

REVISIONS			
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A	Update Hyperlinks. Editorial changes throughout.	18-07-13	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	A	A	A	A	A	A	A	A	A								
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PMIC N/A	PREPARED BY Andrew R. Ernst	DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH	
Original date of drawing 09-19 11	CHECKED BY Andrew R. Ernst	TITLE RESISTOR, VARIABLE, SURFACE MOUNT, 4MM, MULTITURN TRIMMER, 1/4 WATT	
	APPROVED BY Michael A. Radecki		
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1. SCOPE

1.1 Scope. This drawing describes the requirements for a variable, surface mount, non-wirewound resistor.

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

<u>10009</u>	-	<u>*</u>	---
Drawing Number		Termination (3.3.4)	Resistance (3.3.1)

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 SPECIFICATIONS

MIL-PRF-22097 - Resistor, Variable, Non-wirewound, (Adjustment Type), General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-202 - Test Methods Standard for Electronic and Electrical Component Parts.
- MIL-STD-202-208 - Test Method Standard Method 208, Solderability
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <https://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-22097 and as specified herein.

3.2 Interface, and physical dimensions. The resistor shall meet the interface, and physical dimensions as specified in MIL-PRF-22097 and herein (see figure 1).

3.3 Electrical characteristics.

3.3.1 Resistance range. The resistance range shall be from 10 ohms to 2 megohms. Nominal resistance values are as specified in table I.

3.3.2 Resistance tolerance. The resistance tolerance shall be ±10 percent.

3.3.3 Power rating. The power rating shall be 250 milliwatts at +85°C. For operation at temperatures higher than +85°C, derated in accordance with figure 2.

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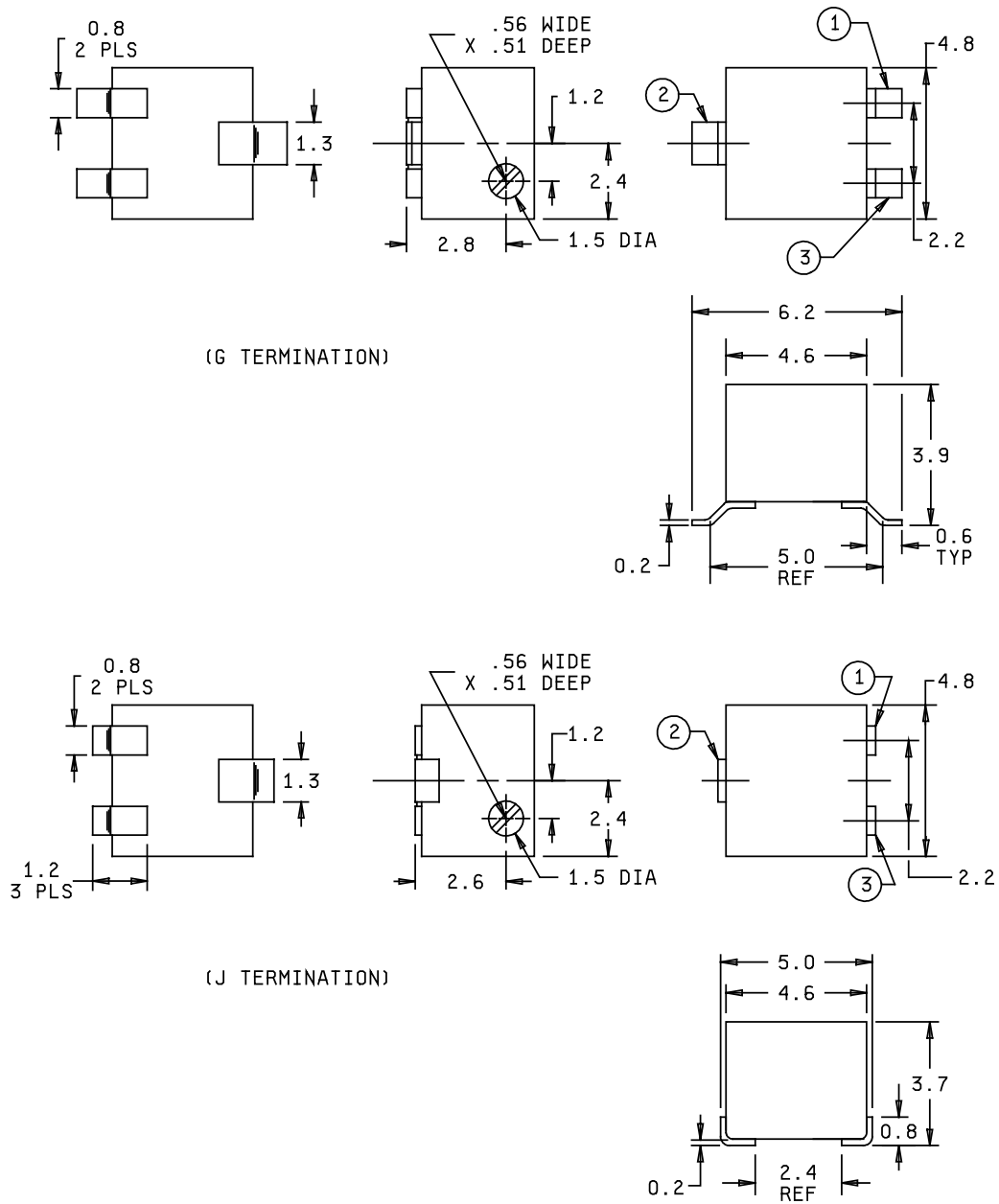


FIGURE 1. Surface mount trimmer.

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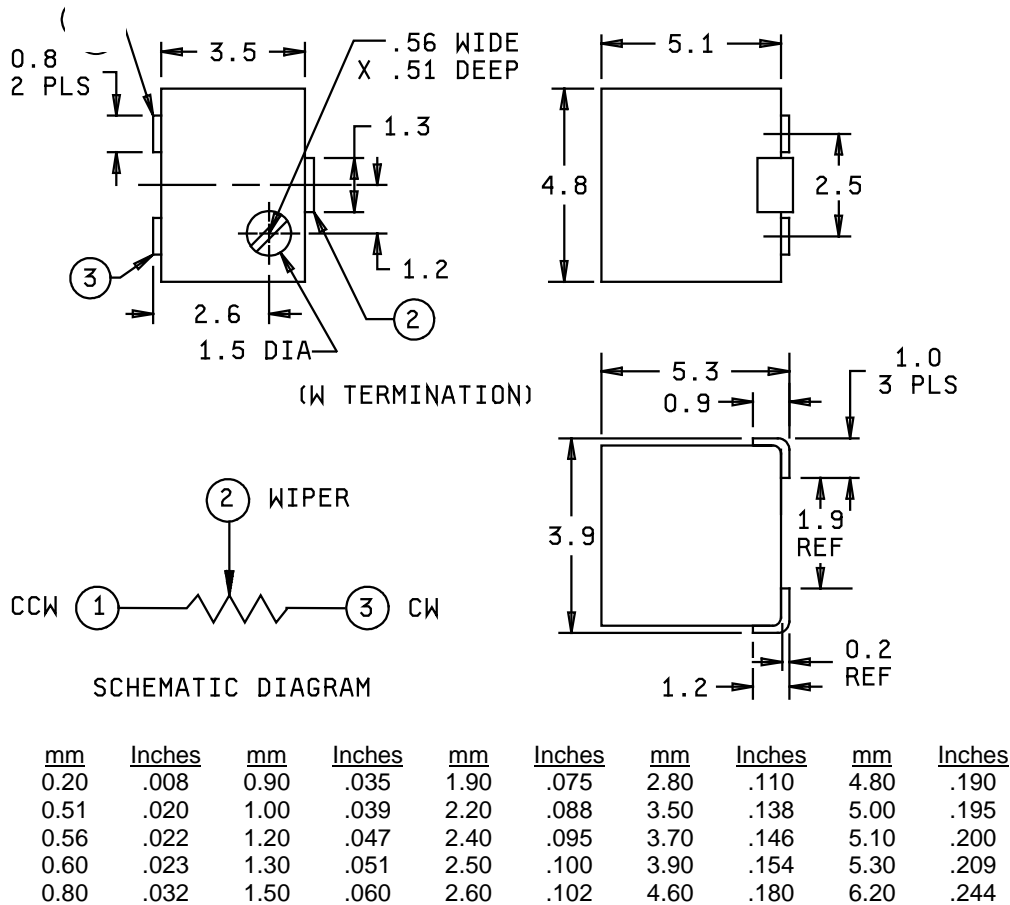
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NOTES:

1. Dimensions are in millimeters.
2. Inches are given for information only.
3. Unless otherwise specified, tolerance is ± 0.3 mm (0.012 inch).

FIGURE 1. Surface mount trimmer – Continued.

TABLE I. Nominal resistance value and resistance value designation.

Resistance value designation	Nominal resistance value (in ohms)	Resistance value designation	Nominal resistance value (in ohms)	Resistance value designation	Nominal resistance value (in ohms)
100	10	102	1,000	104	100,000
200	20	202	2,000	204	200,000
500	50	502	5,000	504	500,000
101	100	103	10,000	105	1,000,000
201	200	203	20,000	205	2,000,000
501	500	503	50,000		

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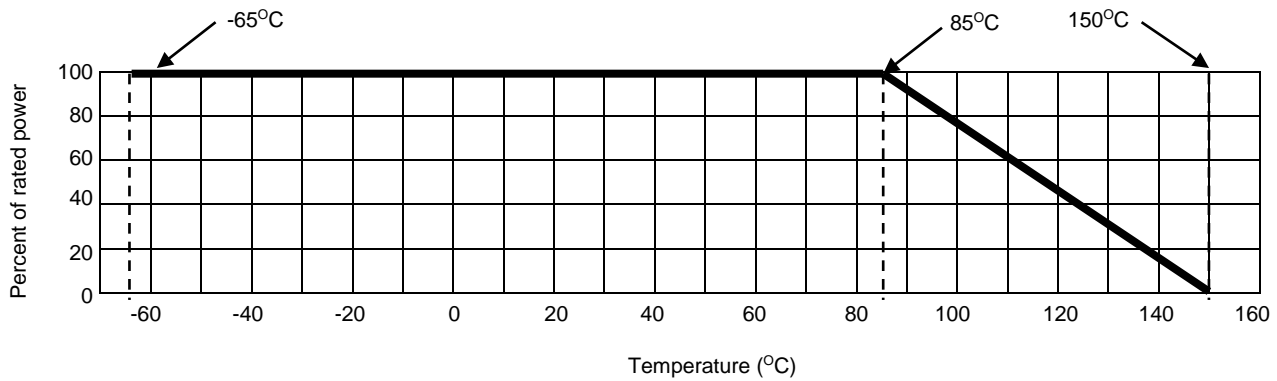


FIGURE 2. Derating curve.

3.3.4 Termination. Resistors are available in J, G, and W terminations in accordance with [figure 1](#).

3.3.5 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](#)).

3.3.6 Voltage. The maximum voltage shall be 300 volts.

3.3.7 End resistance. The maximum end resistance shall be 1 percent of the resistance value or 2 ohm, whichever is greater.

3.3.8 Contact resistance variation. The contact resistance variation shall be ± 1 percent of the resistance value or 3 ohms, whichever is greater.

3.3.9 Temperature range. The temperature range shall be -65°C to $+150^{\circ}\text{C}$.

3.3.10 Temperature coefficient. The temperature coefficient shall be ± 100 ppm/ $^{\circ}\text{C}$ maximum.

3.3.11 Insulation resistance. The insulation resistance shall be 100 megohms minimum.

3.3.12 Electrical continuity. Electrical continuity shall be continuous for full mechanical range.

3.3.13 Resolution. The resolution shall be essentially infinite.

3.3.14 Dielectric strength. When resistors are tested as specified in [4.4](#), there shall be no evidence of mechanical damage, arcing, or breakdown. The leakage current shall not exceed 1 milliampere.

