INCH-POUND

MIL-PRF-19978/9C
w/Amendment 1
11 March 2004
SUPERSEDING
MIL-PRF-19978/9C
27 May 1999

PERFORMANCE SPECIFICATION SHEET

CAPACITORS, FIXED, PLASTIC (OR PAPER-PLASTIC) DIELECTRIC, AXIAL-WIRE TERMINAL, TUBULAR (INSULATED) (HERMETICALLY SEALED IN METAL CASES), ESTABLISHED RELIABILITY, STYLE CQR09

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

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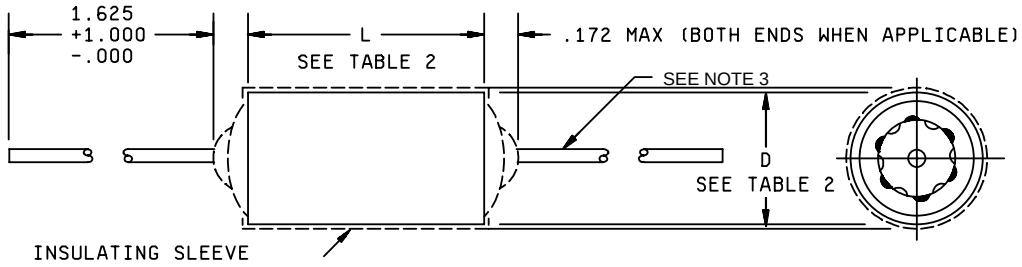
The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-19978.



Inches	mm	Inches	mm
.001	.03	.312	7.92
.004	.10	.400	10.16
.025	.64	.562	14.27
.032	.81	1.000	25.40
.172	4.37	1.562	39.67
.235	5.97	1.625	41.38

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Leads shall be of tinned solid wire, .025 (No. 22 AWG) for cases .235 and .312 in diameter; and .032 (No. 20 AWG) for cases .400 diameter and above. Tolerance on all lead wire diameters shall be +.004, -.001.
4. Capacitors with dimension L of 1.562 or D of .562 and larger, are not intended to be supported by their leads. These capacitors shall be supported with a supplementary means of mounting, such as a wrap-around band. The supporting device will not be supplied with the capacitor.
5. Lead length may be a minimum of 1-inch long for use in tape and reel packaging when specified in the ordering data.

FIGURE 1. Style CQR09 capacitors.

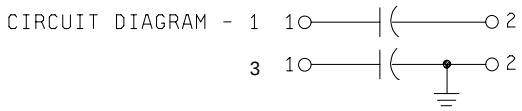
REQUIREMENTS:

Design and construction:

Dimensions and configuration: See figure 1 and table II.

Case: Nonmagnetic (end seal may be of magnetic material).

Terminals: Axial-wire lead (see figure 1).



Rated voltage: See table II.

Rated temperature: -65°C to +125°C.

Capacitance (Cap.) (nom): See table II.

Capacitance tolerance: See table II.

Dissipation factor (DF) (max): 1.0 percent.

Failure rate level: In accordance with MIL-PRF-19978.

Burn-in: In accordance with MIL-PRF-19978.

Radiographic inspection: In accordance with MIL-PRF-19978.

Seal: Method 112 of MIL-STD-202, test condition letter A.

Dielectric withstanding voltage (DWV):

Sleeving: In accordance with MIL-PRF-19978.

Barometric pressure: In accordance with MIL-PRF-19978.

Test points:

Circuit diagram 1: Between terminals and case.

Circuit diagram 3: Between ungrounded terminal and case.

Insulation resistance (IR):

Sleeving: In accordance with MIL-PRF-19978.

Terminal to terminal: See table I.

Terminal to case: Greater than 10,000 megohms.

TABLE I. Terminal-to-terminal insulation resistance.

Capacitance rating	Minimum insulation resistance
Characteristic K	
	At 25°C
0 to 0.6 microfarad	25,000 megohms
Greater than 0.6 microfarad	15,000 megohm-microfarads 1/
	At 125°C
0 to 0.08 microfarad	250 megohms
Greater than 0.08 microfarad	20 megohm-microfarads 1/

1/ Product obtained by multiplying the capacitance in microfarads by the insulation resistance in megohms.

Vibration, high frequency: Method 204 of MIL-STD-202, test condition B, with the following exception:

Direction and duration of motion: 4 hours in each of two mutually perpendicular directions (total of 8 hours), one parallel and the other perpendicular to the cylindrical axis.

