

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add new tolerance (B). Change RTC to 25 ppm/°C. Dimensional changes. Change voltage to 50 V dc. Add new suppliers.	88-05-23	D. Moore
B	Add new requirements for resistance characteristic, power ratings, solderability, and dimensions.	89-05-28	D. Moore
C	Correct figure 2, PIN numbering sequence. Add new vendor CAGE 57252. Editorial changes throughout.	91-12-17	D. Moore
D	Add new tolerances (B) and (D). Deleted power rating on schematic B. Change figure 1, schematic B. Deleted ozone depleting substance. Editorial changes throughout.	93-10-08	D. Moore
E	Add new configuration and vendor; change reference specification to MIL-PRF-914. Editorial corrections throughout.	98-03-24	D. Moore
F	Correct part number. Changes RTC and power ratings paragraphs. Editorial changes throughout.	00-06-22	K. Cottongim
G	Changes in accordance with NOR 5905-R004-02.	02-06-06	K. Cottongim
H	Changes in accordance with NOR 5905-R010-03.	03-04-02	K. Cottongim
J	Remove vendor from suggest sources. Editorial changes throughout.	03-10-06	K. Cottongim
K	Inactivate characteristics K and M, add pure tin, manufacturer's eligibility, and pulse application paragraphs. Dimensions changes. Editorial changes throughout.	12-03-16	M. Radecki
L	Update Hyperlinks. Editorial changes throughout.	18-11-09	M. Radecki
M	Update to present DoD requirements.	24-09-03	M. Radecki

CURRENT DESIGN ACTIVITY CAGE CODE 037Z3  
HAS CHANGED NAMES TO:  
DLA LAND AND MARITIME  
COLUMBUS, OHIO 43218-3990

**Notice of Partial Inactivation for New Design**  
Characteristics K and M of DLA Land and Maritime  
Drawing 87017 are inactive for new design and are no  
longer used, except for replacement purposes.  
Use [MIL-PRF-914/4](#).



Prepared in accordance with [ASME Y14.24](#)

Selected Item Drawing

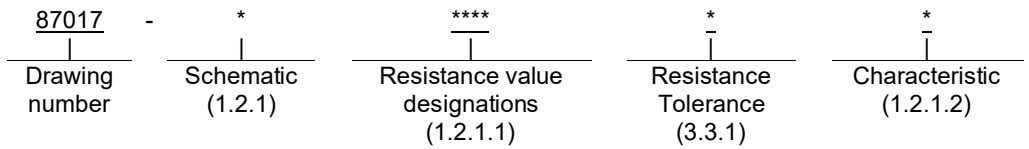
Revision Status of Sheets															
REV															
SHEET															
REV	M	M	M	M	M	M	M	M							
SHEET	1	2	3	4	5	6	7	8							

<b>PMIC N/A</b>  Original date of drawing 1987-11-10	<b>PREPARED BY</b> Allan R. Knox		<b>DEFENSE ELECTRONICS SUPPLY CENTER</b> DAYTON, OHIO 45444-5000	
	<b>CHECKED BY</b> David W. Withrow		<b>TITLE</b> RESISTOR NETWORK, FIXED, FILM, SURFACE MOUNT, 28 PIN, LEADLESS CHIP CARRIER	
	<b>APPROVED BY</b> David E. Moore			
	<b>SIZE</b> A	<b>CAGE CODE</b> 14933	<b>DWG NO.</b> 87017	
<b>REV M</b>		<b>PAGE 1 OF 8</b>		

1. SCOPE

1.1 Scope. This drawing describes the requirements for a 20 pin, leadless chip carrier, resistor network. These networks are available only in nonhermetically sealed packages.

