**REVISIONS**

| LTR | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|
| A | Add pure tin, manufacturer eligibility, and high power pulse paragraphs. Removal of the short time overload test. Manufacturer requested changes. Editorial changes throughout. | 28 MAR 2014 | M. Radecki |
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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

| REV STATUS OF PAGES | REV | A | A | A | A | A | A | A | A | A | | | | | | | | |
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|---|---|---|
| **PMIC N/A** | **PREPARED BY**<br>Andrew R. Ernst | **DEFENSE SUPPLY CENTER, COLUMBUS**<br>**COLUMBUS, OH** |
| Original date of drawing<br><br>17 December 2004 | **CHECKED BY**<br>Andrew R. Ernst<br><br>**APPROVED BY**<br>Kendall A. Cottongim | **TITLE**<br>**RESISTOR, CHIP, FIXED, FILM,**<br>**HIGH VOLTAGE, STYLE 1206** |
| | **SIZE**<br>**A** / **CODE IDENT. NO.**<br>**037Z3** | **DWG NO.**<br>**03025** |
| | **REV** A | **PAGE** 1 **OF** 9 |

1. SCOPE

1.1 Scope. This drawing describes the requirements for a high voltage, fixed, film, chip resistor, style 1206.

1.2 Part or Identifying Number (PIN). The complete PIN is as shown in the following example:

| 03025- | **** | * | * |
|---|---|---|---|
| Drawing number | Resistance value (see 3.3.2) | Tolerance (see 3.3.3) | Termination (see 3.3.8) |

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-55342 - Resistors, Chip, Fixed, Film, Nonestablished Reliability, Established Reliability, Space Level, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-690 - Failure Rate Sampling Plans and Procedures.
MIL-STD-790 - Standard Practice for Established Reliability and High Reliability Qualified Products List (QPL) Systems for Electrical, Electronic, and Fiber Optic Parts Specifications.

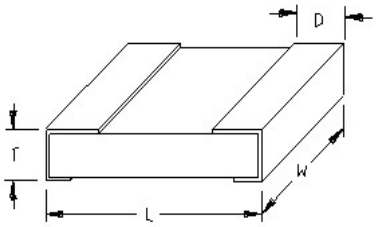
* (Copies of these documents are available online at http://quicksearch.dla.mil.)

* 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 (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 as specified herein.

3.2 Interface and physical dimensions. The interface and physical dimensions shall be as specified in MIL-PRF-55342 and herein (see figure 1). Passivation is not applicable, however, a protective coating over the element shall be provided.




| L | | W | | T (max) | | D | |
|---|---|---|---|---|---|---|---|
| Inch | mm | Inch | mm | Inch | mm | Inch | mm |
| 0.125 ±0.006 | 3.175 ±0.152 | 0.063 ±0.006 | 1.600 ±0.152 | 0.025 ±0.002 | 0.635 ±0.051 | 0.025 max. | 0.635 max. |

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The pictorial view of the styles above 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. Chip resistor.

3.3 Electrical characteristics.

3.3.1 Resistance. The nominal resistance expressed in ohms is identified by four characters, consisting of three digits and a letter. The letter is used simultaneously as a decimal point and as a multiplier. For resistance values:

a. Greater than or equal to 2 megohm but less than 1 gigohms, the letter "M" is used to represent a decimal point.

b. Greater than or equal to 1 gigohm but less than 8 gigohms, the letter "G" is used to represent a decimal point.

All digits preceding and following the letters (M or G) of the group represent significant figures. The resistance value designations are shown in table I. Minimum and maximum resistance values shall be as specified herein (see table II). The resistance values for tolerances F, G, J, and K may be any value within the limits specified herein. Resistance values not listed in the "10 to 100" decade table of MIL-PRF-55342 for the appropriate resistance tolerance shall be considered as not conforming to the specification. The standard values for every decade shall follow the sequence demonstrated for the "10 to 100" decade table specified in MIL-PRF-55342.

3.3.2 Resistance range. The resistance range shall be from 2 Megohms to 8 Gigohms.

TABLE I. Designation of resistance values.

| Designation | Resistance ohms |
|---|---|
| 2M00 to 9M99 incl. | 2,000,000 to 9,999,999 incl. |
| 10M0 to 99M9 incl. | 10,000,000 to 99,999,999 incl. |
| 100M to 999M incl. | 100,000,000 to 999,999,999 incl. |
| 1G00 to 8G00 incl. | 1,000,000,000 to 8,000,000,000 incl. |

3.3.3 Resistance tolerance. Resistors are available in resistance tolerances as specified in table II.

TABLE II. Resistance tolerance.

| Symbol | Resistance tolerance percent |
|---|---|
| F | ±1.0 |
| G | ±2.0 |
| J | ±5.0 |
| K | ±10.0 |

3.3.4 Power rating. The power rating for chip resistors shall be .300 watt at +70°C derated to +150°C at zero power (see figure 2).

