

SEMI G56-93 (Reapproved 0811) TEST METHOD FOR MEASUREMENT OF SILVER PLATING THICKNESS

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NOTICE: This Document was reapproved with minor editorial changes.

1 Purpose

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

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

2 Scope

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

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 *ASTM Standard*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 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.

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.

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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 Report

13.1 The report when used by a supplier to certify a user's requirements or by the user at incoming inspection shall contain, at least, the following information. Other information which is reported shall be agreed between the user and supplier:

13.2 Supplier's lot number and date of shipment,

13.3 Test conditions,

13.4 Results from § 11. (SPC charting techniques may be used to monitor results for each leadframe type and plating requirement.)