| REVISIONS | | | |
|---|---|---|---|
| **LTR** | **DESCRIPTION** | **DATE** (YR-MO-DA) | **APPROVED** |
| A | Correct errors in table I and table III. | 12-04-10 | Michael A. Radecki |
| B | Editorial and formatting updates. | 25-08-21 | Mark Rush |
| | | | |

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** | B | B | B | B | B | B | | | | | | | | | | | |
| | **PAGES** | 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | |

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|---|---|---|
| **PMIC N/A** | **PREPARED BY**<br>Ken Bernier | **DESIGN ACTIVITY**<br>**DEFENSE SUPPLY CENTER, COLUMBUS**<br>**COLUMBUS, OH** |
| Original date of drawing<br>09-10-21 | **CHECKED BY**<br>Ken Bernier | **TITLE**<br>CAPACITOR, TANTALUM, HYBRID, HERMETICALLY SEALED |
| | **APPROVED BY**<br>Michael A. Radecki | |
| | **SIZE**<br>**A** / **CAGE CODE**<br>**037Z3** | **DWG NO.**<br>09022 |
| | **SCALE**<br>N/A / **REV**<br>B | **PAGE** 1 **OF** 6 |

AMSC N/A

5910-2025-E30

1. SCOPE

1.1 Scope. This drawing describes the requirements for tantalum hybrid capacitors, hermetically sealed in welded tantalum case with glass to metal anode terminal.

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

| 09022- | XX |
|---|---|
| Drawing number | Dash number (see table I) |

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 STANDARDS

| | | |
|---|---|---|
| MIL-STD-202-105 | - | Method 105, Barometric Pressure (Reduced) |
| MIL-STD-202-106 | - | Method 106, Moisture Resistance |
| MIL-STD-202-107 | - | Method 107, Thermal Shock |
| MIL-STD-202-112 | - | Method 112, Seal |
| MIL-STD-202-204 | - | Method 204, Vibration, High Frequency |
| MIL-STD-202-208 | - | Method 208, Solderability |
| MIL-STD-202-210 | - | Method 210, Resistance to Soldering Heat |
| MIL-STD-202-211 | - | Method 211, Terminal Strength |
| MIL-STD-202-213 | - | Method 213, Shock (Specified Pulse) |
| MIL-STD-202-214 | - | Method 214, Random Vibration |
| MIL-STD-202-215 | - | Method 215, Resistance to Solvents |
| MIL-STD-1285 | - | Marking of Electrical and Electronic Parts |

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

2.4 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, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

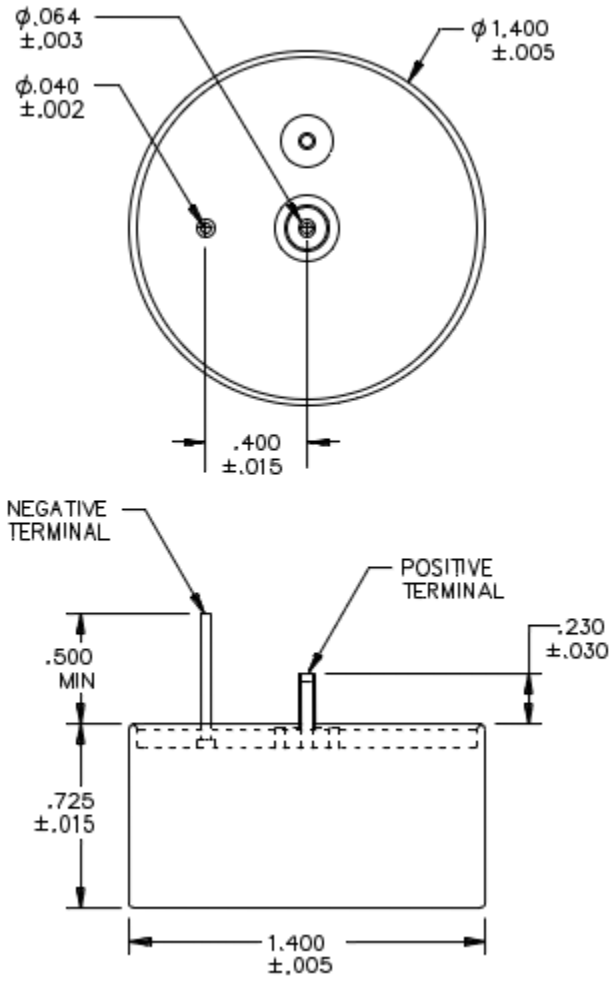
3. REQUIREMENTS

3.1 Interface and physical dimensions. The interface and physical dimensions shall be as specified herein (see figure 1).