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



1.2.1 Schematic. The schematic of the resistor network is identified by a single letter in accordance with figure 1.

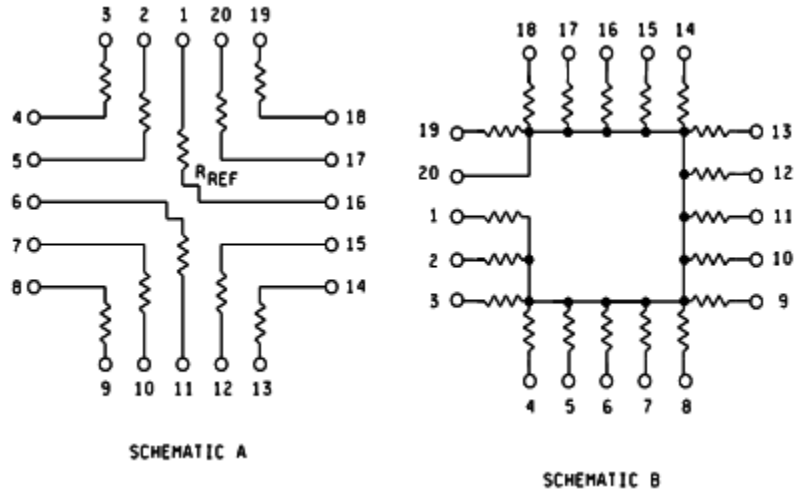


FIGURE 1. Schematics

1.2.1.1 Resistance value designations. The resistance value designations are in accordance with [MIL-PRF-914](#).

1.2.1.2 Characteristic. Resistor networks are available in characteristics H, R, or V. in accordance with [MIL-PRF-914](#) (see 3.2). Characteristics K, and M are inactive for new design.

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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-914](#) - Resistor