

| REVISIONS | | | |
|-----------|--|----------|--------------|
| LTR | DESCRIPTION | DATE | APPROVED |
| A | Changes in accordance with NOR 5905-R001-99 | 99-25-02 | D. Moore |
| B | Title change, dimensional changes per manufacturer, editorial comments throughout. | 03-24-11 | K. Cottongim |
| C | Add pure tin, manufacturer eligibility, and high power pulse paragraphs. Editorial changes throughout. | 10-03-12 | M. Radecki |
| D | Update Hyperlinks. Editorial changes throughout. | 18-05-10 | 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](#)

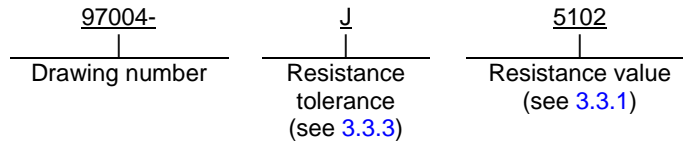
Selected Item Drawing

| | | | | | | | | | | | | | | | | | | |
|--|---------------------------------------|---------------------------|---|---|---|---|---|--|--|--|--|--|--|--|--|--|--|--|
| REV STATUS OF PAGES | REV | D | D | D | D | D | D | D | | | | | | | | | | |
| | PAGES | 1 | 2 | 3 | 4 | 5 | 5 | 6 | | | | | | | | | | |
| PMIC N/A | PREPARED BY Dennis L. Cross | | | | | | | DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH | | | | | | | | | | |
| Original date of drawing 97-08-08 | CHECKED BY Dennis L. Cross | | | | | | | TITLE RESISTOR, FIXED, FILM, (INSULATED), 2 WATT | | | | | | | | | | |
| | APPROVED BY David E. Moore | | | | | | | | | | | | | | | | | |
| | SIZE A | CAGE CODE 037Z3 | | | | | | DWG NO. 97004 | | | | | | | | | | |
| | REV D | | | | | | | PAGE 1 OF 6 | | | | | | | | | | |

1. SCOPE

1.1 Scope. This drawing describes the requirements for insulated, fixed, film, 2 watts resistor available in F (± 1 percent), G (± 2 percent), J (± 5 percent), and K (± 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:



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 SPECIFICATION

MIL-PRF-39017 - Resistor, Fixed, Film (Insulated), Nonestablished Reliability, and 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 <http://quicksearch.dla.mil>).

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).

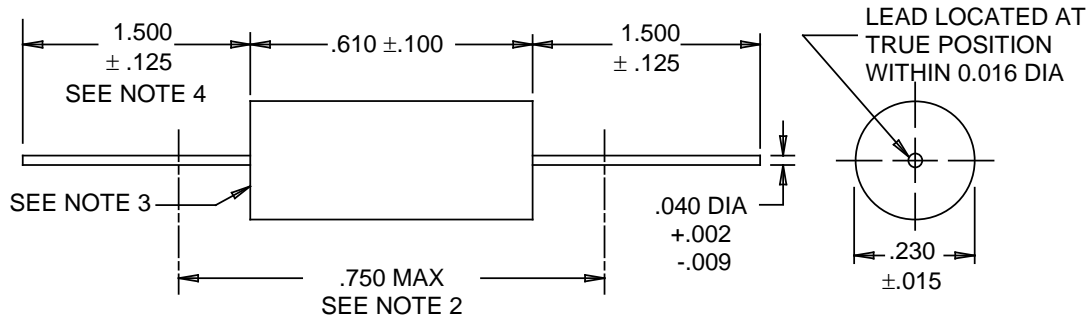
3.3 Electrical characteristics.

3.3.1 Resistance. The nominal resistance expressed in ohms is identified by four digits; the first three digits represent significant figures and the last digit specifies the number of zeros to follow. When the value of resistance is less than 100 ohms, or when fractional values of an ohm are required, the letter "R" shall be substituted for one of the significant figures. Minimum and maximum resistance values shall be as specified in 3.3.2. Resistance values not listed in the "10 to 100" decade table (see table I) for the appropriate resistance tolerance shall be considered nonconforming to the specification.

