THE INSTITUTE FOR
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Qualification Testing for Deposited Organic Interlayer Dielectric Materials for Multichip Modules

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Qualification and Performance of Deposited Organic Interlayer Dielectric Materials for Multichip Modules (MCM-D)

1.0 SCOPE

1.1 Scope This standard has been written for deposited organic interlayer dielectric materials under evaluation for MCM-D applications. The standard and test methods have been written without bias towards any particular class of materials.

1.2 Purpose This standard enables a vendor to evaluate dielectric materials and express their properties in a uniform format. In addition, guidelines are given for reporting specimen processing history. It is hoped that this will facilitate communication between material vendors and module manufacturers and prevent the dissemination of misleading or invalid data.

The data resulting from these test methods are for the comparison and/or differentiation of materials and are not intended to predict performance of a material in a particular application. See 4.1 for limitations.

1.3 Classes This standard provides three classes of dielectric performance to reflect increasing levels of sophistication, functional performance requirements and testing severity.

Class 1 — One layer of deposited dielectric material. The properties of these materials are to be reported following exposure to the manufacturer's recommended cure cycle.

Class 2 — Four layers of deposited dielectric material. The properties of these materials are to be reported following four exposures to the manufacturer's recommended cure cycle. For materials which do not require a thermal cure, the properties are to be reported following a 4 hour exposure to 250°C in a specified atmosphere.

Class 3 — Eight layers of deposited dielectric material. The properties of these materials are to be reported following eight exposures to the manufacturer's recommended cure cycle. For materials which do not require a thermal cure, the properties are to be reported following an 8 hour exposure to 250°C in a specified atmosphere.

2.0 APPLICABLE DOCUMENTS

2.1 IPC — IPC Test Methods Manual, IPC-TM-650, Test Methods:

2.5.5.8 Low Frequency Dielectric Constant and Loss Tangent

2.4.24.2 Glass Transition Temperature (Organic Films) – DMA Method

2.4.24.3 Glass Transition Temperature (Organic Films) – TMA Method

2.4.41.2 In-Plane Coefficient of Thermal Expansion, Organic Films

2.4.41.3 Volumetric Thermal Expansion, Polymer Coatings on Inorganic Substrates

2.4.50 Thermal Conductivity

2.3.40 Thermal Stability

2.4.18.3 Tensile Strength, Elongation, and Modulus

2.4.22.2 Substrate Curvature: Silicon Wafers with Deposited Dielectrics

2.4.1.6 Adhesion, Polymer Coating

2.3.26.2 Mobile Ion Content of the Film

2.2 ASTM

ASTM D 823 Test Methods for Producing Films of Uniform Thickness of Paint, Varnish and Related Products on Test Panels

ASTM D 4708 Standard Practice for Preparation of Uniform Free Films of Organic Coatings

ASTM D 618 Standard Practice for Conditioning Plastics and Electrical Insulating Materials for Testing

ASTM D 3386 Standard Test Method for Coefficient of Linear Thermal Expansion of Electrical Insulating Materials

ASTM D 3850 Standard Test Method for Rapid Thermal Degradation of Solid Electrical Insulating Materials by Thermogravimetric Analysis

ASTM D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheeting

ASTM D 1005 Standard Test Methods for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers