

INCH-POUND

MIL-PRF-39022/10A
25 May 2001
SUPERSEDING
MIL-PRF-39022/10(EC)
26 September 1974

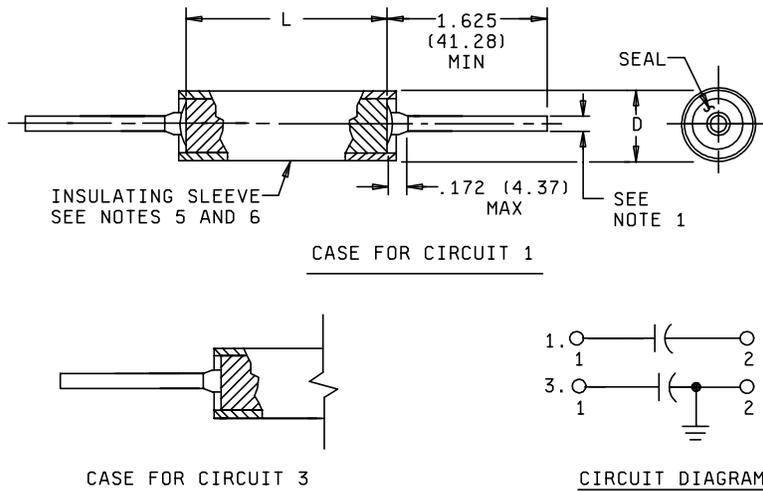
PERFORMANCE SPECIFICATION SHEET

CAPACITORS, FIXED, METALLIZED, PAPER-PLASTIC FILM DIELECTRIC,
DIRECT CURRENT (HERMETICALLY SEALED IN METAL CASES)
ESTABLISHED RELIABILITY, STYLE CHR10 (INSULATED)

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

The requirements for acquiring the product described herein
shall consist of this specification sheet and MIL-PRF-39022.

INACTIVE FOR NEW DESIGN
AFTER 25 MAY 2001



NOTES:

1. Number 24 AWG wire ($.020 \pm .002$ inch (0.51 ± 0.05 mm)) for case diameters of .175 inch (4.45 mm) and .195 (4.95 mm).
Number 22 AWG wire ($.025 \pm .002$ inch (0.64 ± 0.05 mm)) for case diameters of .235 inch (5.97 mm) and .312 (7.92 mm).
Number 20 AWG wire ($.032$ inch $\pm .002$ inch (0.81 ± 0.05 mm)) for case diameters of .400 inch (10.16 mm) and over (see table I for exceptions.)
Number 18 AWG wire (.040 inches $\pm .002$ inch): See table I.
2. See table I for additional dimensions.
3. Dimensions are in inches.
4. Metric equivalents (to the nearest .01 mm) are given for general information only.
5. Insulating sleeve shall extend beyond the capacitor body but shall not exceed .031 inch (0.79 mm) on either end. Insulating sleeve thickness shall not exceed .016 inch (0.41 mm).
6. Plastic insulating sleeve shall be transparent; marking shall be placed on the capacitor case.
7. Metric equivalents are in parentheses.
8. Lead length may be a minimum of one inch long for use in tape and reel packaging, when specified in the ordering data.

FIGURE 1. Dimensions and configuration.

REQUIREMENTS:

Dimensions and configuration: See figure 1 and table I.

Case material: Nonmagnetic.

Capacitance value: See table I.

Capacitance tolerance: 1 percent, 2 percent, 5 percent, and 10 percent.

Rated voltage: See table I for 85°C rating; derate to 60 percent of 85°C rating for operation at 125°C.

Dielectric material: Normally polycarbonate.

Operating temperature range: -55°C to +125°C.

Failure rate level: M (1.0 percent), P (0.1 percent), R (0.01 percent), and S (0.001 percent).

DC burn-in: In accordance with MIL-PRF-39022, table III, qualification inspection, group I and table IV, group A inspection, subgroup 1, except 140 percent of dc rated voltage shall be applied for 48 hours minimum at +125°C +4°C, -0°C. 100 percent inspection required.

