SEMI G56-0318
TEST METHOD FOR MEASUREMENT OF SILVER PLATING THICKNESS

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1 Purpose

1.1 *Use* — This Test Method may be used for process control and outgoing inspection at the supplier or by the customer for incoming inspection.

1.2 *Units* — This Test Method uses SI units.

2 Scope

2.1 This Test Method describes the standard method for measuring the thickness of silver plating on semiconductor leadframes.

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3 Referenced Standards and Documents

3.1 *ASTM Standards*[1]

ASTM B568 — Standard Test Method for Measurement of Coating Thickness by X-Ray Spectrometry

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Significance

4.1 The thickness of plating affects assembly processes such as wire bonding. If the plating is too thin, heat processes such as die attach cause the surface to become unbondable due to bleeding of the base material through the plating.

4.2 Schematic picture for measurement principles is shown in Figure 2.

5 Summary of Test Method

5.1 The method is based on the use of fluorescent X-rays. This method is chosen as the standard because of the small measurement area requirements, the high accuracy of the method for typical silver plating thicknesses used on leadframes, and the noncontact method.

[1] ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: +1.610.832.9585, Fax: +1.610.832.9555, http://www.astm.org

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6 Interferences

6.1 *Impurities in Plating*

6.1.1 Elements with atomic numbers between 42 (molybdenum) and 52 (tellurium) cause false readings.

6.2 *Measurement Time*

6.2.1 At small collimator diameters, the measurement time is no longer proportional to diameter. X-ray counting errors may occur for short measurement times.

6.3 Worn or abraded standards will affect calibration.

6.4 Base material variations will affect results. Standard samples and leadframes must have the same base material and plating system conditions for accurate results.

7 Equipment

7.1 Fluorescent X-ray spectrometer.

8 Sampling

8.1 A sampling plan shall be agreed between supplier and customer.

9 Preparation of Samples

9.1 No special preparation requirements are necessary.

10 Measurement Conditions

10.1 Collimator shall be set at 0.1 mm or 0.3 mm by agreement between user and supplier.

10.2 Measurement time shall be agreed between user and supplier.

11 Equipment Setup and Calibration

11.1 *Equipment Setup*

11.1.1 Set up the equipment according to the manufacturer's instructions.

11.1.2 Allow at least 30 minutes for equipment stabilization before beginning measurements.

11.2 *Calibration*

11.2.1 Calibration curves shall be generated using standard samples traceable to the National Institute of Standards and Technology (NIST) or equivalent standards organization.

11.2.2 Calibration curves shall be generated after the equipment has stabilized per the manufacturer's instructions.

11.2.3 The equipment shall be recalibrated every 8 hours.

12 Procedure

12.1 *Procedure*

12.1.1 Measurements shall be made close to the center of the die pad, if possible. In those situations where the die pad is not plated, the measurement site shall be agreed between user and supplier.

12.1.2 Measure all the selected samples according to the equipment manufacturer's instructions.

NOTE 1: Refer to the equipment manufacturer's instructions and ASTM B568 for safety conditions.

12.2 *Results*

12.2.1 Thicknesses shall be rounded to the first decimal place.

13 Calculation

13.1 No formula for calculation is necessary, because direct reading from the equipment is defined in this Standard.

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