IPC/JEDEC-9702-WAM1 with Amendment 1

Monotonic Bend Characterization of Board-Level Interconnects

Developed by the SMT Attachment Reliability Test Methods Task Group (6-10d) of the Product Reliability Committee (6-10) of IPC and the JEDEC Reliability Test Methods for Packaged Devices Committee (JC-14.1)

Supersedes:
IPC/JEDEC-9702 -
June 2004

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

Contact:

IPC
3000 Lakeside Drive, Suite 105N
Bannockburn, Illinois
60015-1249
Tel 847 615.7100
Fax 847 615.7105

JEDEC
Solid State Technology Association
3103 North 10th Street, Suite 240-S
Arlington, VA 22201-2107
Tel 703 907.7559
Fax 703 907.7501

Table of Contents

Figures

Tables

Monotonic Bend Characterization of Board-Level Interconnects

1 FOREWORD

This publication on monotonic bend testing is intended to characterize the fracture strength of a component's board-level interconnects. The document is applicable to surface mount components attached to printed wiring boards using conventional solder reflow technologies. The monotonic bend characterization results provide a measure of fracture resistance to flexural loading that may occur during conventional non-cyclic board assembly and test operations, and supplements existing standards that address mechanical shock or impact during shipping, handling or field operation.

2 INTRODUCTION

Semiconductor devices are assembled in a variety of package configurations, and are used in a multitude of applications. Given the diversity of package constructions and end-use conditions, it is not feasible to establish a single qualification requirement relating to bend testing; however, definition of a uniform test methodology and a standard reliability characterization reporting process are increasingly necessary to ensure adequate product quality.

3 SCOPE

This publication specifies a common method of establishing the fracture resistance of board-level device interconnects to flexural loading during non-cyclic board assembly and test operations. Monotonic bend test qualification pass/fail requirements are typically specific to each device application and are *outside* the scope of this document.

4 TERMS AND DEFINITIONS

For the purposes of this standard, the selected terms and definitions listed below apply.

General Terms

Component: Packaged semiconductor device

Interconnect: Conductive element used for electrical interconnection, e.g., solder ball, lead, etc.

Monotonic Test: Non-reversing, test to fail

Strain Related Terms

Global PWB Strain: Four-point bending strain of uniform printed wiring board, ignoring any effects due to the package(s)

Microstrain: Dimensionless unit, $10^6 \times$ (change in length) ÷ (original length)

Strain: Dimensionless unit, (change in length) ÷ (original length)

Strain-Rate: Change in strain divided by the time interval during which this change is measured

Strain Gage: Planar copper foil pattern that is adhered to an underlying surface and exhibits a change in resistance when subjected to a strain

Strain Gage Element: Sensing area of strain gage defined by the serpentine copper grid pattern

Uniaxial Strain Gage: Strain gage incorporating a single strain gage element, i.e., capable of detecting strain along a single axis

Mechanical Test Equipment Terms

Anvil: Four-point assembly fixture support with a rounded contact surface

Crosshead Assembly: Clamping/attachment assembly of universal tester that moves relative to the base of the test equipment, and creates the forces necessary for specimen testing

Four-Point Bending Fixture: Test assembly that supports a specimen on two anvils or rollers, and symmetrically loads the specimen on the opposite surface with two anvils or rollers

Load Span: Distance between the two anvils or rollers that load the test specimen

Roller: Four-point assembly fixture support that incorporates a cylindrical bar as the contact surface