Dielectric withstanding voltage (DWV): Method 301 of MIL-STD-202; 100 percent inspection required following dc burn-in.

Terminal to terminal:

AC: 100 ± 10 Hz square wave, peak-to-peak voltage, three times dc rated voltage for 60 seconds minimum, but need not exceed 800 V peak-to-peak. Square wave signal shall have a rise time of 10 to 100 microseconds and a maximum overshoot of 20 percent of rated peak voltage.

DC: 200 percent of dc rated voltage for 60 seconds, minimum.

Terminals to case (when case is not a terminal): Same requirements as specified for terminal to terminal dc DMV test.

Radiographic inspection (X-ray): Method 209 of MIL-STD-202. (Required for FR levels R and S only.)

Thermal shock: Method 107 of MIL-STD-202, condition A, except step 3 shall be +125°C +4°C, -0°C.

Seal: Method 112 of MIL-STD-202, condition A, except at +125°C +4°C, -0°C, 1 hour with no evidence of leakage.

Insulation resistance (IR): Method 302 of MIL-STD-202.

Terminal to terminal: See table III.

Terminal to case (when case is not a terminal): 50,000 megohms, minimum.

Capacitance: Method 305 of MIL-STD-202.

Dissipation factor (DF):

At 25°C: 0.25 percent maximum.

At 85°C: 0.40 percent maximum.

At 125°C: 0.60 percent maximum.

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TABLE I. Capacitor characteristics and dimensions.

DC rated voltage	Capacitance value in μF	Dimensions, nominal	
		D \pm .015, $-$.005	L \pm .031
50	.047	.174	.531
50	.056	.174	.531
50	.068	.174	.625
50	.082	.174	.625
50	.10	.174	.625
50	.12	.174	.625
50	.15	.193	.625
50	.18	.193	.625
50	.22	.235	.625
50	.27	.235	.625
50	.33	.312	.625
50	.39	.312	.625
50	.47	.312	.625
50	.56	.312	.625
50	.68	.312	.843
50	.82	.312	.843
50	1.0	.312	.843
50	1.2	.400	.843
50	1.5	.400	.843
50	1.8	.400	.843
50	2.0	.400	.843
50	2.2	.400	1.125
50	2.7	.400	1.125
50	3.0	.400	1.125
50	3.3	.400	1.125
50	3.9	.500	1.125
50	4.7	.500	1.125
50	5.0	.500	1.125
50	5.6	.500	1.125
50	6.8	.562	1.125
50	8.2	.562	1.312
50	10.0	.670	1.312
50	12.0	.670	1.312
50	15.0	.750	1.375
50	18.0	.750	1.375
50	20.0	.750	1.625
50	22.0	.750	1.625
100	.01	.174	.625
100	.012	.174	.625
100	.015	.174	.625
100	.018	.174	.625
100	.022	.174	.625
100	.027	.174	.625
100	.033	.174	.625
100	.039	.174	.625
100	.047	.193	.625
100	.056	.193	.625
100	.068	.235	.625
100	.082	.235	.625
100	.10	.235	.688
100	.12	.235	.688

See footnotes at end of table.

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TABLE I. Capacitor characteristics and dimensions - Continued.

DC rated voltage	Capacitance value in μF	Dimensions, nominal	
		D $+0.015, -.005$	L $\pm.031$
100	.15	.312	.625
100	.18	.312	.625
100	.22	.312	.688
100	.27	.312	.688
100	.33	.312	.812
100	.39	.312	.812
100	.47	.400	.688
100	.56	.400	.812
100	.68	.400	.812
100	.82	.400	.938
100	1.0	.400	.938
100	1.2	.500	.938
100	1.5	.500	.938
100	1.8	.500	1.125
100	2.0	.500	1.125
100	2.2	.500	1.125
100	2.7	.562	1.312
100	3.0	.562	1.312
100	3.3	.562	1.312
100	4.0	.562	1.562
100	4.7	.670	1.312
100	5.0	.670	1.312
100	5.6	.670	1.312
100	6.8	.670	1.562
100	8.2	.670	1.812
100	10.0	.750	1.812
100	12.0	.750	1.812
100	15.0	1.000	1.875
100	18.0	1.000	1.875
100	20.0	1.000	1.875
100	22.0	1.000	1.875
Case size of 1 inch uses #18 AWG leads			
200	.01	.174	.625
200	.012	.174	.625
200	.015	.174	.625
200	.018	.193	.625
200	.022	.193	.625
200	.027	.235	.625
200	.033	.235	.625
200	.039	.235	.688
200	.047	.235	.688
200	.056	.312	.625
200	.068	.312	.625
200	.082	.312	.688
200	.10	.312	.688
200	.12	.312	.812
200	.15	.312	.812
200	.18	.400	.688
200	.22	.400	.812
200	.27	.400	.812
200	.33	.400	.938

