

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Correction to figure	07-12-18	Michael A. Radecki
B	Approved sources of supply. Inspection of product for delivery. Certification.	09-11-04	Michael A. Radecki
C	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	C	C	C	C	C	C	C	C										
	PAGES	1	2	3	4	5	6	7	8										
PMIC N/A	PREPARED BY Ken Bernier					DESIGN ACTIVITY DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH													
Original date of drawing 04-09-08	CHECKED BY Ken Bernier					TITLE CAPACITORS, TANTALUM, HYBRID, HERMETICALLY SEALED													
	APPROVED BY Kendall Cottongim																		
	SIZE A	CAGE CODE 037Z3			DWG NO. 04005														
	SCALE N/A	REV B			PAGE 1 OF 8														

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 in mounted and un-mounted configurations.

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



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 (see 6.2).

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/>.)

2.3 Order of precedence. Unless otherwise note 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 anodes and ruthenium oxide coated cathodes operating in aqueous electrolyte. The capacitor shall be hermetically sealed such that the case does not leak electrolyte or vent any gas when exposed to a vacuum (see [3.3.3](#)).

3.1.2 Mass. 8 ± 1.5 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](#))

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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 +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 or +125°C with voltage de-rating (see [table I](#)).

3.2.2 Surge voltage. The test shall be 1000 cycles at 110% of rated voltage at +85°C ± 3°C. Each cycle shall consist of a 30 ± 2 second surge voltage application followed by a 330 ± 2 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 (see [table I](#)) and +25°C.

3.2.5 Capacitance. Capacitance shall be as specified in [table I](#) at 120 Hz and +25°C, ± 20 percent.

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 shall be as specified in [table I](#) at 1 kHz and +25°C.

### 3.3 Environmental testing.

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 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 testing.

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

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 in accordance with [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 in accordance with [MIL-STD-202-211](#), test condition A. The capacitor shall not be visibly damaged and the electrical characteristics shall not be affected.

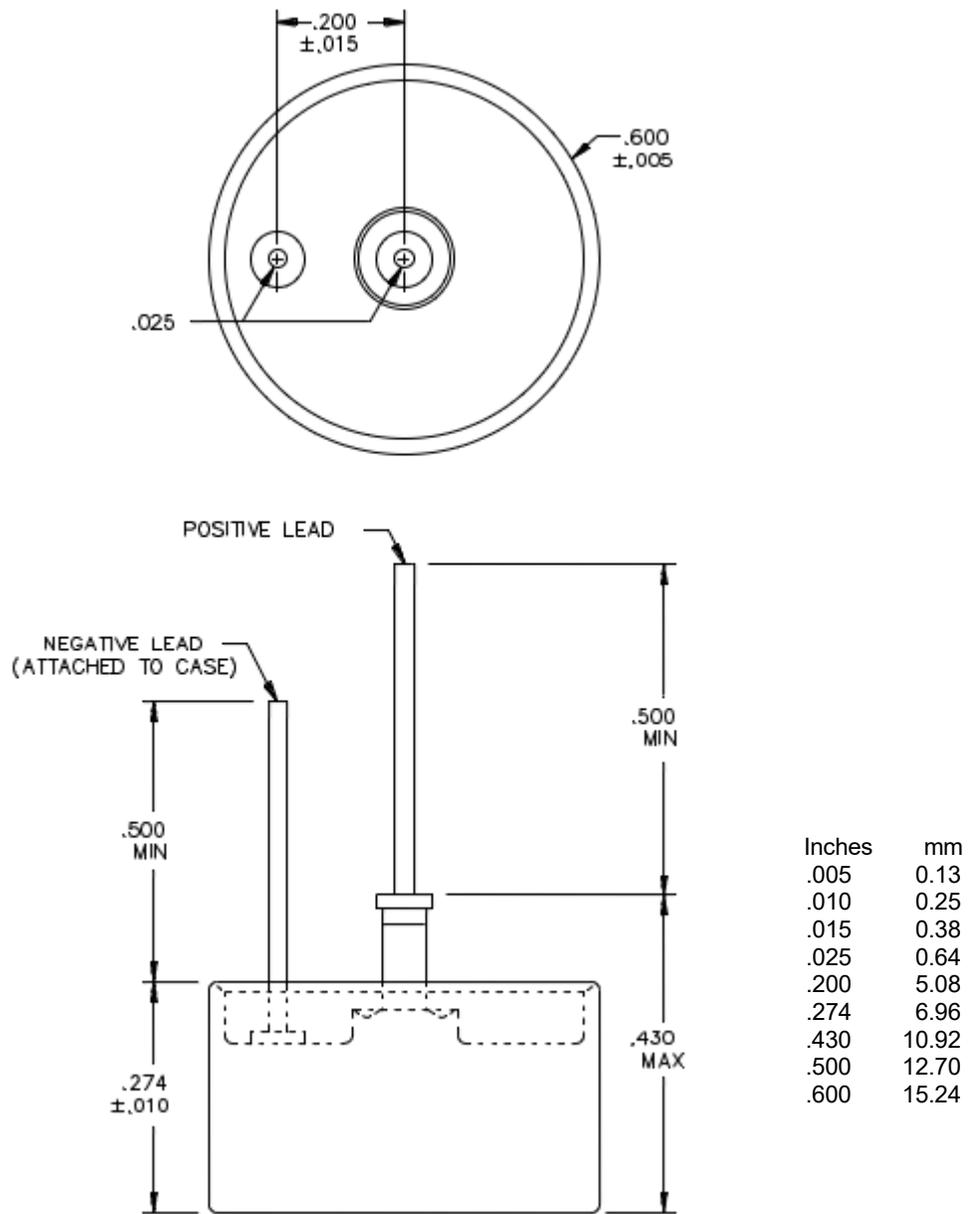
3.4.5 Solderability. The terminations shall be solderable when tested in accordance with [MIL-STD-202-208](#).

