

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	Deleted acceptable cleaning solvents paragraph. Editorial changes throughout.	30 Aug 93	D. Moore
B	Physical, electrical and dimensional changes through out. (In accordance with NOR 5910-E155)	12 Nov 97	A. Ernst
C	Editorial changes throughout.	27 June 00	K. Cottongim
D	Editorial changes throughout	18 Oct 06	Michael A. Radecki

CURRENT DESIGN ACTIVITY CAGE CODE 037Z3
DEFENSE LOGISTICS AGENCY
DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43218-3990

Prepared in accordance with ASME Y14.100

Selected item drawing

REV STATUS OF PAGES	REV	D	D	D	D	D	D	D	D	D	D	D	D	D				
	PAGES	1	2	3	4	5	6	7	8	9	10	11	12	13				
PMIC N/A	PREPARED BY ROBERT E. GRILLOT							DESIGN ACTIVITY DEFENSE ELECTRONICS SUPPLY CENTER, DAYTON, OH 45444-5000										
Original date of drawing 9 MARCH 1990	CHECKED BY Edward H. Back							TITLE CAPACITORS, FIXED, SURFACE MOUNT, METALLIZED POLYESTER FILM, NONHERMETICALLY SEALED										
	APPROVED BY DAVID E. MOORE																	
	SIZE A	CODE IDENT. NO. 14933						DWG NO. 89115										
	REV D							PAGE 1 OF 13										

1. SCOPE

1.1 Scope. This drawing describes the complete requirements for metallized polyester, surface mount, nonhermetically sealed capacitors.

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



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).

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-PRF-55514 - Capacitors, Fixed, Ceramic Dielectric (Temperature Compensating), Established Reliability and Non-Established Reliability, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-202 - Test Methods Standard Electronics and Electrical Component 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 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

EIA-377 - Metallized Dielectric Capacitors in Metallic and Nonmetallic Cases for Direct Current Applications.
EIA-481 - Taping of Surface Mount Components for Automatic Placement.

* (Application for copies can be found online at <http://www.eia.org/> or should be addressed to the Electronic Industries Alliance (EIA), 2500 Wilson Boulevard, Arlington VA 22201-3834.)

2.3 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.

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Table I

DSCC drawing 89115	Capacitance		DCWV volts	Case Code	Dimension T max <u>1/</u>
	Value μ F	Tolerance %			
01	.01	5	50	A	.060 (1.52)
02	.01	10	50	A	.060 (1.52)
03	.01	20	50	A	.060 (1.52)
04	.015	5	50	A	.071 (1.80)
05	.015	10	50	A	.071 (1.80)
06	.015	20	50	A	.071 (1.80)
07	.022	5	50	A	.087 (2.21)
08	.022	10	50	A	.087 (2.21)
09	.022	20	50	A	.087 (2.21)
10	.033	5	50	A	.082 (2.08)
11	.033	10	50	A	.082 (2.08)
12	.033	20	50	A	.082 (2.08)
13	.047	5	50	A	.078 (1.98)
14	.047	10	50	A	.078 (1.98)
15	.047	20	50	A	.078 (1.98)
16	.068	5	50	A	.097 (2.46)
17	.068	10	50	A	.097 (2.46)
18	.068	20	50	A	.097 (2.46)
19	.10	5	50	A	.129 (3.28)
20	.10	10	50	A	.129 (3.28)
21	.10	20	50	A	.129 (3.28)
22	.15	5	50	A	.115 (2.92)
23	.15	10	50	A	.115 (2.92)
24	.15	20	50	A	.115 (2.92)
25	.22	5	50	A	.153 (3.89)
26	.22	10	50	A	.153 (3.89)
27	.22	20	50	A	.153 (3.89)
28	.22	5	50	B	.111 (2.82)
29	.22	10	50	B	.111 (2.82)
30	.22	20	50	B	.111 (2.82)
31	.33	5	50	B	.146 (3.71)
32	.33	10	50	B	.146 (3.71)
33	.33	20	50	B	.146 (3.71)
34	.47	5	50	B	.144 (3.66)
35	.47	10	50	B	.144 (3.66)
36	.47	20	50	B	.144 (3.66)
37	.47	5	50	C	.102 (2.59)
38	.47	10	50	C	.102 (2.59)
39	.47	20	50	C	.102 (2.59)
40	.68	5	50	B	.166 (4.22)
41	.68	10	50	B	.166 (4.22)
42	.68	20	50	B	.166 (4.22)

See footnote at end of table.

