



IPC-TM-650 TEST METHODS MANUAL

1 Scope This test method provides a standard procedure to determine the dissipation factor of printed circuit materials.

2 Applicable Documents None

3 Test Specimen

3.1 At least three specimens; each shall be 10 cm x 10 cm x the thickness of the laminate or substrate.

4 Equipment/Apparatus

4.1 Standard capacitance bridge and accessories

5 Procedure

5.1 Preparation

5.1.1 Remove foil from both sides of the specimens using standard copper etching practices.

5.1.2 Rinse in tap water until clean.

5.1.3 Condition specimens in distilled water for 24 hours at 23°C, then air dry.

5.1.4 Coat both sides of the specimens with silver conductive paint, dry, and file all edges to prevent a conductive path.

5.1.5 Calibrate the capacitance bridge assembly.

5.1.6 Set the Method dial on "Substitute" and connect the balancing capacitor to the unknown direct terminals.

5.1.7 The balancing capacitor must be 100 picofarads greater than the test specimen.

5.1.8 Turn the Method switch to the "Substitute" position.

Number 2.5.8	
Subject Dissipation Factor of Flexible Printed Wiring Material	
Date 7/75	Revision A
Originating Task Group N/A	

5.2 Test

5.2.1 Set the Voltage dial for maximum output and obtain a null on the detector by balancing the Capacitance and Dissipation dials, then take the reading of the capacitance of the dissipation.

5.2.2 Proceed by connecting the test specimen to the unknown substitute terminals.

5.2.3 Obtain a null on the detector by balancing the capacitance bridge, then read the capacitance and the dissipation factor as before.

5.3 Calculation Calculate the dissipation factor from the following equation:

$$DX = (6.01) \frac{C^1}{C^1 - C} (D - D^1)$$

DX = dissipation factor

C¹ = capacitance of balancing capacitor

C = capacitance of test specimen

D¹ = dissipation of balancing capacitor

D = dissipation of test specimen

5.4 Report The results should be recorded in a written report, which contains the following as a minimum:

- Certification that the test was performed in accordance with this test method
- Identification of specimens tested
- Dissipation factor for each specimen tested and the average of all specimens for each material tested

6 Notes The dissipation factor of a dielectric material is the relationship between the permittivity (capacitance of material) and conductivity (ability to conduct or the reciprocal of the electrical resistivity) measured at a given frequency.