3.3.5 Voltage rating. The maximum continuous working voltage shall not exceed 1500 volts. Voltage derating should be applied if low pressure or high humidity is encounter.

* 3.3.6 Resistance temperature coefficient. The resistance temperature coefficient shall be ±100 ppm/°C. For resistance values greater than 1 gigohm the resistance temperature coefficient shall be ±300 ppm/°C.

3.3.7 Operating temperature. The operating temperature shall be -25°C to +150°C.

3.3.8 Termination. The termination material shall be in accordance with MIL-PRF-55342, code letters B, C, G, and U.

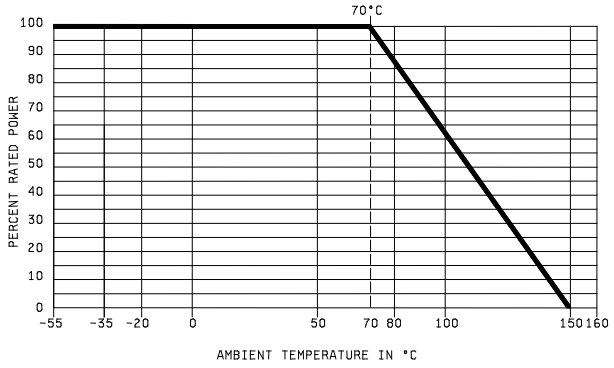



FIGURE 2. Derating curve.

* 3.3.9 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).

3.4 DC resistance. When resistors are tested as specified in 4.6, the dc resistance shall be within the specified tolerance of the nominal resistance.

* 3.5 Thermal shock. When resistors are tested as specified in 4.7, the thermal shock change in resistance shall not exceed ±0.5 percent +0.01 ohm.

* 3.6 Low temperature operation. When resistors are tested as specified in 4.9, the low temperature operation change in resistance shall not exceed ±.5 percent +0.01 ohm for ohmic values ≤ 1 gigohms, and ±2.0 percent +0.01 ohm for ohmic values > 1 gigohm to ≤ 8 gigohms.

* 3.7 Resistance to solder heat. When resistors are tested as specified in 4.10, the resistance to bonding exposure change in resistance shall not exceed ±0.5 percent +0.01 ohm.

3.8 Resistance temperature characteristic. When resistors are tested as specified in 4.11, the RTC shall not exceed the values specified (see 3.3.6).

3.9 Moisture resistance. When resistors are tested as specified in 4.12, the moisture resistance change in resistance shall not exceed ±0.5 percent +0.01 ohm.

3.10 High temperature exposure. When resistors are tested as specified in 4.13 the high temperature exposure change in resistance shall not exceed ±0.5 percent +0.01 ohm.

* 3.11 Life. When resistors are tested as specified in 4.14, the life change in resistance shall not exceed ±5.0 percent +0.01 ohm for ohmic values ≤ 1 gigohms, and ±10.0 percent +0.01 ohm for ohmic values > 1 gigohm to ≤ 8 gigohms.

* 3.12 Solderability. The requirement for solderability shall be as specified in 4.8 and 4.4.1.1.3.

3.13 Marking. Marking is not required on this resistor; however, each waffle pack shall be marked with the PIN assigned herein (see 1.2), the manufacturer's identification code, the date code, and the lot code. At the option of the manufacturer, the resistor may be marked (i.e., laser, color dot, etc.). The marking shall remain legible after all tests.

3.14 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.

* 3.15 Manufacturer eligibility. To be eligible for listing as an approved source of supply, a manufacturer shall be listed on the MIL-PRF-55342 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.

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

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

4. VERIFICATION

4.1 Product assurance program. The product assurance program specified in MIL-PRF-55342 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 Product level qualification. The product level qualification specified in MIL-PRF-55342 and MIL-STD-690 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 groups A and B inspections.

4.4.1.1 Group A inspection. Group A inspection shall consist of the inspections specified in table III, and shall be made on the same set of sample units, in the order shown. Part per million testing and verification as specified in MIL-PRF-55342 is not applicable to this document.

TABLE III. Group A inspection.

