INCH-POUND

MIL-DTL-3965/20F
19 August 2002
SUPERSEDING
MIL-C-3965/20E
26 August 1970

DETAIL SPECIFICATION SHEET

CAPACITORS, FIXED, ELECTROLYTIC (NONSOLID ELECTROLYTE), TANTALUM, (POLARIZED, SINTERED SLUG) - 85°C (VOLTAGE DERATED TO 125°C), STYLES CL10 AND CL13

INACTIVE FOR NEW EQUIPMENT DESIGN
NO SUPERSEDING DOCUMENT

This specification is approved for use to the Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification and MIL-DTL-3965.

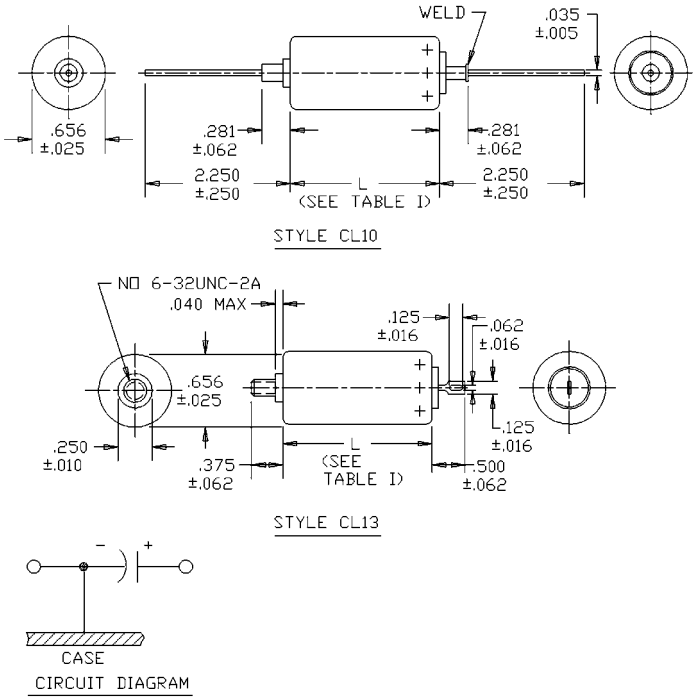

FIGURE 1. Styles CL10 and CL13 capacitors.

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

Inches	mm	Inches	mm
.005	0.13	.125	3.18
.010	0.25	.250	6.35
.016	0.41	.281	7.14
.025	0.64	.375	9.53
.035	0.89	.500	12.70
.040	1.02	.656	16.66
.062	1.57	2.250	57.15

NOTES:

1. All dimensions are in inches.
2. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.

FIGURE 1. Styles CL10 and CL13 capacitors – Continued.

TABLE I. Capacitor characteristics.

PIN 1/	Voltage			Capac-tance	Dissi-pation factor (max)	DC leakage (max)			Impedance (max)	Dimensions L ±.062 (1.57)
	Rated (+85°C)	Derated (+125°C)	Surge (+85°C)			+25°C	+85°C	+125°C		
	volts, dc	volts, dc	volts,dc	µF	%	µA	µA	%	ohms	Inches
CL1-BC700TPG	8	7	9.2	70	53.0	6	30	48	60	.438(11.13)
CL1-BC141TPG	8	7	9.2	140	53.0	10	50	80	30	.562(14.27)
CL1-BD500TPG	10	9	11.5	50	37.5	5	25	40	75	.438(11.13)
CL1-BD101TPG	10	9	11.5	100	37.5	9	45	72	40	.562(14.27)
CL1-BF280TPG	20	18	23.0	28	21.4	6	30	48	85	.438(11.13)
CL1-BF560TPG	20	18	23.0	56	21.4	10	50	80	45	.562(14.27)
CL1-BH200TPG	30	26	34.5	20	15.0	7	35	56	125	.438(11.13)
CL1-BH400TPG	30	26	34.5	40	15.0	12	60	96	75	.562(14.27)
CL1-BK120TPG	60	52	69.0	12	9.1	7	35	56	180	.438(11.13)
CL1-BK250TPG	60	52	69.0	25	9.6	12	60	96	90	.562(14.27)
CL1-BM080TPG	90	78	103.0	8	6.1	7	35	56	250	.438(11.13)
CL1-BM160TPG	90	78	103.0	16	6.1	12	60	96	125	.562(14.27)
CL1-BR040TPG	180	155	207.0	4	6.1	7	35	56	500	.719(18.26)
CL1-BR080TPG	180	155	207.0	8	6.1	12	60	96	250	.938(23.83)
CL1-BS2R5TPG	270	235	310.0	2.5	5.7	7	35	56	750	1.031(26.19)
CL1-BS050TPG	270	235	310.0	5	5.7	11	55	88	375	1.375(34.93)
CL1-BT020TPG	360	310	414.0	2	6.1	7	35	56	1,000	1.312(33.32)
CL1-BT040TPG	360	310	414.0	4	6.1	12	60	96	500	1.781(45.24)

1/ Complete type designation will include an additional symbol to indicate style.

TABLE II. Cross-reference data.

From	To	From	To
PIN 1/ MIL-DTL-3965/20	PIN 2/ MIL-PRF-39006/18	PIN 1/ MIL-DTL-3965/20	PIN 2/ MIL-PRF-39006/18
	M39006/18-		M39006/18-
CL1-BC700TPG	1000	CL1-BK250TPG	1009
CL1-BC141TPG	1001	CL1-BM080TPG	1010
CL1-BD500TPG	1002	CL1-BM160TPG	1011
CL1-BD101TPG	1003	CL1-BR040TPG	1012
CL1-BF280TPG	1004	CL1-BR080TPG	1013
CL1-BF560TPG	1005	CL1-BS2R5TPG	1014
CL1-BH200TPG	1006	CL1-BS050TPG	1015
CL1-BH400TPG	1007	CL1-BT020TPG	1016
CL1-BK120TPG	1008	CL1-BT040TPG	1017

1/ Complete PIN will include an additional symbol to indicate style.
2/ PIN referenced will substitute for styles CL10 and CL13.

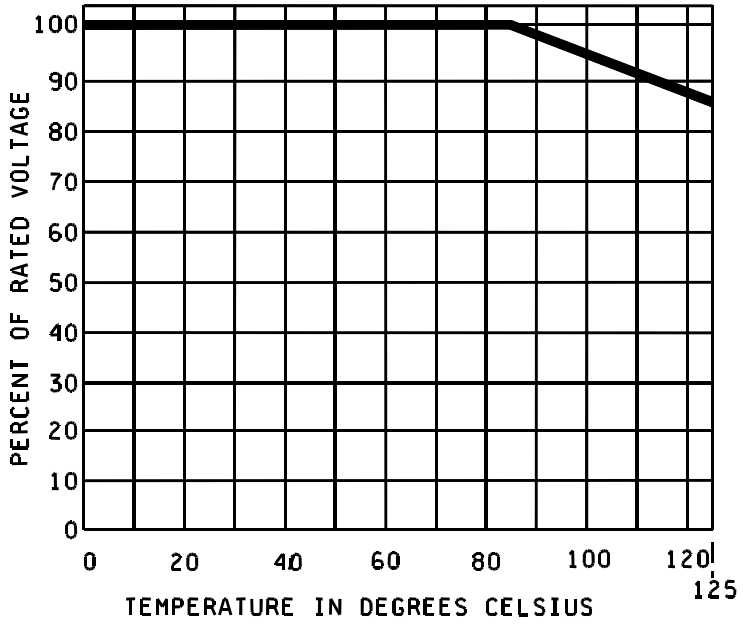

FIGURE 2. Voltage derating with temperature.

REQUIREMENTS:

Design and construction:

Dimensions and configuration: See figure 1.

Case type: Tubular; uninsulated.

Seal type: Hermetic (symbol G).

Terminals: See figure 1.

Rated temperature: -55°C to +85°C, voltage derated to +125°C (see figure 2).

Rated voltage: See table I.

