

SEMI G60-94 (Reapproved 0302)

TEST METHOD FOR THE MEASUREMENT OF ELECTROSTATIC PROPERTIES OF SEMICONDUCTOR LEADFRAME INTERLEAFING MATERIALS

The test method was technically approved by the Global Assembly and Packaging Committee and is the direct responsibility of the Japanese Assembly and Packaging Committee. Current edition approved by the Japanese Regional Standards Committee on November 26, 2001. Initially available at www.semi.org on December 2001; to be published March 2002. Originally published in 1994.

1 Purpose

1.1 This test method describes a procedure to determine the electrostatic properties of interleaf materials in film or sheet form by measuring the magnitude and polarity of an induced charge and the time required for complete dissipation of the charge.

NOTE 1: The method is independent of volume or insulation resistivities.

2 Scope

2.1 This test method is suitable for all interleaf materials and may be used by vendors at outgoing inspection, or customers at incoming inspection.

2.2 This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety health practices and determine the applicability or regulatory limitations prior to use.

3 Referenced Standards

3.1 None

4 Terminology

4.1 *electrostatic properties* — For the purposes of this document, electrostatic properties are defined as the ability of a material, when grounded, to dissipate a charge induced onto the surface of that material.

4.2 *interleaf (for semiconductor leadframes)* — A paper or plastic film placed between layers of semiconductor leadframe strips to prevent transformation.

5 Summary of Method

The method involves charging the interleaf material to a high voltage and observing the time required for the charge to be dissipated using an electrometer.

6 Significance

6.1 This procedure evaluates the electrostatic build up and dissipation properties of the interleaf materials

which may affect the reliability and efficiency of devices.

7 Interferences

7.1 The interleaf material and the leadframes must only be touched while wearing double-layer gloves with polyethylene outer gloves in order to avoid contamination which may change the electrostatic properties.

7.2 The test is not valid if the interleaving material is dusty.

8 Equipment

8.1 Aluminum panel measuring 127 mm × 76.2 mm × 3.2 mm (5" × 3" × 1/8").

8.2 High voltage source, 0 to 15 KV, positive and negative.

8.3 Electrometer with a full scale reading of 0.01, 0.1, 1.0, 10, and 100, or a recording oscilloscope with a response of 1 microsecond per division, or equivalent.

8.4 Fabricated electrostatic test chamber with electrostatic test unit, illustrated in Figure 1.

8.5 Single channel, pen type recorder with speeds of 12.7 mm, 25.4 mm, 50.8 mm, 101.6 mm, and 203.2 mm (0.5", 1.0", 2.0", 4.0", and 8.0") per minute and per second.

8.6 Four RG 114/U cables for connections between the detector and the electrometer and between the electrometer and the recorder. The nominal lengths of the cables are:

8.6.1 127 mm (5") for the connections between the detector and the output connector on the electrostatic test chamber.

8.6.2 863.6 mm (34") between the electrostatic test chamber and the electrometer exclusive of the connectors.

8.6.3 800.1 mm (31.5") between the electrometer and the recorder (2 required).

8.7 Three position control switch for connecting the test specimen to the high voltage source or the ground or neutral potential.

8.8 The equipment shall be assembled as illustrated in Figure 2.

9 Sampling

9.1 Sample size shall be agreed between user and supplier.

NOTE 2: The minimum sample size shall be three (3) per lot. Each specimen shall measure 127 mm × 76.2 mm (5" × 3").

9.2 Each specimen shall be free of defects such as holes, cracks, and tears.

NOTE 3: If the specimen is coated, the coating shall be continuous.

10 Sample Conditioning

10.1 Prior to testing, specimens shall be placed in the electrostatic test chamber for 24 hours at the following conditions.

Temperature: $23 \pm 3^{\circ}\text{C}$

Relative Humidity: $50 \pm 5\%$

11 Set-Up Procedure

11.1 Turn on all the equipment and allow to warm up as noted in the operations manuals.

11.2 Electrometer

11.2.1 Set "MULTIPLIER" switch to provide a half scale reading when the test voltage is applied.

11.2.2 Set the "OPERATE" switch at "ZERO CHECK".

11.2.3 Set meter to read positive charge.

11.3 Set the high voltage for 5KV positive output.

11.4 Mount the 127 mm × 76.2 mm × 3.2 mm (5" × 3" × 1/8") aluminum panel between the electrodes in the electrostatic test unit so that the detector head is directly over the center of the panel. Tighten the four wing nuts to secure the panel.

11.5 Set the recorder chart speed to 25.4 mm/min. (1"/min.).

11.6 Set "OPERATION" switch to "OPERATE".

11.7 Turn the three-position control switch to "HIGH VOLTAGE".

11.8 Verify that the reading on the recorder is identical to the meter reading. Adjust the recorder as necessary.

11.9 Turn the three-position switch to "GROUND" to remove the charge from the test panel.

11.10 When the electrometer meter reaches "ZERO", stop the recorder and set the "OPERATE" switch to "ZERO CHECK".

11.11 Repeat the calibration for a high voltage 5KV negative output.

12 Measurements and Calculations

12.1 Mount the specimens vertically between the electrodes and tighten the wing nuts to insure intimate contact between specimen and the electrodes.

12.2 Set chart recorder to 12.7 mm/sec. (0.5"/sec.) and turn on recorder.

12.3 Set electrometer meter switch to indicate "POSITIVE" or "NEGATIVE" charge depending on the high voltage to be applied.

12.4 Adjust the high voltage to 5KV positive or negative as desired.

12.5 Set "OPERATION" switch to "OPERATE".

12.6 Turn the three-position control switch to "HIGH VOLTAGE".

12.7 When the meter reaches a peak, indicating that the specimen has received its maximum charge, turn the three-position switch to "GROUND".

12.8 When the meter needle reaches "ZERO" or after 10 seconds whichever ever comes first, stop the recorder and move the "OPERATION" switch to "GROUND CHECK".

12.9 Charge each specimen three (3) times with both positive and negative charges. Allow the specimens to remain grounded for 10 minutes after each charging cycle to remove any residual charge on the specimen.

NOTE 4: If the interleaf material is non-homogenous, both surface shall be charged by reversing the faces of the specimen in contact with the electrodes.

12.10 Calculate the decay time, in seconds, by measuring the horizontal distance on the chart from the point where the specimen was grounded until the point where the needle reached "ZERO".

13 Report

The report, when used by a vendor to certify a customer's requirements, or by a customer at incoming inspection shall, at least, contain the following information. Additional information shall be agreed between user and supplier.

13.1 Interleaf material.