REVISIONS			
LTR	**DESCRIPTION**	**DATE**	**APPROVED**

Prepared in accordance with ASME Y14.100 Source control drawing

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PMIC N/A	**PREPARED BY** Ken Bernier	**DEFENSE SUPPLY CENTER, COLUMBUS** **COLUMBUS, OH**
Original date of drawing 21 October 2009	**CHECKED BY** Ken Bernier	**TITLE** CAPACITORS, TANTALUM, HYBRID, HERMETICALLY SEALED
	APPROVED BY Michael A. Radecki	
	SIZE **A** / **CODE IDENT. NO.** **037Z3**	**DWG NO.** 09021
	REV	**PAGE** 1 **OF** 8

AMSC N/A 5910-E435

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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 General. 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 a glass to metal terminal seal.

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

09021-	XX
Drawing number	Dash number (see table I)

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 (see 6.2).

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-202	-	Test Methods for Electronic and Electrical Components Parts.
MIL-STD-1285	-	Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. 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. The case shall be tantalum.

3.1.2 Mass. 0 – 50 volt parts: 104 ± 3 grams; 63 – 125 volt parts: 128 ± 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).

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 of rated surge voltage at 85°C. 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 visible damaged and the electrical characteristics must remain within specification.

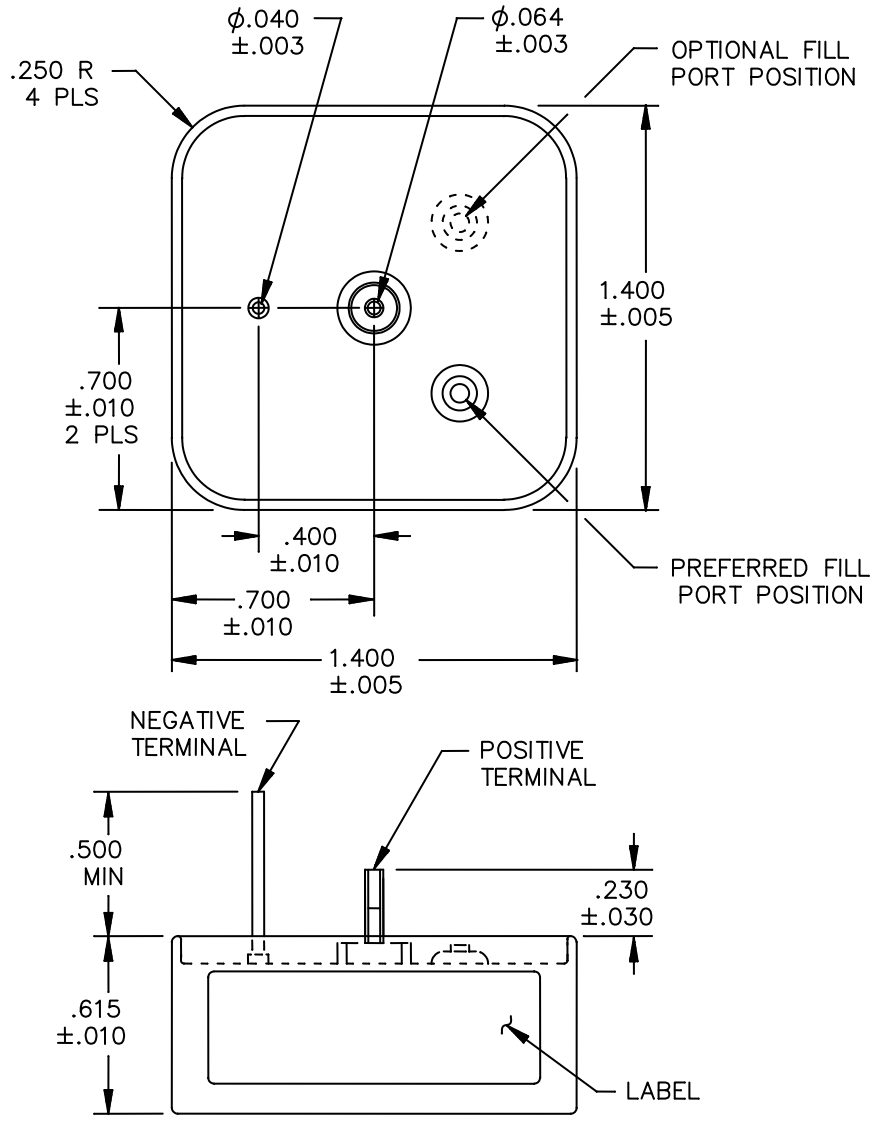
3.2.3 Dielectric. The dielectric shall be an aqueous electrolyte.