3.1.1 Case and capacitor element. The capacitor shall utilize a sintered tantalum anode and ruthenium oxide coated cathodes operating in aqueous electrolyte. The components shall be hermetically sealed in a welded tantalum case with glass-to-metal anode terminal seal.

3.1.2 Mass. 0 – 50 volt parts: 100 ± 3 grams; 63 – 125 volt parts: 125 ± 3 grams.

3.1.3 Pure tin. The use of pure tin, as an underplate or final finish is prohibited both internally and externally. Tin content of capacitor 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).




| Inches | mm |
|---|---|
| .002 | 0.05 |
| .003 | 0.08 |
| .005 | 0.13 |
| .015 | 0.38 |
| .030 | 0.76 |
| .040 | 1.02 |
| .064 | 1.63 |
| .230 | 5.84 |
| .400 | 10.16 |
| .500 | 12.70 |
| .725 | 18.42 |
| 1.400 | 35.56 |

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are in millimeters and are given for general information only.

FIGURE 1. Case dimensions and configuration.

3.1.4 Storage temperature. The storage temperature shall be -62°C to +130°C.

3.1.5 Operating temperature range. The operating temperature range shall be -55°C to +85°C, de-rated to +125°C.

3.2 Electrical characteristics.

3.2.1 Rated voltage. The rated voltage shall be in accordance with table I at -55°C to +85°C, de-rated to + 125°C.

3.2.2 Surge voltage. The test shall be 1000 cycles at 110 percent of rated voltage. Each cycle shall consist of a 30 second surge voltage application followed by a 330 second discharge period. The part shall be charged and discharged through a 1000 ohm resistor. The capacitor must not be visibly damaged and the electrical characteristics must remain within specification.

3.2.3 Dielectric. The dielectric shall be an aqueous electrolyte.

3.2.4 DC leakage current (DCL). The maximum DC leakage current shall be as specified in table I following 5 minutes at the working voltage and +25°C.

3.2.5 Capacitance. Capacitance shall be as specified in table I at 120Hz and +25°C, ± 20%.

3.2.6 Capacitance tolerance. The capacitance tolerance shall be ± 20 percent at +25°C.

3.2.7 Equivalent series resistance (ESR). The maximum equivalent series resistance (ESR) shall be as specified in table I at 1 kHz and +25°C.

TABLE I. Electrical characteristics.

| DLA Land and Maritime drawing PIN 09022- | Capacitance (uF) | +85°C Rated voltage ($V_{dc}$) | +125°C Rated voltage ($V_{dc}$) | ESR max (ohms) | Leakage current max (μA) |
|---|---|---|---|---|---|
| 01 | 200,000 | 10 | 6 | 0.025 | 300 |
| 02 | 120,000 | 16 | 9.5 | 0.025 | 300 |
| 03 | 70,000 | 25 | 15 | 0.025 | 300 |
| 04 | 50,000 | 35 | 21 | 0.025 | 300 |
| 05 | 30,000 | 50 | 30 | 0.025 | 400 |
| 06 | 16,000 | 63 | 37.5 | 0.035 | 400 |
| 07 | 11,000 | 80 | 48 | 0.035 | 500 |
| 08 | 7,500 | 100 | 60 | 0.035 | 500 |
| 09 | 4,500 | 125 | 75 | 0.050 | 500 |

3.3 Environmental characteristics.

3.3.1 Thermal shock. Thermal shock test shall be as specified in MIL-STD-202-107, test condition A.

3.3.2 Moisture resistance. Moisture resistance test shall be as specified in MIL-STD-202-106. Polarization voltage shall be 6V.

