



IPC-TM-650 TEST METHODS MANUAL

1 Scope The purpose of this test is to measure the capacitance effects arising from plastic substrates, adhesives, or coatings, which may be critical to the reliable functioning of a circuit.

2 Applicable Documents None

3 Test Specimen Specimen thickness for all tests must be uniform within $\pm 1\%$ of the average thickness. At frequencies below 1 MHz the specimen shall be large enough to provide circular electrodes at least 10 cm in diameter and between 1.5 mm to 6.35 mm thick. At frequencies from 1.0 MHz to 1000 MHz, a micrometer electrode holder should be used with the test specimen.

4 Equipment/Apparatus

4.1 A bridge or resonant circuit capable of measuring the capacitance and dissipation factor with the required accuracy at the specified frequency may be used. The inherent accuracy of the measurement shall be $\pm 0.5\%$, $\pm 0.2\%$ picofarad, unless otherwise specified. The electrode material may be thin foil, evaporated metal, sprayed metal, or air drying conductive paint.

4.2 The generating circuit may be any suitable source that can furnish sufficient current for the specified precision of measurement or voltage gradient in the dielectric.

5 Procedure

5.1 Preparation The atmospheric conditions surrounding the specimen prior to and during test must be 23°C , $\pm 1.1^{\circ}\text{C}$ and 50%, $\pm 4\%$ RH.

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5.2 Test Place the test specimen in a suitable measuring cell or holder and measure its capacitance and dissipation factor with a suitable measuring circuit having required sensitivity and accuracy.

5.3 Evaluation Record the shape and dimensions of the specimen, type and dimensions of electrodes and measuring cell, test conditions, method of measurement, applied voltage, voltage gradient, and frequency and capacitance.

5.4 Calculation

$$C = \frac{Q}{V} = \frac{GA}{4\pi do} = \frac{A}{4\pi do}$$

where:

C = capacitance in Farads

Q = total charge in coulombs

V = potential difference between plates in volts

GA = area of plates

$4\pi do$ = distance between plates

6 Notes

6.1 Suitable measurement techniques must be used to minimize errors due to the connections between the measuring apparatus and the specimen.

6.2 The AC voltage actually impressed across the specimen must be as low as possible. When DC polarizing voltages are required, it must be as specified.