3.4.6 Resistance to solvents. Resistance to solvents shall be as specified in [MIL-STD-202-215](#).

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

3.4.8 Random vibration. Random vibration shall be in accordance with [MIL-STD-202-214](#), test condition I-D (1.5 hours / axis, 12g rms).

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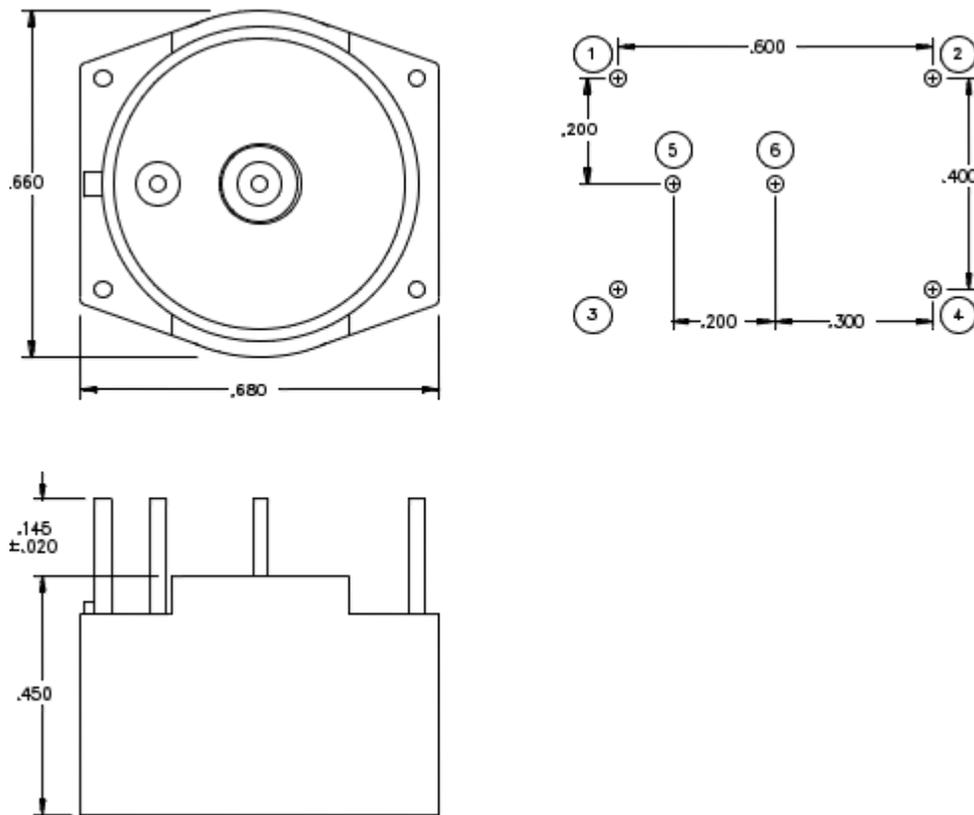