See footnotes at end of table.

TABLE I. Capacitor characteristics and dimensions - Continued.

DC rated voltage	Capacitance value in μF	Dimensions, nominal	
		D $+0.015, -.005$	L $\pm.031$
200	.39	.400	.938
200	.47	.400	1.125
200	.56	.400	1.312
200	.68	.500	1.125
200	.82	.500	1.125
200	1.0	.562	1.125
200	1.2	.562	1.312
200	1.5	.562	1.312
200	1.8	.562	1.812
200	2.0	.562	1.812
200	2.2	.562	1.812
200	2.7	.670	1.562
200	3.0	.750	1.562
200	3.3	.750	1.812
200	4.0	.750	1.812
200	4.7	.750	2.062
200	5.0	.750	2.062
200	5.6	.750	2.312
200	6.0	.750	2.312
200	7.0	1.000	1.812
200	8.2	1.000	2.062
200	10.0	1.000	2.312
Case size of 1" dia for 8.2 μF and 10 μF uses #18 AWG leads			
300	.01	.193	.688
300	.012	.235	.688
300	.015	.235	.688
300	.018	.235	.812
300	.022	.235	.812
300	.027	.312	.688
300	.033	.312	.688
300	.039	.312	.812
300	.047	.312	.812
300	.056	.312	.938
300	.068	.312	.938
300	.082	.400	.812
300	.10	.400	.938
300	.12	.400	.938
300	.15	.400	1.125
300	.18	.400	1.312
300	.22	.400	1.312
300	.27	.562	1.125
300	.33	.562	1.125
300	.39	.562	1.125
300	.47	.562	1.562
300	.56	.562	1.562
300	.68	.670	1.312
300	.82	.670	1.562
300	1.0	.670	1.812
300	1.2	.670	1.812
300	1.5	.750	2.062
300	1.8	.750	2.062

See footnotes at end of table.

TABLE I. Capacitor characteristics and dimensions - Continued.

DC rated voltage	Capacitance value in μF	Dimensions, nominal	
		D $+0.015, -.005$	L $\pm.031$
300	2.0	.750	2.312
300	2.2	1.000	1.812
300	2.5	1.000	1.812
300	2.7	1.000	1.812
300	3.0	1.000	2.062
300	3.3	1.000	2.312
300	3.9	1.000	2.562
400	.01	.235	.688
400	.012	.235	.812
400	.015	.235	.812
400	.018	.235	.812
400	.022	.312	.688
400	.027	.312	.812
400	.033	.312	.812
400	.039	.312	.938
400	.047	.400	.812
400	.056	.400	.812
400	.068	.400	.938
400	.082	.400	.938
400	.10	.400	1.125
400	.12	.400	1.312
400	.15	.400	1.312
400	.18	.562	1.125
400	.22	.562	1.125
400	.27	.562	1.312
400	.33	.562	1.562
400	.39	.562	1.562
400	.47	.562	1.812
400	.56	.670	1.562
400	.68	.670	1.812
400	.82	.750	1.812
400	1.0	.750	2.062
400	1.2	1.000	1.812
400	1.5	1.000	1.812
400	1.8	1.000	2.062
400	2.0	1.000	2.062
400	2.2	1.000	2.312
400	2.5	1.000	2.562
400	2.7	1.000	2.562
600	.01	.312	.812
600	.012	.312	.812
600	.015	.400	.812
600	.018	.400	.812
600	.022	.400	.812
600	.027	.400	.937
600	.033	.400	.937
600	.039	.400	1.125
600	.047	.400	1.125
600	.056	.400	1.312
600	.068	.400	1.312

See footnotes at end of table.