3.3.3 Hermetic Seal. The capacitor shall be hermetically sealed such that the case does not leak electrolyte or vent any gas when exposed to a vacuum in accordance with MIL-STD-202-112, test condition C, procedure IIIa.

3.3.4 Barometric pressure (reduced). Barometric pressure (reduced) shall be in accordance with MIL-STD-202-105, condition D (100,000 ft.).

3.4 Physical characteristics.

3.4.1 Shock (specified pulse). Shock test shall be as specified in MIL-STD-202-213, test condition G (50g, 11 ms).

3.4.2 Vibration, high frequency. Vibration, high frequency shall be in accordance with MIL-PRF-202-204, test condition D (20g peak, 12 sweeps / axis).

3.4.3 Resistance to solder heat. The capacitor shall withstand solder dipping of the terminals at +260°C for 10 seconds per MIL-STD-202-210, test condition B. The capacitor shall not be visibly damaged and the electrical characteristics shall not be affected.

3.4.4 Terminal strength. The capacitor terminals shall withstand a 5-pound pull test for 30 seconds per MIL-STD-202-211, test condition A. The capacitor shall not be visibly damaged and the electrical characteristics shall not be affected.

3.4.5 Solderability. The terminations shall be solderable per MIL-STD-202-208.

3.4.6 Resistance to solvents. Resistance to solvents shall be in as specified in MIL-STD-202-215.

3.4.7 Random vibration. Random vibration shall be as specified in MIL-STD-202-214, test condition I-D (1.5 hours / axis, 12g rms).

3.4.8 Fungus. The capacitor materials shall not support fungus growth and shall not be a nutrient to fungus.

3.5 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.

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

3.7 Manufacturer eligibility: To be eligible for listing as an approved source of supply a manufacturer shall perform all testing specified herein on a sample of parts agreed upon by the manufacturer and DLA Land and Maritime-VA.

3.8 Marking. Marking shall be in accordance with MIL-STD-1285, except the capacitor shall be marked with the PIN as specified herein (see 1.2), the manufacturer's name or Commercial and Government Entity (CAGE) code, date code, lot symbol, and polarity.

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

## 4. VERIFICATION

4.1 Qualification inspection. Qualification inspection is not required.

4.2 Conformance inspections.

4.2.1 Inspection of product for delivery. Inspection of product for delivery shall consist of DCL, capacitance, ESR as specified in 3.2.4, 3.2.5, and 3.2.7 respectively.

## 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 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, which may be helpful, but is not mandatory.)

6.1 Intended use. Hybrid capacitors covered by this drawing are intended mainly for use in defense electronic systems, avionics, and weapon systems.

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

c. Requirements for packaging and packing.

d. Requirements for notification of change of product to acquiring activity, if applicable.

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 manufacturer 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 Replaceability. Capacitors covered by this drawing will replace the same commercial device covered by contractor prepared specification or drawing.

6.5 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

6.6 Users of record. Coordination of this document for future revisions are 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 should be in writing to: DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or e-mailed to capacitorfilter@dla.mil or by telephone (614) 692-4709 or DSN 850-4709.

6.7 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. For assistance in the use of this drawing, contact DLA Land and Maritime, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990 or e-mailed to capacitorfilter@dla.mil or by telephone (614) 692-4709 or DSN 850-4709.

TABLE II. Similar vendor type.

| DLA Land and Maritimed drawing PIN 09022- 1/ | Vendor similar type | Vendor CAGE | Vendor name and address |
|---|---|---|---|
| 01 | THQ4010204 | 06MN5 | Evans Capacitor Company<br>72 Boyd Ave.<br>East Providence, RI 02914-1202 |
| 02 | THQ4016124 | | |
| 03 | THQ4025703 | | |
| 04 | THQ4035503 | | |
| 05 | THQ4050303 | | |
| 06 | THQ4063163 | | |
| 07 | THQ4080113 | | |
| 08 | THQ4100752 | | |
| 09 | THQ4125452 | | |

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