Salt spray: In accordance with MIL-PRF-19978.

Immersion:

DWV:

Sleeving: In accordance with MIL-PRF-19978.

IR:

Sleeving: In accordance with MIL-PRF-19978.

Solderability: In accordance with MIL-PRF-19978.

Terminal strength: Method 211 of MIL-STD-202, test condition letter D.

Moisture resistance:

DWV:

Sleeving: In accordance with MIL-PRF-19978.

IR:

Sleeving: In accordance with MIL-PRF-19978.

Stability at low and high temperatures:

Low temperature:

Test temperature: -65°C +0°C, -5°C.

Capacitance change (max): 10 percent.

High temperature:

Test temperature: +125°C +0°C, -5°C.

Capacitance change (max): +10 percent.

Life:

Capacitance change (max): ±5 percent of initial measured value.

Resistance to soldering heat: In accordance with MIL-PRF-19978.

TABLE II. Style CQR09 capacitors.

Part number 1/	DC voltage rating	Capacitance rating	Capacitance Tolerance	Failure rate level	Case dimensions 2/			
					Circuit 1		Circuit 3	
					L ±.031	D +.015 -.005	L ±.031	D +.015 -.005
	Volts	µF			Inches	Inches	Inches	Inches
CQR09A-KC392-3-	200	.0039	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KC472-3-	200	.0047	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KC562-3-	200	.0056	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KC682-3-	200	.0068	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KC183-3-	200	.018	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KC223-3-	200	.022	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KC273-3-	200	.027	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KC333-3-	200	.033	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KC393-3-	200	.039	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KC473-3-	200	.047	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KC563-3-	200	.056	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KC683-3-	200	.068	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KC823-3-	200	.082	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KC104-3-	200	.10	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KC124-3-	200	.12	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KC154-3-	200	.15	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KC184-3-	200	.18	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KC224-3-	200	.22	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KC274-3-	200	.27	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KC334-3-	200	.33	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KC394-3-	200	.39	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KC474-3-	200	.47	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KC564-3-	200	.56	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KC684-3-	200	.68	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KC824-3-	200	.82	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KC105-3-	200	1.000	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KE272-3-	400	.0027	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KE332-3-	400	.0033	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KE123-3-	400	.012	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KE153-3-	400	.015	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KE273-3-	400	.027	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KE333-3-	400	.033	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KE393-3-	400	.039	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KE473-3-	400	.047	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KE563-3-	400	.056	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KE683-3-	400	.068	G, J, K	M, P, R, S	1.375	.400	1.312	.400

See footnotes at end of table.

TABLE II. Style CQR09 capacitors - Continued.

Part number 1/	DC voltage rating	Capacitance rating	Capacitance tolerance	Failure rate level	Case dimensions 2/			
					Circuit 1		Circuit 3	
					L ±.031	D +.015 -.005	L ±.031	D +.015 -.005
	Volts	µF			Inches	Inches	Inches	Inches
CQR09A-KE823-3-	400	.082	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KE104-3-	400	.10	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KE124-3-	400	.12	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KE154-3-	400	.15	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KE184-3-	400	.18	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KE224-3-	400	.22	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KE274-3-	400	.27	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KE334-3-	400	.33	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KE394-3-	400	.39	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KE474-3-	400	.47	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KF102-3-	600	.0010	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KF122-3-	600	.0012	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KF152-3-	600	.0015	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KF182-3-	600	.0018	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KF222-3-	600	.0022	G, J, K	M, P, R, S	.750	.235	.688	.235
CQR09A-KF272-3-	600	.0027	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF332-3-	600	.0033	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF392-3-	600	.0039	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF472-3-	600	.0047	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF562-3-	600	.0056	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF682-3-	600	.0068	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF822-3-	600	.0082	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF103-3-	600	.010	G, J, K	M, P, R, S	.875	.312	.812	.312
CQR09A-KF123-3-	600	.012	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KF153-3-	600	.015	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KF183-3-	600	.018	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KF223-3-	600	.022	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KF273-3-	600	.027	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KF333-3-	600	.033	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KF393-3-	600	.039	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KF473-3-	600	.047	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KF563-3-	600	.056	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KF683-3-	600	.068	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KF823-3-	600	.082	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KF104-3-	600	.10	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KF124-3-	600	.12	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KF154-3-	600	.15	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KF184-3-	600	.18	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KF224-3-	600	.22	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KF274-3-	600	.27	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KF334-3-	600	.33	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KF394-3-	600	.39	G, J, K	M, P, R, S	2.375	.750	2.312	.750
CQR09A-KF474-3-	600	.47	G, J, K	M, P, R, S	2.375	.750	2.312	.750
CQR09A-KG102-3-	1000	.0010	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG122-3-	1000	.0012	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG152-3-	1000	.0015	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG182-3-	1000	.0018	G, J, K	M, P, R, S	.875	.400	.812	.400

See footnotes at end of table.