3.4 Mechanical characteristics.

3.4.1 Actual electrical travel. The actual electrical travel shall be 11 turns nominal.

3.4.2 Shaft torque. The maximum shaft torque shall be 180 gm-cm maximum.

3.4.3 Rotational life. When resistors are tested as specified in [4.5](#), the change in total resistance shall not exceed ± 3 percent or 3 ohms, whichever is greater. There shall be no evidence of mechanical damage.

3.4.4 Resistance to soldering heat. When resistors are tested as specified in [4.6](#), there shall be no evidence of mechanical damage. The change in resistance shall not exceed 1 percent.

3.4.5 Solderability. When resistors are tested as specified in [4.7](#), there shall be no evidence of mechanical damage.

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3.5 Environmental characteristics. Environmental characteristics shall be in accordance with [MIL-PRF-22097](#), characteristic F.

3.6 Marking. Resistors shall be marked with the PIN assigned herein (see [1.2](#)), and manufacturer's CAGE code (or logo), in accordance with [MIL-STD-1285](#).

3.7 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the [MIL-PRF-22097 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.

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

3.8 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.

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

4. VERIFICATION

4.1 Qualification inspection. Qualification inspection 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 inspection of [MIL-PRF-22097](#) (see [6.5](#)).

4.2.2 Certification. The acquiring activity may accept a certificate of compliance in lieu of group B inspection (see [6.2d](#)).

4.3 Inspection of packaging. Inspection of packaging shall be in accordance with [MIL-PRF-22097](#).

4.4 Dielectric strength. Dielectric strength shall be in accordance with [MIL-PRF-22097](#). The following details and exceptions shall apply:

- a. 600 V rms: Sea level.
- b. 250 V rms: 80,000 feet.

4.5 Rotational life. Rotational life shall be in accordance with [MIL-PRF-22097](#). The following detail and exception shall apply: 200 cycles.

4.6 Resistance to soldering heat. The requirements for resistance to soldering heat shall be as follows:

- a. Measure total resistance (R_{T1}).
- b. Subject units to 215°C for 3 minutes. (Using boiling FC-70 fluorinated vapors as temperature medium.)
- c. After a minimum of 3 hours, measure total resistance (R_{T2}).
- d. Calculate total resistance shift (TRS) by using the following formula:

$$TRS = \frac{R_{T2} - R_{T1}}{R_{T1}} \times 100$$

- e. This test will be performed before the leads are trimmed and formed into the surface mount terminals.

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4.7 Solderability. The requirements for solderability shall be as follows:

- a. Steam age in accordance with MIL-STD-202-208, 8 hours.
- b. Apply solder paste of a composition of 60 percent tin, 40 percent lead, to the middle of the terminal. A sufficient amount of paste is a bead that will cover the entire terminal with a minimum of .005 inch (0.13 mm) thickness on the mounting surface.
- c. The entire unit shall then be immersed at a rate of $1 \pm .250$ inch (25.4 ± 6.35 mm) per second into boiling fluorinated vapors (FC-70) at $215^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 30 seconds, and then removed at a rate $1 \pm .250$ inch per second.
- d. After dipping, clean the flux from the terminal with isopropyl alcohol.
- e. Examine the terminals under 10X magnification.
- f. The terminal mounting area shall be coated with at 95 percent, by a continuous new solder coating, with pin holes and voids not concentrated in any one area and do not exceed 5 percent of total mounting area.

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 material 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 activities within the Military Service 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 that 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, described herein are intended to be used in surface mount applications.

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. If purchase order makes no reference to group B screening the manufacturer will provide a certification of compliance (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 Date code caution note. The approved source of supply's vendor part number used 100% pure tin (see 6.3) on terminals (DLA Land and Maritime drawing 92021, now cancelled) and was not compliant since August 2000. They are now in compliance with this drawing. More details are available from the approved source for any resistor with the vendor's part number and date code before 945C.

6.5 Critical user parameters. For critical user parameters required during the soldering and board cleaning processing, see manufacturing application notes.

6.6 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.

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6.7 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
10009-****	3224-FL4 (see 6.4)	32997	Bourns, Incorporated 1200 Columbia Avenue Riverside, CA 92507-2114

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.

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