Network, Fixed, Film, Surface Mount, Nonestablished Reliability, and Established Reliability, General Specification For

DEPARTMENT OF DEFENSE STANDARD

[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 <https://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. 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-914](#) and as specified herein.

3.2 Interface and physical dimension requirements. Resistors shall meet the interface and physical dimensions as specified in [MIL-PRF-914](#) and herein (see figure 2).

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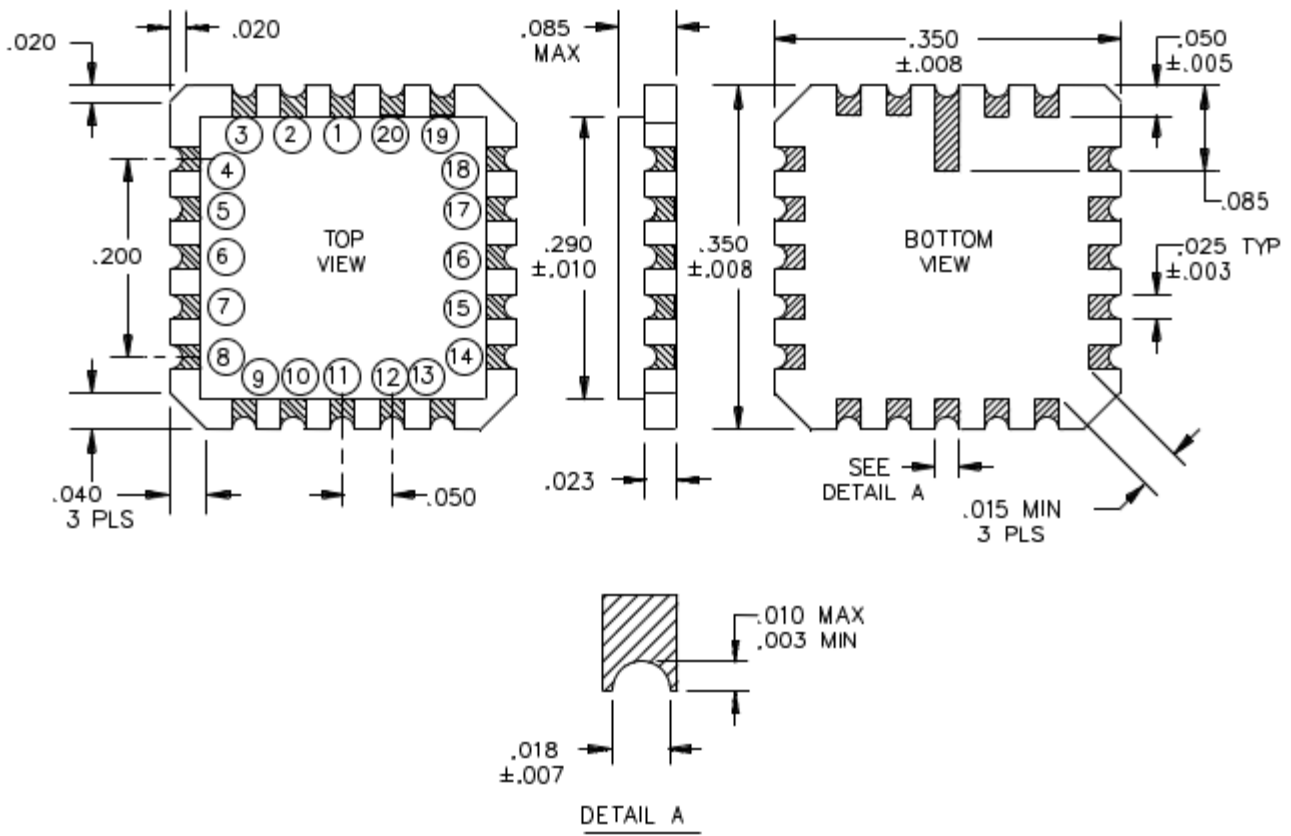
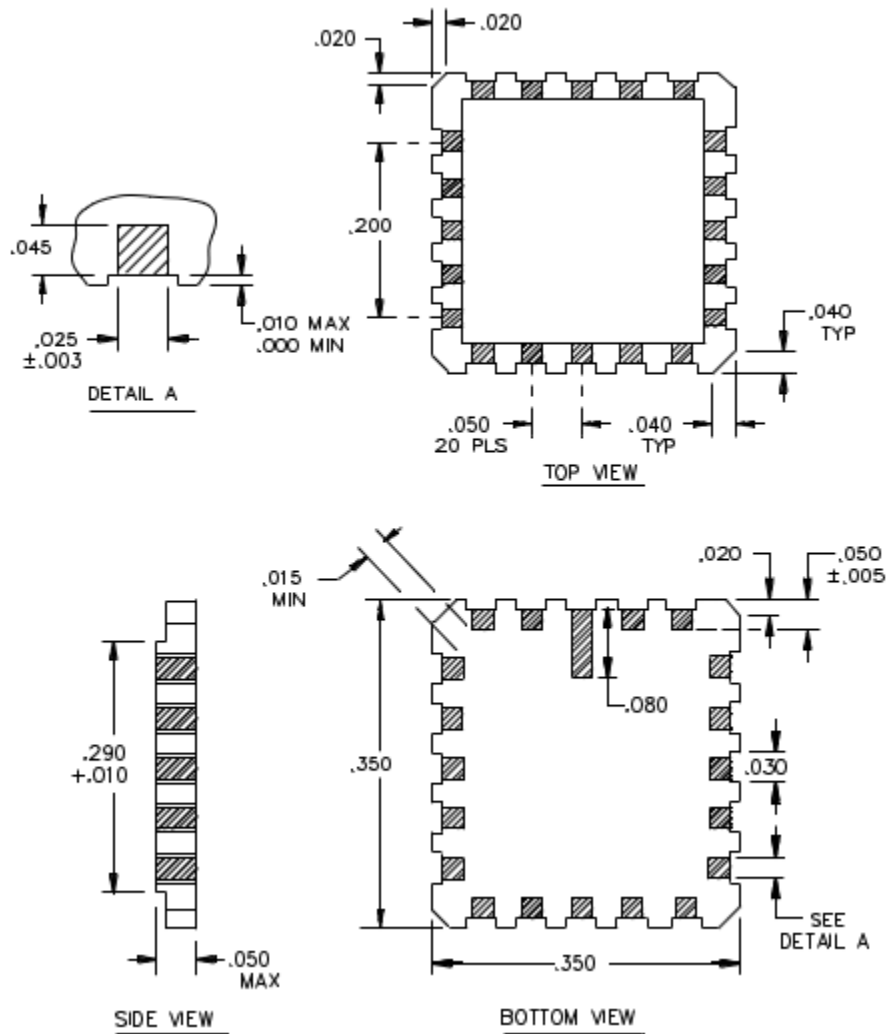


