JEDEC STANDARD

Board Level Drop Test Method of Components for Handheld Electronic Products

JESD22-B111A

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

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TEST METHOD B111A

BOARD LEVEL DROP TEST METHOD OF COMPONENTS FOR HANDHELD ELECTRONIC PRODUCTS

Introduction

The handheld electronic products fit into the consumer and portable market segments. Included in the handheld electronic products are cameras, calculators, cell phones, pagers, palm size PCs, Personal Computer Memory Card International Association (PCMCIA) cards, smart cards, mobile phones, personal digital assistants (PDAs) and other electronic products that can be conveniently stored in a pocket and used while held in user's hand.

These handheld electronic products are more prone to being dropped during their useful service life because of their size and weight. This dropping event can not only cause mechanical failures in the housing of the device but also create electrical failures in the printed circuit board (PCB) assemblies mounted inside the housing due to transfer of energy through PCB supports. The electrical failures may result from various failure modes such as cracking of circuit board, trace cracking on the board, cracking of solder interconnections between the components and the board, and the component cracks. The primary driver of these failures is excessive flexing of circuit board due to input acceleration to the board created from dropping the handheld electronic product. This flexing of the board causes relative motion between the board and the components mounted on it, resulting in component, interconnects, or board failures. This type of failure is a strong function of the combination of the board design, construction, material, thickness, and surface finish; interconnect material and standoff height; and component size.

TEST METHOD B111A

BOARD LEVEL DROP TEST METHOD OF COMPONENTS FOR HANDHELD ELECTRONIC PRODUCTS

(From JEDEC Board Ballot JCB-16-57, formulated under the cognizance of the JC-14.1 Subcommittee on Reliability Test Methods for Packaged Devices.)

1 Scope

The board level drop test method is intended to evaluate and compare drop performance of surface mount electronic components for handheld electronic product applications in an accelerated test environment, where excessive flexure of a circuit board causes product failure. The purpose of this document is to standardize the test board and test methodology to provide a reproducible assessment of the drop test performance of surface mounted components while duplicating the failure modes normally observed during product level test. This is not meant to replace any system level drop test that maybe needed to qualify a specific handheld electronic product nor to cover the drop test required to simulate shipping and handling related shock of electronic components or PCB assemblies. These requirements are already addressed in JESD22-B110.

The method is applicable to both area-array and perimeter-leaded surface mounted packages. The correlation between test and field conditions is not yet fully established. Consequently, the test procedure is presently more appropriate for relative component performance comparison than for use as a pass/fail criterion. Rather, results should be used to augment existing data or establish baseline for potential investigative efforts in package/board technologies.

The comparability between different test sites, data acquisition methods, and board manufacturers has not been fully demonstrated by existing data. As a result, if the data are to be used for direct comparison of component performance, matching study must first be performed to prove that the data are in fact comparable across different test sites and test conditions.

This method is not intended to substitute for full characterization testing, which might incorporate substantially larger sample sizes and increased number of drops. Due to limited sample size and number of drops specified here, it is possible that enough failure data may not be generated in every case to perform full statistical analysis.

2 Apparatus

The shock-testing apparatus shall be capable of providing shock pulses with a peak acceleration of up to 2900 multiples of gravity (g), a velocity change of 100 to 544 centimeters per second (39 to 214 inches per second), and a pulse duration between 0.3 and 8.0 milliseconds to the body of the component. For free-state testing, a velocity change of 125 to 544 centimeters per second (49 to 214 inches per second) and a pulse duration between 0.3 and 2.0 milliseconds is sufficient. Conversely, for mounted-state testing, apparatus capable of a velocity change of 100 to 544 centimeters per second (39 to 214 inches per second) and a pulse duration between 5.0 and 8.0 milliseconds to the body of the component is sufficient.