TABLE II. Style CQR09 capacitors - Continued.

Part number 1/	DC voltage rating	Capacitance rating	Capacitance tolerance	Failure rate level	Case dimensions 2/			
					Circuit 1		Circuit 3	
					L ±.031	D +.015 -.005	L ±.031	D +.015 -.005
	Volts	µF			Inches	Inches	Inches	Inches
CQR09A-KG222-3-	1000	.0022	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG272-3-	1000	.0027	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG332-3-	1000	.0033	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG392-3-	1000	.0039	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG472-3-	1000	.0047	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG562-3-	1000	.0056	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG682-3-	1000	.0068	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG822-3-	1000	.0082	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG103-3-	1000	.010	G, J, K	M, P, R, S	.875	.400	.812	.400
CQR09A-KG123-3-	1000	.012	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KG153-3-	1000	.015	G, J, K	M, P, R, S	1.125	.400	1.062	.400
CQR09A-KG183-3-	1000	.018	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KG223-3-	1000	.022	G, J, K	M, P, R, S	1.375	.400	1.312	.400
CQR09A-KG273-3-	1000	.027	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KG333-3-	1000	.033	G, J, K	M, P, R, S	1.125	.562	1.062	.562
CQR09A-KG393-3-	1000	.039	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KG473-3-	1000	.047	G, J, K	M, P, R, S	1.375	.562	1.312	.562
CQR09A-KG563-3-	1000	.056	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KG683-3-	1000	.068	G, J, K	M, P, R, S	1.625	.562	1.562	.562
CQR09A-KG823-3-	1000	.082	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KG104-3-	1000	.10	G, J, K	M, P, R, S	1.625	.670	1.562	.670
CQR09A-KG124-3-	1000	.12	G, J, K	M, P, R, S	1.875	.670	1.812	.670
CQR09A-KG154-3-	1000	.15	G, J, K	M, P, R, S	1.875	.670	1.812	.670
CQR09A-KG184-3-	1000	.18	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KG224-3-	1000	.22	G, J, K	M, P, R, S	2.125	.750	2.062	.750
CQR09A-KG274-3-	1000	.27	G, J, K	M, P, R, S	2.125	1.000	2.062	1.000
CQR09A-KG334-3-	1000	.33	G, J, K	M, P, R, S	2.125	1.000	2.062	1.000
CQR09A-KG394-3-	1000	.39	G, J, K	M, P, R, S	2.375	1.000	2.312	1.000
CQR09A-KG474-3-	1000	.47	G, J, K	M, P, R, S	2.375	1.000	2.312	1.000

1/ Complete part number shall include additional symbols to indicate circuit, capacitance tolerance and failure rate level as applicable.

2/ Dimensions are for basic case; sleeving shall extend .016 inch minimum and .062 inch maximum, beyond each end of the capacitor body; however, if a shrink-fitted insulation is used for the sleeving, it shall lap over the ends of the capacitor body. Add .047 inch maximum to the nominal for capacitor diameter.

* TABLE III. Millimeter equivalent of decimal inches.

Inches	mm	Inches	mm	Inches	mm
0.005	0.13	0.562	14.27	1.312	33.32
0.015	0.38	0.670	17.02	1.375	34.93
0.016	0.41	0.688	17.48	1.562	39.67
0.031	0.79	0.750	19.05	1.625	41.28
0.047	1.19	0.812	20.62	2.062	52.37
0.062	1.57	0.875	22.23	2.125	53.98
0.235	5.97	1.000	25.40	2.312	58.72
0.312	7.92	1.062	26.97	2.375	60.33
0.400	10.16	1.125	28.58		

* Referenced documents: In addition to MIL-PRF-19978, this document references MIL-STD-202.

Amendment notations: The margins of this specification are marked with asterisks to indicate modifications generated by this amendment. 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.

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

Preparing activity:
DLA - CC

(Project 5910-2246)

Review activities:
Navy - MC
Air Force - 19, 99

* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at www.dodssp.daps.mil.