FIGURE 2. Leadless chip carrier

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Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
0.003	0.08	0.010	0.25	0.020	0.51	0.045	1.14	0.200	5.08
0.005	0.13	0.015	0.38	0.025	0.64	0.050	1.27	0.290	7.37
0.007	0.17	0.016	0.41	0.030	0.76	0.080	2.03	0.350	8.89
0.008	0.20	0.018	0.45	0.040	1.02	0.085	2.16		

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±0.008 (0.20 mm).
4. Adjacent corner pads may be rounded or diagonally cut to meet the 0.015 (0.38 mm) minimum requirement.

FIGURE 2. Leadless chip carrier (Optional slot configuration). - continued.

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3.2.1 Termination. Termination finish shall be tin-lead or hot solder dip as specified in [MIL-PRF-914](#).

3.2.2 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 6.4).

3.3 Electrical characteristic.

3.3.1 Resistance tolerance. Resistance tolerances are in accordance with table I.

TABLE I. Resistance tolerance.

Symbol	Resistance tolerance ± percent	Symbol	Resistance tolerance ± percent
B	0.1	G	2.0
D	0.5	J	5.0
F	1.0		

3.3.2 Resistor power ratings. The power rating for individual resistors shall be in accordance with table II.

TABLE II. Power ratings.

Symbol	Characteristic			
	K and M <sup>1/</sup>		H, R, and V	
	Element (watts)	Network (watts)	Element (watts)	Network (watts)
A	0.10	1.00	0.050	0.50
B	0.05	0.95	0.025	0.475

<sup>1/</sup> Characteristics K and M are inactivated for new design.

3.3.3 Package power rating. The package power rating shall be in accordance with table II. For temperatures in excess of 70°C, resistors shall be derated in accordance with [MIL-PRF-914](#).

3.3.4 Power conditioning. Power conditioning shall be in accordance with [MIL-PRF-914](#) at 1.5 times rated power specified for individual resistors (see 3.3.2).

3.3.5 Temperature range. The operating temperature range shall be -55°C to +125°C.

3.3.6 Resistance temperature characteristic. The resistance temperature characteristic shall be in accordance with [MIL-PRF-914](#).

3.3.7 Resistance range. The resistance range shall be from 10 ohms to 2.2 megohms.

3.3.8 Operating voltage. The maximum operating voltage shall be 50 V dc.

3.4 Environmental characteristic. The environmental characteristics shall be in accordance with [MIL-PRF-914](#) characteristic H, R, or V. Characteristics K and M are inactivated for new design.

3.5 Marking. Marking shall be in accordance with [MIL-STD-1285](#), except the resistor network shall be marked with the PIN as specified herein (see 1.2), the manufacturer's name or CAGE code, and date lot codes.

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 to be added as an approved source of supply, a manufacturer shall be listed on the [MIL-PRF-914 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.

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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 Workmanship. Resistors shall be uniform in quality and 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-914](#) 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.

4.2.1 Failure rate qualification. The failure rate qualification specified in [MIL-PRF-914](#) is not applicable to this document.

4.3 Conformance inspections.

4.3.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and group B inspections of [MIL-PRF-914](#).

4.3.2 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 6.2d).

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-914](#).

#### 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel 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 that may be helpful, but is not mandatory.)

6.1 Intended use. Resistor networks are used in surface mounting applications 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 (037Z3) 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 (i.e. ESD sensitive packaging).
- d. Whether the manufacturer performs the group B tests or provides certification of compliance with group B requirements (see 4.3.2).

6.3 PIN supersession. PIN's in the original [87017](#) and revision A have been superseded by a new PIN in revision B that includes a characteristic code to differentiate between hermetically and nonhermetically sealed resistor networks. Table III illustrates a generic PIN substitution:

TABLE III. PIN supersession.

87017	87017A nonhermetic
87017-87017X	87017-87017XM

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6.4 Electrostatic charge. Under several combinations of conditions, these resistors can be electrically damaged, by electrostatic charges, and drift from specified value. Users should consider this phenomena when ordering or shipping resistors. Direct shipment to the Government is controlled by [MIL-DTL-39032](#) which specifies a preventive packaging procedure.

6.5 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).

6.6 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.

6.7 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](mailto:resistor@dla.mil) or in writing to: DLA Land and Maritime - VAT, P.O. Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-9821 or DSN 850-9821.

6.8 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](mailto:resistor@dla.mil) or contact DLA Land and Maritime - VAT, P.O. Box 3990, Columbus, OH 43218-3990, or by telephone (614) 692-9821 or DSN 850-9821.

DLA Land and Maritime drawing PIN 87017-*****	Vendor similar designation or type number <sup>1/</sup>	Vendor CAGE	Vendor's name and address
Characteristic H, K, M, R, or V; Resistance values 10 ohms through 150 kilohms; Resistance tolerances B, D, F, G, and J; Schematics A and B.	790*	57027	IRC, Incorporated 4222 S. Staples Street Corpus Christi, TX 78411-2702
Characteristic K or M; Resistance values 10 ohms through 1 megohms; Resistance tolerances F, G, and J; Schematics A and B.	210-014	57489	VISHAY Thin Film 2160 Liberty Drive Niagara Falls, NY 14304-3798
Characteristic K or M; Resistance values 10 ohms through 1 megohms; Resistance tolerance F, G, and J; Schematics A and B.	HJCB20-----	56235	State of the Art, Incorporated 2470 Fox Hill Rd. State College, PA 16803-1797
Characteristic V and H; Resistance values 1K, 2K, and 5K ohms; Resistance tolerances F; Schematics B	HC-156-1001-0.5-LR-1 HC-156-2001-0.5-LR-1 HC-156-5001-0.5-LR-1	27851	Spectrum Microwave 400 Nickerson Road Marlborough, MA 01752

<sup>1/</sup> 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.

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