NOTES:

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

FIGURE 1. Case dimensions and configuration.

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TERMINALS: 60/40 Sn/Pb PLATED		
1	N/C	.032 Diameter
2	N/C	.032 Diameter
3	N/C	.032 Diameter
4	N/C	.032 Diameter
5	Negative	.026 Diameter
6	Positive	.026 Diameter

FIGURE 2. Mounted Configuration - Case dimensions for PINs 04005-11 to -20 (see table 1).

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TABLE I. Electrical characteristics.

DLA Land and Maritime drawing PIN 04005- 1/	Capacitance in (uF)	+85°C rated voltage (V <sub>dc</sub> )	+125°C rated voltage (V <sub>dc</sub> )	ESR (max) (ohms)	Leakage current max (uA)
01	10,000	10	6	0.20	50
02	5,000	16	9.5	0.20	50
03	3,800	25	15	0.20	50
04	3,000	30	18	0.25	50
05	2,500	35	21	0.25	50
06	1,500	50	30	0.25	50
07	875	60	36	0.35	50
08	565	75	45	0.50	50
09	360	100	60	0.80	50
10	215	125	75	1.25	50
11	10,000	10	6	0.20	50
12	5,000	16	9.5	0.20	50
13	3,800	25	15	0.20	50
14	3,000	30	18	0.25	50
15	2,500	35	21	0.25	50
16	1,500	50	30	0.25	50
17	875	60	36	0.35	50
18	565	75	45	0.50	50
19	360	100	60	0.80	50
20	215	125	75	1.25	50

1/ PINs 04005-11 to -20 are mounted versions of PINs 04005-01 to -10 (see figure 2).

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 lot code 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, and ESR as specified in [3.2.4](#), [3.2.5](#), and [3.2.7](#) respectively.

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## 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 (see 5.1).
- 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 manufacturer. 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 been shown to inhibit the growth of tin whiskers. For additional information in 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 Similar vendor type. See [table II](#).

6.6 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.

6.7 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](mailto:capacitorfilter@dla.mil) also by telephone (614) 692-4709 or DSN 850-4709.

6.8 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](mailto:capacitorfilter@dla.mil) also by telephone (614) 692-4709 or DSN 850-4709.

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TABLE II. Similar vendor type.

DLA Land and Maritime drawing PIN 04005- <u>1/</u>	Vendor similar type	Vendor CAGE	Vendor name and address
01	THQA2010103	06MN5	Evans Capacitor Company 72 Boyd Ave. East Providence, RI 02914-1202
02	THQA2016502		
03	THQA2025382		
04	THQA2030302		
05	THQA2035252		
06	THQA2050152		
07	THQA2060871		
08	THQA2075561		
09	THQA2100361		
10	THQA2125211		
11	THQM2010103		
12	THQM2016502		
13	THQM2025382		
14	THQM2030302		
15	THQM2035252		
16	THQM2050152		
17	THQM2060871		
18	THQM2075561		
19	THQM2100361		
20	THQM2125211		

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

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