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IPC-9701A

Performance Test Methods and Qualification Requirements for Surface Mount Solder Attachments

Developed by the SMT Attachment Reliability Test Methods Task Group (6-10d) of the Product and Reliability Committee (6-10) of IPC

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Users of this publication are encouraged to participate in the development of future revisions.

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Performance Test Methods and Qualification Requirements for Surface Mount Solder Attachments

1 SCOPE

This specification establishes specific test methods to evaluate the performance and reliability of surface mount solder attachments of electronic assemblies. It further establishes different levels of performance and reliability of the solder attachments of surface mount devices to rigid, flexible and rigid-flex circuit structures. In addition, it provides an approximate means of relating the results from these performance tests to the reliability of solder attachments for the use environments and conditions of electronic assemblies.

1.1 Purpose The purpose of this document is:

- To provide confidence that the design and the manufacturing/assembly processes create a product that is capable of meeting its intended goals.
- To permit the analytical prediction of reliability based on a generic database and technical understanding.
- To provide standardized test methods and reporting procedures.

1.2 Performance Classification This specification recognizes that surface mount assemblies (SMAs) will be subject to variations in performance requirements based on end use. While Performance Classes are defined in IPC-6011, *Generic Performance Specification for Printed Boards,* these performance classifications are not specific as to the required reliability. At this point in time, the reliability requirements need to be established by agreement between customer and supplier.

1.3 Definition of Terms The definition of all terms used herein **shall** be as specified in IPC-T-50, except as otherwise specified in Section 3.

1.4 Interpretation "**Shall**," the imperative form of the verb, is used throughout this specification whenever a requirement is intended to express a provision that is mandatory. Deviation from a "**shall**" requirement may be considered if sufficient data is supplied to justify the exception.

The words "should" and "may" are used whenever it is necessary to express non-mandatory provisions. "Will" is used to express a declaration of purpose."

To assist the reader, the word "**shall**" is presented in bold characters.

1.5 Revision Level Changes Changes made to this revision of the IPC-9701 include Appendix B which establishes guidelines for thermal cycle requirements for Pb-free solder joints. Appendix B provides additional recommendations to existing IPC-9701 section requirements when utilizing a Pb-free soldering process.

2 APPLICABLE DOCUMENTS

The following documents are applicable and constitute a part of this specification to the extent specified herein. Subsequent issues of, or amendments to, these documents will become a part of this specification. Documents are grouped under categories as IPC, Joint Industry Standard, ITRI, EIA and others depending on the source.

2.1 IPC[1]

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

IPC-D-279 Design Guidelines for Reliable Surface Mount Technology Printed Board Assemblies

IPC-TM-650 Test Methods Manual[2]

2.1.1 Microsectioning

2.4.1 Adhesion, Plating

2.4.8 Peel Strength, Metal Foil

2.4.21.1 Bond Strength, Surface Mount Land (Perpendicular Pull Method)

2.4.22 Bow and Twist

2.4.36 Rework Simulation, Plated-Through Holes

2.4.41.2 Coefficient of Thermal Expansion, Strain Gage Method

2.5.7 Dielectric Withstanding Voltage, Printed Wiring Material

2.6.5 Physical (Mechanical) Shock, Multilayer Printed Wiring

2.6.7.2 Thermal Shock-Rigid Printed Boards

2.6.8 Thermal Stress, Plated-Through Holes

2.6.9 Vibration, Rigid Printed Wiring

IPC-SM-785 Guidelines for Accelerated Reliability Testing of Surface Mount Solder Attachments

IPC-S-816 SMT Process Guideline and Checklist

1. www.ipc.org
2. Current and revised IPC Test Methods are available on the IPC website (www.ipc.org/html/testmethods.htm).