*

| Inspection | Requirement paragraph | Method paragraph | Sampling procedure |
|---|---|---|---|
| Subgroup I<br>Thermal shock<br>DC resistance | <br>3.5<br>3.4 | <br>4.7<br>4.6 | 100 percent |
| Subgroup II<br>Visual inspection | <br>3.2, 3.13, 3.16 | <br>4.5 | 13 samples,<br>0 failures |
| Subgroup III<br>Solderability | <br>3.12 | <br>4.8 | 5 samples<br>0 failures |

4.4.1.1.1 Subgroup I. Subgroup I tests shall be performed on 100 percent of the product supplied under this document. Resistors that are out of resistance tolerance, or which experience a change in resistance greater than that permitted for the tests of this subgroup shall be removed from the lot. Lots having more than 5 percent total rejects, due to exceeding the specified resistance tolerance change limit shall not be furnished on contracts.

4.4.1.1.2 Subgroup II. A sample of 13 parts shall be randomly selected, if one or more defects are found, the lot shall be rescreened and defects removed. A new sample of 13 parts shall then be randomly selected. If one or more defects are found in this second sample, the lot shall be rejected and shall not be supplied against this document.

4.4.1.1.3 Subgroup III. A sample of five parts shall be randomly selected, if one or more defects are found, the lot shall be rejected/rescreened in accordance with MIL-PRF-55342.

4.4.1.2 Group B inspection. Group B inspection shall consist of the inspections specified in table IV, and shall be made on the same set of sample units, in the order shown.

4.4.1.2.1 Certification. The procuring activity may accept a certificate of compliance in lieu of group B inspection (see 6.2d).

4.4.1.2.2 Action in case of failure. If any of the subgroups fail the group B inspection and an appropriate lot screen can be established, the lot shall be screened and a new set of samples (see table IV) from the screened lot, shall be submitted to the subgroup that failed. If one or more defects are found in the resubmitted samples, the lot shall be rejected and shall not be supplied to this specification.

4.4.1.2.3 Disposition of sample units. Sample units which have been subjected to group B inspections shall not be supplied to this specification.

TABLE IV. Group B inspection.

*

| Inspection | Requirement paragraph | Method paragraph | Sampling procedure |
|---|---|---|---|
| Subgroup I<br>Life | 3.11 | 4.14 | 10 samples,<br>0 failures |
| Subgroup II<br>Thermal shock<br>Low temperature operation | 3.5<br>3.6 | 4.7<br>4.9 | 30 samples,<br>0 failures |
| Subgroup III<br>Resistance to soldering heat<br>Resistance temperature characteristic<br>Moisture resistance | 3.7<br>3.8<br>3.9 | 4.10<br>4.11<br>4.12 | 30 samples,<br>0 failures |
| Subgroup IV<br>High temperature exposure | 3.10 | 4.13 | 30 samples<br>0 failures |

4.5 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-55342.

4.6 DC resistance. DC resistance shall be tested in accordance with MIL-PRF-55342.

4.7 Thermal shock. Thermal shock shall be tested in accordance with MIL-PRF-55342.

* 4.8 Solderability. Solderability shall be tested in accordance with MIL-PRF-55342 and 4.4.1.1.3 herein.

a. Coating durability: 1 hour ±5 minutes steam aging.

4.9 Low temperature operation. Low temperature operation shall be tested in accordance with MIL-PRF-55342.

4.10 Resistance to soldering heat. Resistance to soldering heat shall be tested in accordance with MIL-PRF-55342.

4.11 Resistance temperature characteristic. Resistance temperature characteristic shall be tested in accordance with MIL-PRF-55342.

4.12 Moisture resistance. Moisture resistance shall be tested in accordance with MIL-PRF-55342.

4.13 High temperature exposure. High temperature exposure shall be tested in accordance with MIL-PRF-55342.

* 4.14 Life. Life shall be tested in accordance with MIL-PRF-55342 with the following exception.

a. Test condition: One thousand hours elapsed time for inspection with all samples.

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 that may be helpful, but is not mandatory.)

6.1 Intended use. Chip resistors are intended to be used in thick or thin film circuits where microcircuity is intended, also, for use in surface mounting application.

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 data or a certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.

c. Packaging requirements (see 5.1). (i.e. Electrostatic discharge sensitive packaging).

d. Whether the manufacturer performs the group B tests or provides certificate of compliance with group B (see 4.4.1.2.1).

6.3 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 Government is controlled by MIL-DTL-39032 that specifies a preventative packaging procedure.

* 6.4 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).

* 6.5 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.

* 6.6 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.

* 6.7 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 |
|---|---|---|---|
| 03025-****** | CRHVTCX* (1206) | 91637 | Vishay Techno<br>1122 23rd St.<br>Columbus, NE 68601 |

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