3.3.2 Resistance range. Minimum and maximum resistance values for temperature characteristics of ± 100 parts per million (ppm) and ± 350 ppm shall be as follows:

| | | |
|--------------------|----------------|----------------|
| | <u>100 ppm</u> | <u>350 ppm</u> |
| Minimum resistance | 10 ohms | 3.0 Megohms |
| Maximum resistance | 2.7 Megohms | 22 Megohms |

| | | | |
|---|-------------------|----------------------------|--------------------------|
| DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO | SIZE A | CAGE CODE 037Z3 | DWG NO. 97004 |
| | | REV D | PAGE 2 |



| <u>Inches</u> | <u>mm</u> | <u>Inches</u> | <u>mm</u> | <u>Inches</u> | <u>mm</u> | <u>Inches</u> | <u>mm</u> |
|---------------|-----------|---------------|-----------|---------------|-----------|---------------|-----------|
| 0.002 | 0.05 | 0.031 | 0.79 | 0.125 | 3.18 | 0.650 | 15.88 |
| 0.015 | 0.38 | 0.040 | 1.02 | 0.190 | 4.83 | 1.500 | 38.10 |
| 0.016 | 0.41 | 0.042 | 1.07 | 0.562 | 14.27 | | |

NOTES:

- Dimensions are in inches. Metric equivalents are for reference only.
- Maximum length is "clean lead" to "clean lead".
- 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.
- Lead length for tape and reel packaging shall be 1 inch (25.4 mm) minimum (see 6.2).
- 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.

3.3.3 Resistance tolerance. The resistance tolerance available shall be F (±1 percent), G (±2 percent), J (±5 percent), and K (±10 percent).

3.3.4 Power rating. The power rating shall be 2 watts at 70°C. For operation at temperatures higher than 70°C, derating shall be in accordance with figure 2.

3.3.5 Voltage rating. The maximum continuous working voltage shall not exceed 500 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. 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.

3.5 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-VAT.

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

| | | | |
|---|-------------------|----------------------------|--------------------------|
| DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO | SIZE A | CAGE CODE 037Z3 | DWG NO. 97004 |
| | | REV D | PAGE 3 |

TABLE I Standard decade table.

| Tolerance (+%) | | | Tolerance (+%) | | | Tolerance (+%) | | |
|----------------|-----------------|----------|----------------|-----------------|----------|----------------|-----------------|----------|
| 1.0 (F) | 2.0 (G)/5.0 (J) | 10.0 (K) | 1.0 (F) | 2.0 (G)/5.0 (J) | 10.0 (K) | 1.0 (F) | 2.0 (G)/5.0 (J) | 10.0 (K) |
| 10.00 | 10.00 | 10.00 | | | | | | |
| 10.20 | | | 24.30 | 24.00 | | 51.10 | 51.00 | |
| 10.50 | | | 24.90 | | | 52.30 | | |
| 10.70 | | | 25.50 | | | 53.60 | | |
| 11.00 | 11.00 | | 26.10 | | | 54.90 | | |
| 11.30 | | | | 27.00 | 27.00 | | 56.00 | 56.00 |
| 11.50 | | | 27.40 | | | 56.20 | | |
| 11.80 | | | 28.00 | | | 57.60 | | |
| | 12.00 | 12.00 | 28.70 | | | 59.00 | | |
| 12.10 | | | 29.40 | | | 60.40 | | |
| 12.40 | | | | 30.00 | | 61.90 | | |
| 12.70 | | | 30.10 | | | | 62.00 | |
| 13.00 | 13.00 | | 30.90 | | | 63.40 | | |
| 13.30 | | | 31.60 | | | 64.90 | | |
| 13.70 | | | 32.40 | | | 66.50 | | |
| 14.00 | | | | 33.00 | 33.00 | | 68.00 | 68.00 |
| 14.30 | | | 33.20 | | | 68.10 | | |
| 14.70 | | | 34.00 | | | 69.80 | | |
| 15.00 | 15.00 | 15.00 | 34.80 | | | 71.50 | | |
| 15.40 | | | 35.70 | | | 73.20 | | |
| 15.80 | | | | 36.00 | | 75.00 | 75.00 | |
| 16.20 | | | 36.50 | | | 76.80 | | |
| 16.50 | | | 37.40 | | | 78.70 | | |
| 16.90 | | | 38.30 | | | 80.60 | | |
| 17.40 | | | | 39.00 | 39.00 | | 82.00 | 82.00 |
| 17.80 | | | 39.20 | | | 82.50 | | |
| | 18.00 | 18.00 | 40.20 | | | 84.50 | | |
| 18.20 | | | 41.20 | | | 86.60 | | |
| 18.70 | | | 42.20 | | | 88.70 | | |
| 19.10 | | | | 43.00 | | 90.90 | | |
| 19.60 | | | 43.20 | | | | 91.00 | |
| 20.00 | 20.00 | | 44.20 | | | 93.10 | | |
| 20.50 | | | 45.30 | | | 95.30 | | |
| 21.00 | | | 46.40 | | | 97.60 | | |
| 21.50 | | | | 47.00 | 47.00 | | | |
| | 22.00 | 22.00 | 47.50 | | | | | |
| 22.10 | | | 48.70 | | | | | |
| 22.60 | | | 49.90 | | | | | |
| 23.20 | | | | | | | | |
| 23.70 | | | | | | | | |