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

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.



Inches	mm
.002	0.05
.003	0.08
.005	0.13
.010	0.25
.030	0.76
.040	1.02
.064	1.63
.230	5.84
.250	6.35
.400	10.16
.500	12.70
.615	15.62
.700	17.78
1.400	35.56

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

FIGURE 1. Case dimensions and configuration.

TABLE I. Electrical characteristics.

DSCC drawing 09021-	Capacitance in (uF)	85°C Rated voltage dc	125°C Rated voltage dc	Surge Voltage dc	ESR max (ohms)	Leakage current max (μA)
01	200,000	10	6	11	0.025	400
02	130,000	16	9.5	18	0.025	400
03	75,000	25	15	28	0.035	400
04	50,000	35	20	39	0.035	400
05	30,000	50	30	55	0.035	500
06	16,000	63	38	69	0.035	500
07	10,000	80	48	88	0.040	600
08	9,000	85	51	94	0.050	600
09	7,000	100	60	110	0.050	600
10	6,000	110	65	127	0.065	600
11	4,200	125	75	138	0.065	600

3.3 Environmental characteristics.

TABLE II. Environmental testing.

Test	Test Method	Condition	Details
Shock	MIL-STD-202 Method 213	G	11mS @ 50g
Vibration	MIL-STD-202 Method 204	D	12 Sweeps/Axis, 20g peak
Vibration	MIL-STD-202 Method 214	I, Letter D	1.5 Hours/Axis, 12g rms
Moisture Resistance	MIL-STD-202 Method 106		6 V Polarity
Thermal Shock	MIL-STD-202 Method 107	A	
Altitude	MIL-STD-202 Method 105	D	100,000 ft test

3.3.1 Thermal shock. Thermal shock test shall be as specified in Table II.

3.3.2 Moisture resistance. Moisture resistance test shall be as specified in Table II.

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, per MIL-STD-202, method 112, test condition C, procedure IIIa.

3.4 Physical characteristics.

3.4.1 Shock . Shock test shall be as specified in Table II.

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, method 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, method 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, method 208.

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

3.4.7 Vibration. Vibration shall be as specified in table II.

3.4.8 Altitude. Barometric pressure (reduced). Capacitors shall be tested using MIL-STD-202, method 105, condition D.

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

3.5 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable 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 DSCC-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 dc leakage, capacitance, and ESR.

4.2.2 Certification. The procuring activity, at its discretion, may accept a certificate of compliance for table II requirements in lieu of performing table II tests.

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 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 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 procuring 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 Similar vendor PIN's. See table III.

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: Defense Supply Center, Columbus, ATTN: DSCC/VAT, Post Office Box 3990, Columbus, OH 43218-3990 or e-mailed to capacitorfilter@dscc.dla.mil also by telephone (614) 692-0563 or DSN 850-0563.

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 Defense Supply Center, Columbus, ATTN: DSCC-VAT, Post Office Box 3990, Columbus, OH 43218-3990 or e-mailed to capacitorfilter@dscc.dla.mil also by telephone (614) 692-0563 or DSN 850-0563.

Table III. Similar vendor PIN.

DSCC PIN 09021- 1/	Vendor similar PIN
01	THS3010204
02	THS3016134
03	THS3025753
04	THS3035503
05	THS3050303
06	THS3063163
07	THS3080103
08	THS3085902
09	THS3100702
10	THS3110602
11	THS3125422

1/ Parts must be purchased to this DSCC PIN to assure all performance requirements and tests are met.

Vendor CAGE Number	Vendor name and address
06MN5	Evans Capacitor Company 72 Boyd Avenue East Providence, RI 02914-1202