Standard Capacitance
Reference or Working Standard

1409 Series

Highly stable cost-effective capacitance standards with low temperature coefficient, low losses and a wide range of values.

- 0.001 µF to 1000 µF
- ±0.01%/year stability
- Verify meter and instrumentation calibration
- Two-to-five terminal configuration, depending on model

Model 1409 Standard Capacitance

SPECIFICATIONS

Calibration Accuracy: 100 ppm for 1 nF; 0.01% for 1 µF and under; 0.04% for 100 µF and under; and 0.4% for 1000 µF;

At test frequency of 1 kHz for up to 5 µF; 100 Hz for over 5 µF.

2-terminal and 3-terminal measurements are provided.

Stability: <0.01% per year.

Temperature Coefficient: 20 ppm/°C for 1 µF and under;
-50 ppm/°C for capacitance to 190 µF;
-150 ppm/°C for 1000 µF.

Operating Temperature: 10°C to 50°C.

Dissipation Factor: 0.01 µF - 1 µF; 0.0003 at 1 kHz;
10 µF; 0.0005; 100 µF; 0.001;
1000 µF; 0.002 at 100 Hz and 120 Hz; 0.02 at 1 kHz.

Series Inductance: Typically < 0.06 µH, 0.01 µF - 1 µF.

Series Resistance at 1 MHz: 0.02 Ω, 0.01 µF - 0.1 µF; 0.03 Ω, 1 µF.

Frequency Characteristics: Varies as $\sqrt{f}$ above 100 kHz. See figure 1.

Leakage Resistance: 5,000 ohm-Farads or 100 GΩ, whichever is less.

Max Voltage: See table.

Test Conditions: (100 Hz, 120 Hz and 1 kHz at 23°C; < 1 µF; 5 - terminal measurement for values 1 µF, 1 MHz or other available.

Capacitor Type: Hermetically sealed silvered mica for 100 pF to 1 µF; hermetically sealed polystyrene for 10 µF; hermetically sealed polycarbonate for >10 µF.

Terminals: Three binding posts, for values up to 1 µF;
five binding posts, for values over 1 µF.

Dimensions:
-F/L/T: 10.2 cm H x 8.3 cm W x 5.1 cm D (4.0" x 3.3" x 2.0")
-Y: 14.3 cm H x 8.3 cm W x 6.9 cm D (5.6" x 3.2" x 2.7")
-10 µF/100 µF: 86 cm H x 10.5 cm W x 12.7 cm D (3.4" x 4.15" x 5.0")
-1000 µF: 8.6 cm H x 30.5 cm W x 8.9 cm D (3.4" x 12" x 3.5")

Weight: -F/L/T: ~ 0.6 kg (1.25 lb.)
-Y: ~ 1.1 kg (2.25 lb.)
-10 µF/100 µF: ~ 0.4 kg (0.8 lb.)
-1000 µF: ~ 2 kg (4.5 lb.)

Model	Value	Adjustment Accuracy	Dissipation Factor (typical)	Maximum Voltage** (V)
1409-F	1 nF	±0.02%	0.0003	500
1409-L	10 nF	±0.02%	0.0003	500
1409-T	100 nF	±0.02%	0.0003	500
1409-Y	1 µF	±0.02%	0.0003	500
1409-10 µF	10 µF	±0.04%	0.0005	44 Vrms+
1409-100 µF	100 µF	±0.05%	0.001	22 Vrms+
1409-1000 µF	1000 µF	±0.4%	0.001	22 Vrms+
1409-X	Custom	*	*	*

+ Maximum allowable Vrms; subject to maximum Vdc = 50 V and max Vrms = (39000/f) for C = 10 µF; (26000/f) for C = 19 µF; (13000/f) for C ≥ 100 µF; (9500/f) for C ≥ 1000 µF, where f = frequency (in Hz).
* Depends on Custom value
** Peak up to 10 kHz.

IET LABS, INC. in the GenRad Tradition
534 Main Street, Westbury, NY 11590
www.ietlabs.com
TEL: (516) 334-5959 • (800) 899-8438 • FAX: (516) 334-5988

Figure 1
Change in capacitance as a function of frequency for typical 1409 Capacitors. The 1-kHz value on the plot should be used as a basis of reference in estimating frequency errors.

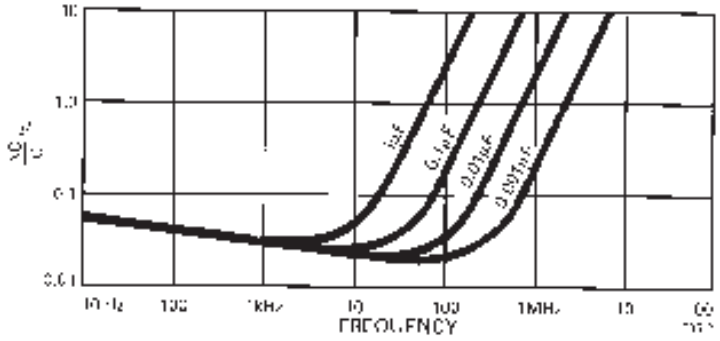
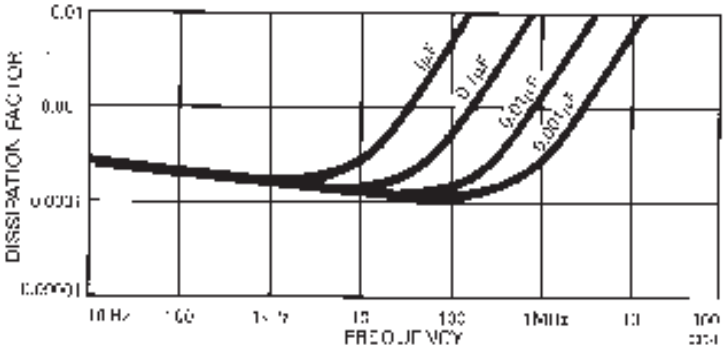


Figure 2
Dissipation factor as a function of frequency.



ORDERING INFORMATION

1409-9706	1409-F,	0.001 µF
1409-9712	1409-L,	0.01 µF
1409-9720	1409-T,	0.1 µF
1409-9725	1409-Y,	1.0 µF
1409-9730	1409,	10 µF
1409-9735	1409,	100 µF
1409-9740	1409,	1000 µF
1409-9740	1409,	Custom Value