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TABLE I. Capacitor characteristics and dimensions - Continued.

DC rated voltage	Capacitance value in μF	Dimensions, nominal	
		D $+0.015, -.005$	L $\pm.031$
600	.082	.562	1.125
600	.10	.562	1.125
600	.12	.562	1.312
600	.15	.562	1.312
600	.18	.562	1.562
600	.22	.562	1.812
600	.27	.670	1.562
600	.33	.670	1.812
600	.39	.670	1.812
600	.47	.750	1.812
600	.56	.750	2.062
600	.68	.750	2.312
600	.82	1.000	1.812
600	1.0	1.000	2.062

1/ Dimensions are bare case sizes (see figure 1).

2/ Dimensions are for circuit 1. For circuit 3, deduct .062 inches (1.57 mm) from length.

3/ See table II for metric equivalents.

TABLE II. Metric equivalents of decimal inches. 1/

Inches	mm	Inches	mm	Inches	mm
.005	0.13	.625	15.88	1.125	28.58
.015	0.38	.670	17.02	1.312	33.32
.031	0.79	.688	17.48	1.375	34.93
.174	4.42	.750	19.05	1.562	39.67
.193	4.90	.812	20.62	1.625	41.28
.235	5.97	.843	21.41	1.812	46.02
.312	7.92	.874	22.20	1.875	47.63
.400	10.16	.937	23.80	2.062	52.37
.500	12.70	.938	23.83	2.124	53.95
.531	13.49	1.000	25.40	2.312	58.72
.562	14.27	1.062	26.97	2.562	65.07

1/ Metric equivalents (to the nearest .01 millimeter) are given for general information only.

TABLE III. Insulation resistance.

In megohms:	
At 25°C $\pm 3^\circ\text{C}$ (need not exceed)	250,000
At 85°C $+4^\circ\text{C}, -0^\circ\text{C}$ (need not exceed)	25,000
At 125°C $+4^\circ\text{C}, -0^\circ\text{C}$ (need not exceed)	15,000
In megohms x microfarads (minimum):	
At 25°C $\pm 3^\circ\text{C}$	100,000
At 85°C $+4^\circ\text{C}, -0^\circ\text{C}$	6,000
At 125°C $+4^\circ\text{C}, -0^\circ\text{C}$	1,000

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Barometric pressure (reduced): Method 105 of MIL-STD-202, condition D (100,000 feet). 125 percent of rated voltage applied. See MIL-PRF-39022 for voltage limitations.

Vibration, high frequency: Method 204 of MIL-STD-202, condition D (20 G).

50 percent of rated voltage applied.

Salt spray (corrosion): Method 101 of MIL-STD-202, condition B (48 hours).

Salt solution: 5 percent.

Immersion: Method 104 of MIL-STD-202, condition C.

DWV:

Insulating sleeves: 4,000 V dc, minimum.

Terminal to terminal: 150 percent of rated voltage.

Terminals to case (when case is not a terminal): 200 percent of dc rated voltage.

IR:

Insulating sleeves: 100 megohms, minimum.

Terminal to terminal: 60 percent of value specified in table III.

Terminals to case (when case is not a terminal): 30,000 megohms, minimum.

Capacitance: Within ± 3 percent of initial value.

DF: Not more than 110 percent of initial limit.

Solderability: Method 208 of MIL-STD-202.

Shock (specified pulse): Method 213 of MIL-STD-202, condition I.

50 percent of rated voltage applied.

Moisture resistance: Method 106 of MIL-STD-202.

DWV, IR, Capacitance, and DF: Same as for immersion.

Terminal strength: Method 211 of MIL-STD-202, conditions A and D.

Condition A: Applied force 5 pounds.

Condition D: 3 rotations of 360 degrees.

Low temperature and capacitance change with temperature:

Low temperature: -55°C $+0^{\circ}\text{C}$, -3°C for 48 ± 4 hours with rated voltage applied.