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Table I – continued.

DSCC drawing 89115	Capacitance		DCWV Volts	Case Code	Dimension T Max <u>1/</u>
	Value μ F	Tolerance %			
43	.68	5	50	C	.130 (3.30)
44	.68	10	50	C	.130 (3.30)
45	.68	20	50	C	.130 (3.30)
46	1.00	5	50	B	.225 (5.72)
47	1.00	10	50	B	.225 (5.72)
48	1.00	20	50	B	.225 (5.72)
49	1.00	5	50	C	.175 (4.45)
50	1.00	10	100	C	.175 (4.45)
51	1.00	20	50	C	.175 (4.45)
52	1.50	5	50	D	.161 (4.09)
53	1.50	10	50	D	.161 (4.09)
54	1.50	20	50	D	.161 (4.09)
55	2.20	5	50	D	.217 (5.51)
56	2.20	10	50	D	.217 (5.51)
57	2.20	20	50	D	.217 (5.51)
58	3.30	5	50	D	.300 (7.62)
59	3.30	10	50	D	.300 (7.62)
60	3.30	20	50	D	.300 (7.62)
61	4.70	5	50	D	.411 (10.44)
62	4.70	10	50	D	.411 (10.44)
63	4.70	20	50	D	.411 (10.44)

1/ Metric equivalents are in parentheses.

3. REQUIREMENTS

3.1 Interface and physical dimensions. The interface and physical dimensions shall be as specified herein (see [figure 1](#), [table I](#)).

3.1.1 Electrodes. Evaporated aluminum.

3.1.2 Construction. Parallel plate, noninductive.

3.1.3 Operating temperature range. The operating temperature range shall be -55°C to +125°C. The voltage shall be derated by 1.25 percent per degrees C from +85°C to +125°C.

3.2 Electrical characteristics. The electrical characteristics shall be as follows.

3.2.1 Working voltage. 50 V dc and 100 V dc.

3.2.2 Dielectric. Metallized polyethylene terephthalate film.

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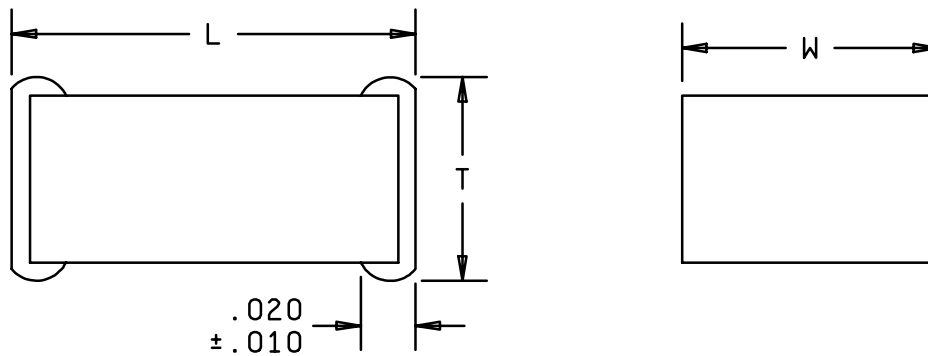
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Dimensions

Case code	L	W
A	.180 ±.012	.126 ±.008
B	.220 ±.012	.250 ±.016
C	.280 -0 +.025	.240 ±.016
D	.378 ±.012	.270 ±.016

Inches	mm
.008	0.20
.010	0.25
.012	0.30
.016	0.41
.020	0.50
.126	3.20
.180	4.57
.220	5.59
.240	6.10
.250	6.35
.270	6.86
.280	7.11
.378	9.60

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. T dimensions are listed in table I.