Capacitance (cap) (nom): See table I.

Capacitance tolerance: Symbol T (+ 50 percent, -15 percent).

DC leakage (DCL) (max) (at +25°C): See table I.

Dissipation factor (DF) (max): See table I.

Seal: In accordance with MIL-DTL-3965.

Dielectric withstanding voltage (DWV):

Sleeving to case (min): Not applicable.

Terminal to case: Not applicable.

Insulation resistance:

Sleeving to case (min): Not applicable.

Terminal to case: Not applicable.

Temperature cycling:

DCL (max): 125 percent of 25°C value of table I.

ΔCap.: Within $\pm$ 5 percent of initial measurement.

DF (max): 115 percent of table I value.

Solderability: In accordance with MIL-DTL-3965 (CL10, only).

Terminal strength:

Pull test: In accordance with MIL-DTL-3965.

Bend test (if required) (CL13, only): In accordance with MIL-DTL-3965.

Torque test (CL13, only): In accordance with MIL-DTL-3965.

Wire-lead bend test (CL10, only): In accordance with MIL-DTL-3965.

Twist test: Not applicable.

Surge voltage: See table I.

Moisture resistance:

DCL (max): 125 percent of 25°C value of table I.

ΔCap.: Within $\pm$ 8 percent of initial measurement.

DF (max): 115 percent of table I value.

Low temperature (storage):

DCL (max): See table I (25°C).

ΔCap.: Within $\pm$ 5 percent of initial measurement.

DF (max): See table I.

Stability at low and high temperature:

Step 1 (+25°C):

DCL (max): See table I.

Cap.: Within tolerance of table I value.

DF (max): See table I.

Step 2 (-55°C):

Impedance: See table I.

ΔCap. (max): -60 percent (< 20 V), -40 percent (30 V), or -30 percent (>30 V) of step 1 value.

Step 3 (+25°C):

DCL (max): See table I.

ΔCap.: Within ±5 percent of step 1 value.

DF (max): See table I.

Step 4 (+85°C):

DCL (max): See table I.

ΔCap (max): +30 percent (≤ 20 V) or +20 percent (> 20 V) of step 1 value.

DF (max): See table I.

Step 5 (+125°C):

DCL (max): See table I.

ΔCap. (max): +30 percent (≤ 18 V) or +20 percent (> 18 V) of step 1 value.

DF (max): See table I.

Step 6 (+25°C):

DCL (max): See table I.

ΔCap.: Within ±5 percent of initial measurement.

DF (max): See table I.

Reverse voltage: Not applicable.

Life at +85°C:

2,000-hr (qualification):

DCL (max): See table I (25°C).

ΔCap.: Within ±15 percent of initial measurement.

DF (max): See table I (25°C).

240-hour (group B):

DCL (max): See table I (25°C).

ΔCap.: Within ±10 percent of initial measurement.

DF (max): See table I.

1,760-hour (group C):

DCL (max): See table I (25°C).

ΔCap.: Within ±15 percent of initial measurement.

DF (max): See table I.

Barometric pressure:

Test voltage: Rated voltage.

Life at +125°C.

DCL (max): See table I (25°C).

ΔCap.: Within ±15 percent of initial measurement.

DF (max): 130 percent of initial requirement.

DWV and IR: Not applicable.

Marking: Capacitors shall be marked as shown in the following example:

EXAMPLE:

CL10BC700TPG	-	Type designation
12345 7015	-	Source and date code
70 μF 8 V dc	-	Capacitance and rated voltage (at 85°C).

Polarity: Series of plus (+) symbols encircling positive end (see figure 1).

Voltage groups (85°C rated voltage):

I - - - - - - - - - - 8 to 90 V inclusive
II - - - - - - - - - - - - 180 to 360 V, inclusive

NOTE: The capacitors covered by this specification sheet are substitutable for those covered by MIL-C-3965/20. See table II.

Custodians:
Army – CR
Navy – EC
Air Force – 11
DLA - CC

Preparing activity:
DLA – CC

Project 5910-2160-03