Capacitance change with temperature:

At -55°C $+0^{\circ}\text{C}$, -3°C , $+0$, -2 percent.

At $+85^{\circ}\text{C}$ $+4^{\circ}\text{C}$, -0 : ± 1 percent.

At $+125^{\circ}\text{C}$ $+4^{\circ}\text{C}$, -0°C : ± 2 percent.

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Fault count: Not applicable.

Fungus: Method 508 of MIL-STD-810, procedure I.

Resistance to soldering heat: Method 210 of MIL-STD-202, condition C, except the time shall be 10 seconds \pm 1 second.

IR: See table II.

Capacitance: Within \pm 3 percent of initial value.

DF: Not more than initial limit.

Life: Method 108 of MIL-STD-202.

Qualification:

Accelerated conditions: 140 percent of rated voltage for 2,000 +72, -0 hours at 85°C. End of life requirements as specified for rated conditions.

Rated conditions: 100 percent of rated voltage for 10,000 +96, -0 hours at 85°C.
DF (at +85°C +4°C -0°C) between first 24 and 48 hours of test:

Not greater than initial limit.

DF (at +85°C +4°C -0°C) during last 48 hours of test:

0.8 percent, maximum.

IR:

Insulating sleeves: 100 megohms, minimum.

Terminal to terminal: Not less than 30,000 megohm-microfarads or 75,000 megohms.

Terminals to case (when case is not a terminal): 30,000 megohms, minimum.

Capacitance: Within \pm 5 percent of initial value.

DF (at +25°C \pm 3°C) after life: 0.5 percent maximum.

Extended life:

Accelerated conditions: 2,000 +75, -0 hours.

Rated conditions: 10,000 +96, -0 hours.

IR, Capacitance, and DF: Same requirements as for qualification life test.

125°C verification life test: 85°C rated voltage for 2,000 +75, -0 hours at 125°C. 25 pieces representative of production shall be tested every six months.

IR, Capacitance, and DF: Same requirements as for qualification life test.

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Marking: In accordance with MIL-PRF-39022.

Part or Identifying Number (PIN): M39022/10 (type designation as detailed below).

Explanation of type designation:

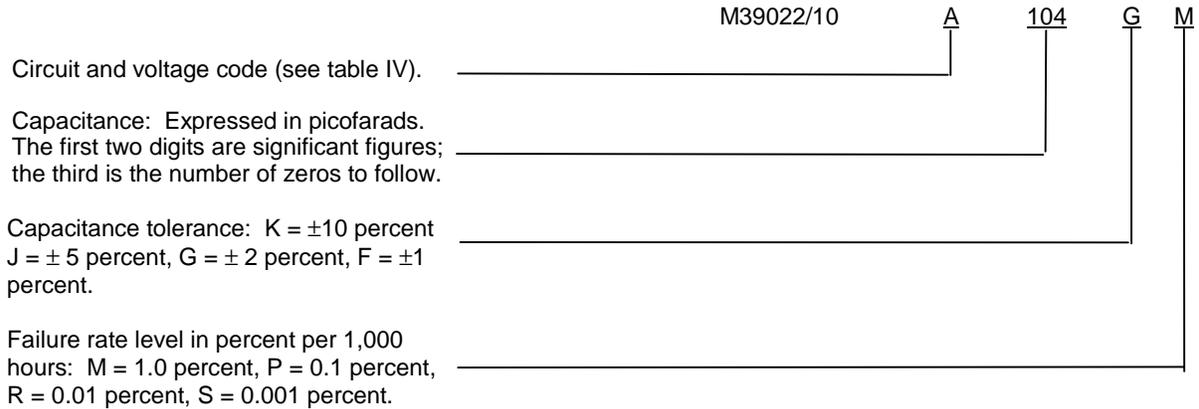


TABLE IV. Circuit and voltage codes.

Code	Circuit	Voltage
A	1	50
B	3	50
C	1	100
D	3	100
E	1	200
F	3	200
G	1	400
H	3	400
J	1	600
K	3	600
L	1	300
M	3	300

Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC
(Project 5910-2068)