FIGURE 1. Case dimensions and configuration.

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3.2.3 Terminals. Aluminum coated with tin-copper alloy, suitable for IR, convection or vapor phase soldering at +220 degrees C for 1 minute.

3.2.4 Long term stability. After 1 year storage, standard environment ΔC of < 2 percent.

3.2.5 Capacitance (see [table I](#)). Capacitance shall be measured in accordance with [MIL-PRF-55514](#).

3.2.7 Capacitance tolerance. See [table I](#).

3.2.7 Dissipation factor. Dissipation factor shall not exceed 0.8 percent at +25°C, 0.5 percent at +85°C or 2.0 percent at +125°C when measured in accordance with [MIL-PRF-55514](#).

3.2.8 Insulation resistance. Insulation resistance shall be measured in accordance with [MIL-PRF-55514](#), minimum insulation resistance shall be 10^3 Megohm-Mfd. At +25°C, 10^2 Megohm-Mfd. At +85°C and 10 Megohm-Mfd. At +125°C.

3.2.8.1 Measurements. The insulation resistance shall be measured after 1 minute at 10 V dc.

3.2.9 Self-inductance. Self-inductance = 6 nH, A case size.

3.3 Soldering criteria.

3.3.1 Soldering temperature. Capacitors are suitable for IR convection or vapor phase reflow soldering at temperatures not exceeding +220 degrees C (see [figure 2](#)).

3.3.2 Recommended pad dimensions. See [figure 3](#).

3.3.3 Solder resistance. Dry parts for reference at +125°C for 1 hour, vapor phase at +215°C for 1 minute, ΔC of 3 percent.

3.4 Dielectric strength. 1.3 x W V dc, 2 seconds, no breakdowns.

3.5 Maximum pulse rate. See [table II](#).

TABLE II.

Value μF	DCWV volts	Case code	Volts per microsecond
.01	50	A	195
.015	50	A	195
.022	50	A	195
.033	50	A	150
.047	50	A	100
.068	50	A	100
.1	50	A	100
.15	50	A	95
.22	50	A	95
.22	50	B	95
.33	50	B	95
.47	50	B	70
.47	50	C	50
.68	50	B	70
.68	50	C	50
1.0	50	B	70
1.0	100	C	50
1.5	50	D	35
2.2	50	D	35
3.3	50	D	35
4.7	50	D	35

