0
16.0	---	36.0	---	75.0	---
18.0	18.0	39.0	39.0	82.0	82.0
20.0	---	43.0	---	91.0	---

3.3.3 Resistance range. Minimum and maximum resistance values for temperature characteristic of ±350 parts per million (ppm) shall be 3.3 megohm and 22 megohms respectively.

3.3.4 Power rating. The power rating shall be 1/2 watt at +70°C. For operation at temperatures higher than +70°C, derate in accordance with figure 2.

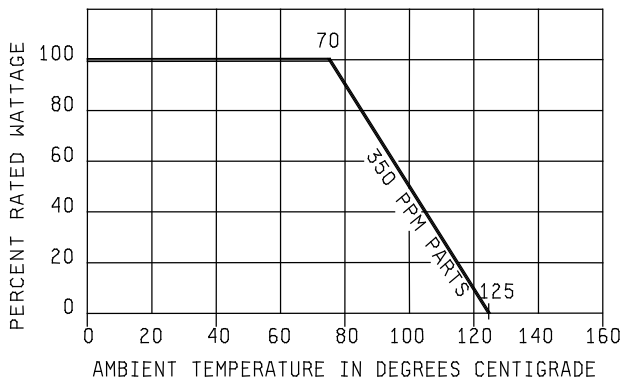


FIGURE 2. Derating curve

3.3.5 Voltage rating. The maximum continuous working voltage shall not exceed 350 volts.

3.3.6 Termination. Termination material shall be in accordance with MIL-PRF-39017.

* 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).

3.3.7 Solderability. The requirement for solderability shall be as specified in MIL-PRF-39017.

3.4 Marking. Full marking shall be in accordance with MIL-STD-1285, except the resistors shall be marked with the PIN as specified herein (see 1.2), the manufacturer's name or Commercial and Government Entity (CAGE) code, and date lot codes is required on the unit package.

3.5 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.

* 3.6 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-39017 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-VA.

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

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

4. VERIFICATION

* 4.1 Qualification inspection. The qualification inspection specified in MIL-PRF-39017 and maintained in accordance with MIL-STD-790 is not applicable to this document.

4.2 Conformance inspection.

4.2.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and group B inspections of MIL-PRF-39017.

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

4.3 Product level qualification. The product level qualification specified in MIL-PRF-39017 is not applicable to this document.

4.4 Visual and mechanical examination. Resistors shall be examined to verify that the materials, design, construction, physical dimensions, marking, and workmanship are in accordance with the applicable requirements of MIL-PRF-39017.

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.

6. NOTES

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

6.1 Intended use. Resistors conforming to this drawing are intended for use when military specifications do not exist. 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: One copy of the conformance inspection results or certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.

c. Terminal finish.

d. Requirements for packaging and packing.

e. Whether the manufacturer performs the group B tests or provides certification of compliance with group B requirements (see 4.2.2).

* 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 Pulse applications. Designers are CAUTIONED on using the above resistors in high power pulse applications. Since they have not been qualified nor tested for such applications, damage and premature failure are possible. These resistors only see a one time pulse (Short-time overload) as part of the group B inspection of MIL-PRF-39017.

* 6.5 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-VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-0552 or DSN 850-0552.

* 6.6 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-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	Vendor similar designation or type number 1/	Vendor CAGE	Vendor name and address
98021-****	ERL-20-36	91637	Vishay Dale, Inc. PO Box 609 Columbus, NE 68602-0609

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