Standard Capacitance
Reference or Working Standards

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**

SPECIFICATIONS

Adjustment Accuracy: within ±0.05% of nominal value.

Calibration Accuracy: 0.01% for 1 µF; 0.012% for 5 µF; 0.02% for 10 µF, 0.035% for 100 µF; and 0.4% for 1000 µF

Stability: <0.01% per year.

Temperature Coefficient: <+35 ±10ppm for capacitance ≤1µF; <-60±50 ppm/°C for capacitance of 10 µF; <±110 ppm/°C for capacitance over 10 µF.

Operating Temperature: 10°C to 50°C.

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

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

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

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

Leakage Resistance: 5000 ohm-Farads or 100 GΩ, whichever is less.

Maximum Voltage: See table.

Test Conditions: (100 Hz, 120 Hz and 1kHz 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: Five 5-way binding posts, >1 µF; Three 5-way binding posts, ≤ 1 µF.

Dimensions:

-F/L/T:	83w x 102h x 51 dp (mm) (3.2 x 4.0 x 2.0 in.)
-Y:	83w x143h x 69 dp (mm) (3.2 x 5.6 x 2.6 in.)
-10µF/100µF:	105w x 86h x 127 dp (mm) (4.15 x 3.4 x 5.0 in.)
-1000µF:	312w x 86h x 89 dp (mm) (12 x 3.4 x 3.5 in.)

Weight:

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

Model	Value	Accuracy	Dissipation Factor (typical)	Maximum Voltage** (V)
1409-F	1 nF	±0.05%	0.0003	500
1409-L	10 nF	±0.05%	0.0003	500
1409-T	100 nF	±0.05%	0.0003	500
1409-Y	1 µF	±0.05%	0.0003	500
1409-10µF	10µF	±0.02%	0.0005	44 Vrms+
1409-100µF	100 µF	±0.04%	0.001	22 Vrms+
1409-1000µF	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.
Standards • Decades • Strobes • Sound Level Meters • Bridges
Formerly manufactured by
GenRad
534 Main Street, Westbury, NY 11590
TEL: (516) 334-5959 • (800) 899-8438 • FAX: (516) 334-5988
www.ietlabs.com

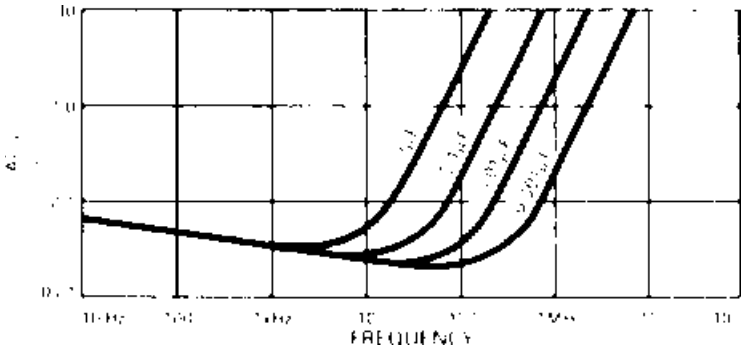

Figure 1
Change in capacitance as a function of frequency for typical 1409 Capacitors. The 1-kHz value on the plot should be used as a basis of reference in estimating frequency errors.

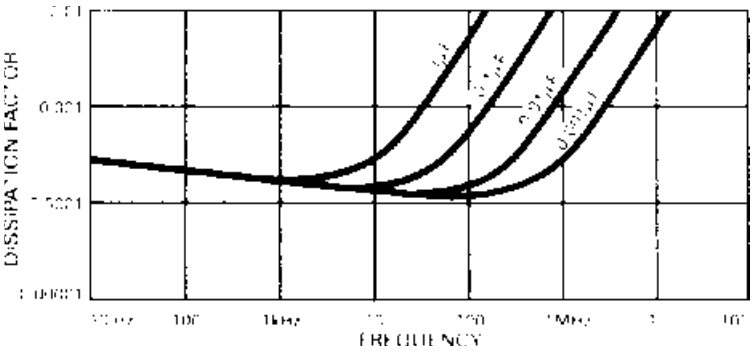

Figure 2 Dissipation factor as a function of frequency.

ORDERING INFORMATION

Reference Standard Capacitor

Catalog Number	Item
1409-9706	1409-F, 0.001µF
1409-9712	1409-L, 0.01µF
1409-9720	1409-T, 0.1µF
1409-9725	1409-Y, 1.0µF
1409-9730	1049, 10µF
1409-9735	1409,100µF
1409-9740	1409,1000µF
1409-X	1409, Custom Value

Includes:

Calibration Certificate Traceable to NIST

Operational Accessories:

Calibration Data

IET LABS, INC.
Standards • Decades • Strobes • Sound Level Meters • Bridges
Formerly manufactured by
GenRad
534 Main Street, Westbury, NY 11590
TEL: (516) 334-5959 • (800) 899-8438 • FAX: (516) 334-5988
www.ietlabs.com
1409/08-13-02