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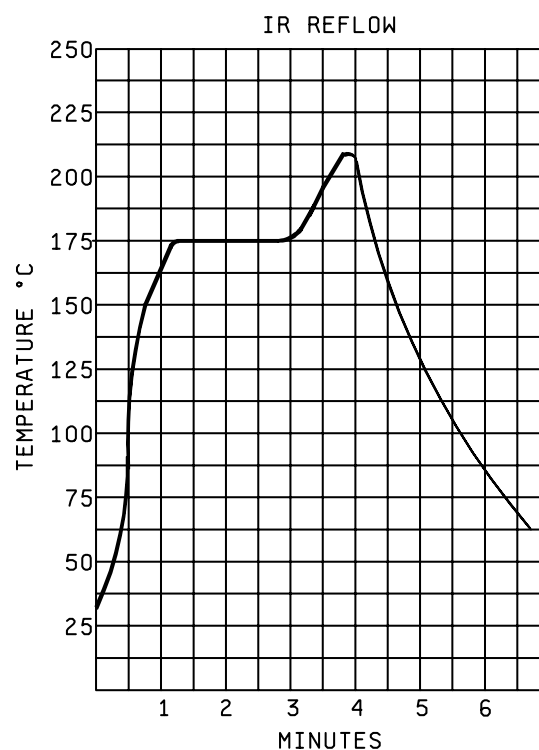
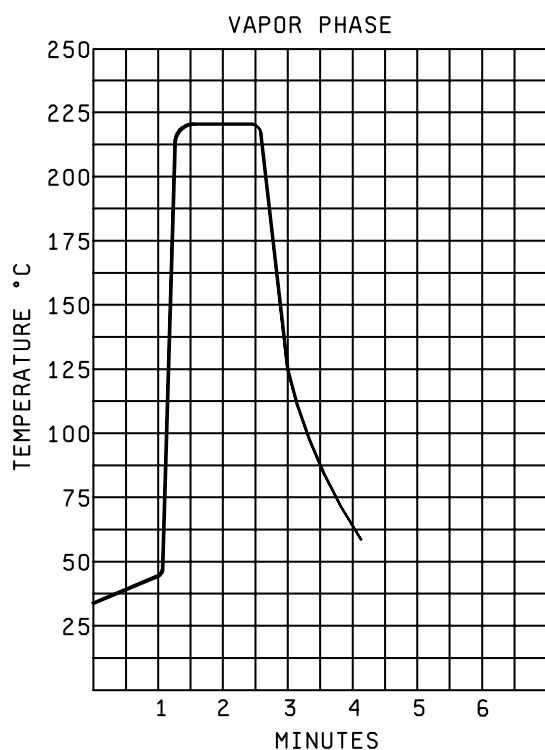
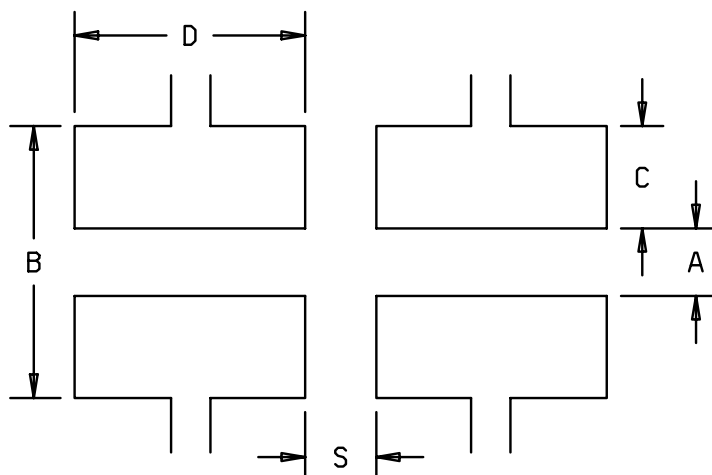


FIGURE 2. Recommended film capacitor solder reflow temperature profiles.

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PC pad dimensions for cap thickness $\leq .080$ inch (2.03 mm)					
Case Code	A	B	C	D	S
A	.120 (3.05)	.240 (6.10)	.060 (1.52)	.160 (4.06)	.060 (1.52)
B	.152 (3.86)	.272 (6.91)	.060 (1.52)	.286 (7.26)	.060 (1.52)
C	.212 (5.38)	.332 (8.43)	.060 (1.52)	.276 (7.01)	.060 (1.52)
D	.310 (7.87)	.430 (10.92)	.060 (1.52)	.306 (7.77)	.060 (1.52)

PC pad dimensions for cap thickness $> .080$ inch (2.03 mm)					
Case Code	A	B	C	D	S
A	.120 (3.05)	.268 (6.81)	.074 (1.88)	.160 (4.06)	.060 (1.52)
B	.152 (3.86)	.338 (8.59)	.093 (2.36)	.286 (7.26)	.060 (1.52)
C	.230 (5.84)	.430 (10.90)	.100 (2.54)	.276 (7.01)	.060 (1.52)
D	.310 (7.87)	.496 (12.6)	.093 (2.36)	.306 (7.77)	.060 (1.52)

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances shall be $\pm .005$ (0.13 mm).
4. Metric equivalents are in parentheses.

FIGURE 3. Recommended printed circuit pad dimensions.

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3.6 Life. Life shall be 125 percent of the rated voltage applied at +85°C for 1,000 hours.

3.6.1 Post life test end points. After testing in accordance with 3.6, units shall meet the following requirements:

- a. No mechanical damage shall be evident.
- b. Capacitance shall not have changed by more than 5 percent of the initial value.
- c. Insulation resistance shall not exceed 50 percent of specified limits.
- d. Dissipation factor shall not exceed 1.0 percent.