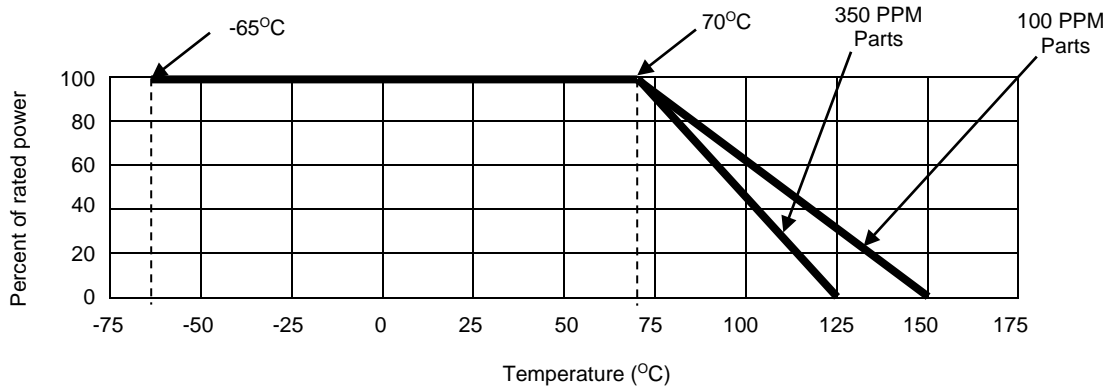


FIGURE 2. Derating curve.

| | | | |
|---|-------------------------|----------------------------------|--------------------------------|
| DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO | SIZE A | CAGE CODE 037Z3 | DWG NO. 97004 |
| | | REV D | PAGE 4 |

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

4. VERIFICATION

4.1 Product assurance program. The product assurance program specified in [MIL-PRF-39017](#) 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 Failure rate qualification. The failure rate qualification specified in [MIL-PRF-39017](#) 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 the group A and group B inspections of [MIL-PRF-39017](#) where applicable.

4.4.2 Group B inspection. Group B inspection shall be in accordance with [MIL-PRF-39017](#).

4.4.2.1 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 6.2d).

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 and qualified military devices that will perform the required function are not available for the OEM application.

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 a certificate of compliance with group B requirements. If purchase order makes no reference to Group B screening the manufacturer will provide a certification of compliance (see 4.4.2.1).

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 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](#).

| | | | |
|---|-------------------|----------------------------|--------------------------|
| DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO | SIZE A | CAGE CODE 037Z3 | DWG NO. 97004 |
| | | REV D | PAGE 5 |

6.5 Users of record. User 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 - VAT, P.O. Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-8754 or DSN 850-8754.

6.6 Approved source 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 - 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 (see 1.2) | Vendors similar designation or type number <u>1/</u> | Vendor CAGE | Vendor's name and address |
|---|--|-------------|--|
| 97004-***** | ERL-62-1 ERL-62-2 <u>2/</u> | 91637 | Vishay Dale P.O. Box 609 1122 23rd Street Columbus, NE 68602-0609 |

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

2/ Hot solder dip.

| | | | |
|---|-------------------|----------------------------|--------------------------|
| DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OHIO | SIZE A | CAGE CODE 037Z3 | DWG NO. 97004 |
| | | REV D | PAGE 6 |