3.7 Moisture. [EIA-377](#), P3.12, 72 hours.

3.7.1 Post moisture test end points. After testing in accordance with 3.7, units shall meet the following requirements.

- a. No mechanical damage shall be evident.
- b. Capacitance shall not have changed by more than 7 percent of the initial value.
- c. Insulation resistance > 10 MΩ, after 4 hours air dry.
- d. Dissipation factor shall not exceed 1.0 percent.

3.8 Steam age. When specified the samples shall be subjected to steam age of 4 hours in accordance with [method 208 of MIL-STD-202](#). After 4 hours in the same environment, the capacitors shall be dried at +120°C for 1 hour.

3.9 Solderability. Solderability shall be in accordance with [method 208 of MIL-STD-202](#) with the following exceptions:

- a. The capacitor shall be held using a small pair of stainless steel tweezers as shown on [figure 4](#). No part of the tweezers shall make contact with solder terminals of the capacitor being tested.
- b. The capacitor shall be held as described above and shall be immersed in nonactivated soldering flux for approximately 2 seconds and the excess flux shall be allowed to drain.
- c. The terminations shall be immersed in a solder alloy consisting of 63 percent Sn and 37 percent Pb so that the entire metallized surfaces are covered by the solder bath. The solder temperature shall be +225° ±5°C. The immersion rate shall be 1.0 ±0.25 second per inch and the dwell time in the solder bath shall be 5 ± 0.5 seconds.
- d. After a maximum of 60 minutes, flux residues shall be removed from the capacitor by cleaning with a suitable solvent.
- e. The capacitor shall then be visually examined under normal lighting and approximately 10X magnification. The contact area shall be covered with smooth and bright solder conforming to the contour of the surface being tinned. A small amount of scattered imperfections such as pinholes or unwetted areas are permitted. These imperfections shall not be concentrated in one area.

3.10 Moisture resistance. The maximum capacitance change from the initial value shall be 7.0 percent.

3.11 Resistance to soldering heat. [See 3.3](#).

3.12 Vibration high frequency. Not applicable.

3.13 Shock. Not applicable.

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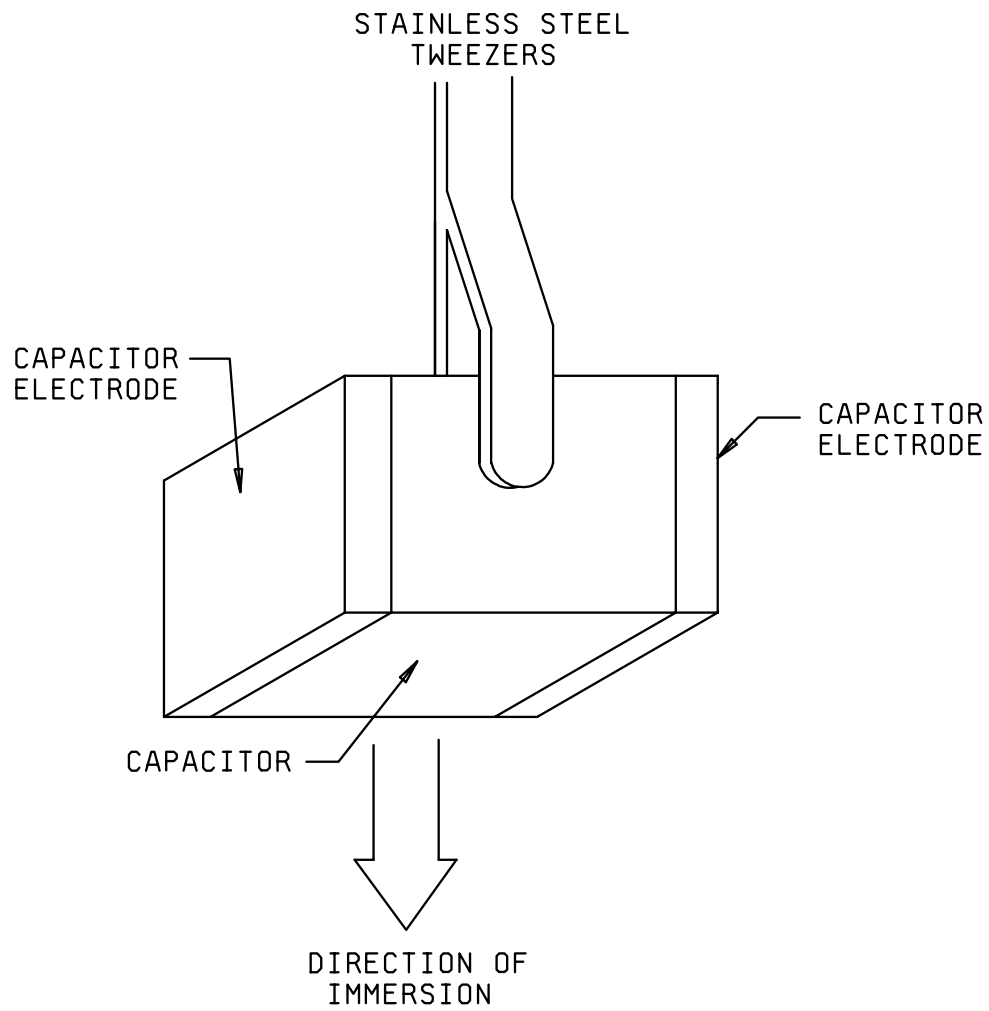


FIGURE 4. Tweezers.

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3.14 Terminal strength. Terminal strength shall be as follows:

- a. The capacitors to be tested shall be vapor phase reflow soldered to printed circuit test cards with test holes pre-drilled as shown on [figure 5](#).
- b. After the capacitors have been soldered to the printed circuit boards, visually examine the units under 10X magnification to be certain that wetting has taken place between the reprinted circuit pad and the capacitor electrodes. Wetting should be present along 50 percent of the capacitor electrode length.
- c. Using an Ameter Accuforce Cadet Force Gauge or equivalent, apply a steady force of 2.2 pounds for 5 seconds against the capacitor body. The force shall be applied to the bottom surface of the capacitor body through the hole in the printed circuit board.
- d. Reexamine the units under 10X magnification. There shall be no evidence of physical damage.

3.15 Resistance to solvents. Not applicable.

3.16 Marking. Marking of the Capacitor is not required; however, each unit package shall be marked in accordance with [MIL-STD-1285](#) and include the PIN as specified herein ([see 1.2](#)), the manufacturer's name or Commercial and Government Entity (CAGE) code, and date lot codes.

3.17 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.

3.18 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be a suggested source of supply.

3.19 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.

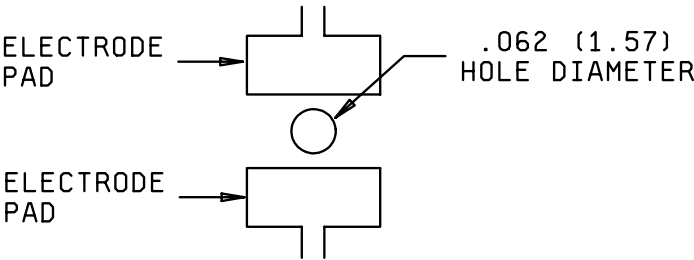
4.2 Conformance inspection.

4.2.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection of [MIL-PRF-55514](#). Group B inspection shall be performed when specified on the purchase order.

4.2.2 Preconditioning. Group A preconditioning seal test not required.

4.2.3 Certification. The acquiring activity, at its discretion, may accept a certificate of compliance with group B inspections in lieu of performing group B inspections ([see 6.2c](#)).

4.2.4 Inspection of packaging. Inspection of packaging shall be in accordance with [MIL-PRF-55514](#).



NOTES:

- 1. Dimensions are in inches.
- 2. Metric equivalents are given for general information only.
- 3. Metric equivalents are in parentheses.

FIGURE 5. Printed circuit test cards.

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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 actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite 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 Department's System Command. 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. Capacitors conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. This drawing is intended exclusively to prevent the proliferation of unnecessary duplicate specifications, drawings, and stock catalog listings. When a military specification exists and the product covered by this drawing has been qualified for listing, this drawing becomes obsolete and will not be used for new design.

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. Whether the manufacturer performs the group B inspections, or provides certification of compliance with group B inspections.
- e. Requirements for notification of change of product to procuring activity, if applicable.

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

6.4 Similar vendor PIN's. See [table III](#).

6.5 Users of record. Coordination of this document for future revisions is coordinated only with the suggested 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, by e-mail to capacitorfilter@dla.mil or by telephone (614) 692-0563 or DSN 850-0563.

6.5 Suggested sources of supply. Suggested 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, by e-mail to capacitorfilter@dla.mil , or by telephone (614) 692-0563 or DSN 850-0563.

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Table III

DSCC drawing 89115-	Vendor CAGE number	Similar vendor PIN 1/ 2/ 3/		DSCC drawing 89115-	Vendor CAGE number	Similar vendor PIN 1/ 2/ 3/
01	19396	103J050ST1812-		33	19396	334M050ST2225-
02	19396	103K050ST1812-		34	19396	474J050ST2225-
03	19396	103M050ST1812-		35	19396	474K050ST2225-
04	19396	153J050ST1812-		36	19396	474M050ST2225-
05	19396	153K050ST1812-		37	19396	474J050ST2824-
06	19396	153M050ST1812-		38	19396	474K050ST2824-
07	19396	223J050ST1812-		39	19396	474M050ST2824-
08	19396	223K050ST1812-		40	19396	684J050ST2225-
09	19396	223M050ST1812-		41	19396	684K050ST2225-
10	19396	333J050ST1812-		42	19396	684M050ST2225-
11	19396	333K050ST1812-		43	19396	684J050ST2824-
12	19396	333M050ST1812-		44	19396	684K050ST2824-
13	19396	473J050ST1812-		45	19396	684M050ST2824-
14	19396	473K050ST1812-		46	19396	105J050ST2225-
15	19396	473M050ST1812-		47	19396	105K050ST2225-
16	19396	683J050ST1812-		48	19396	105M050ST2225-
17	19396	683K050ST1812-		49	19396	105J050ST2824-
18	19396	683M050ST1812-		50	19396	105K100ST2824-
19	19396	104J050ST1812-		51	19396	105M050ST2824-
20	19396	104K050ST1812-		52	19396	155J050ST3827-
21	19396	104M050ST1812-		53	19396	155K050ST3827-
22	19396	154J050ST1812-		54	19396	155M050ST3827-
23	19396	154K050ST1812-		55	19396	225J050ST3827-
24	19396	154M050ST1812-		56	19396	225K050ST3827-
25	19396	224J050ST1812-		57	19396	225M050ST3827-
26	19396	224K050ST1812-		58	19396	335J050ST3827-
27	19396	224M050ST1812-		59	19396	335K050ST3827-
28	19396	224J050ST2225-		60	19396	335M050ST3827-
29	19396	224K050ST2225-		61	19396	475J050ST3827-
30	19396	224M050ST2225-		62	19396	475K050ST3827-
31	19396	334J050ST2225-		63	19396	475M050ST3827-
32	19396	334K050ST2225-				

1/ Caution. Do not use this number for item acquisition and marking.
The similar vendor type may not satisfy the performance requirements
of this drawing.

2/ The complete PIN shall have B = bulk or T = tape and reel.

3/ Parts may be bulk or tape and reel when specified in the purchase order.

Vendor CAGE
Number

19396

Vendor name
and address

ITW Paktron
Division of Illinois Tool Works, Inc.
P.O. Box 4539
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DESIGN ACTIVITY DEFENSE ELECTRONICS SUPPLY CENTER, DAYTON, OH 45444-5000	SIZE C	CODE IDENT NO. 14933	DWG NO. 89115
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