JEDEC STANDARD

Evaluation Procedure for Determining Capability to Bottom Side Board Attach by Full Body Solder Immersion of Small Surface Mount Solid State Devices

JESD22-A111B

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EVALUATION PROCEDURE FOR DETERMINING CAPABILITY TO BOTTOM SIDE BOARD ATTACH BY FULL BODY SOLDER IMMERSION OF SMALL SURFACE MOUNT SOLID STATE DEVICES

Introduction

Frequently, small Surface Mount Devices (SMDs) are attached to the bottom side of a printed circuit board by passing them through a wave solder (full body immersion) while simultaneously soldering devices with pins on the top of the board (plated through hole attach). As a result, these small SMDs may be exposed to temperatures as high as 265 °C during this type of board attach method.

If sufficient moisture exists in the package, exposure to the molten solder causes the moisture to turn to vapor, resulting in increased pressure within the package which in turn may cause quality and/or reliability degradation.

The test method in this document will address the issues related to the determination of the capability of a solid state device to withstand the stresses of full body wave solder immersion and subsequent field use.

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(From JEDEC Board Ballot JCB-18-13, formulated under the cognizance of the JC-14.1 Subcommittee on Reliability Test Methods for Packaged Devices.)

1 Scope

This evaluation procedure is written to provide users of ICs of small surface mount packages with a method to evaluate the capability of a device to withstand full wave solder immersion. This document lists procedures for two solder pot, nominal temperatures, 245C and 260C. The 260C condition can cover both SnPb and Pb-free solders.

Typically packages capable of full body solder immersion (wave solder immersion) board attach have a lead pitch greater than 0.5 mm. There is only limited demonstrated capability to survive full body (wave solder) immersion attach for QFPs and packages with bodies larger than 5.5 mm x 12.5 mm (or die paddle sizes greater than 2.5 mm x 3.5 mm). Devices in packages with limited or no data for capability demonstration should not be wave soldered.

The capability of a device for full body immersion is strongly affected by its package structure. Devices with large body packages may have reliability and/or quality problems induced by such a board attach method. Die and paddle sizes, as well as wavesolder conditions (board size, package profile, speed, part density, etc.), are some of the factors that modulate quality and reliability problems. Package styles with bottom terminations, such as Ball Grid Array (BGA), Land Grid Array (LGA), and Quad/Dual Flatpack No lead (QFN/DFN) are not suitable for full body solder immersion board attach.

If wave solder immersion results in a different Moisture Sensitivity Level than the J-STD-020 solder reflow level specified by the supplier, the user must take appropriate precautions to ensure that the new floor life is not exceeded during the user's manufacturing processes.

The purpose of this test method is to identify the potential wave solder classification level of small plastic Surface Mount Devices (SMDs) that are sensitive to moisture-induced stress so that they can be properly packaged, stored, and handled per J-STD-033 to avoid subsequent mechanical damage during the assembly wave solder attachment and/or repair operations. This test method also provides a reliability preconditioning sequence for small SMDs that are wave soldered using full body immersion.

This test method, may be used by users to determine what classification level should be used for initial board level reliability qualification.

2 Applicable documents

JESD22-A113, *Preconditioning Procedures of Plastic Surface Mount Devices Prior to Reliability Testing*

JESD47, *Stress Test Driven Qualification Specification*

JESD625, *Requirements for handling Electrostatic Discharge Sensitive (ESD) Devices*

J-STD-020, *Moisture/Reflow Sensitivity Classification for Non-Hermetic Solid State Surface Devices*

J-STD-033, *Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices*

J-STD-035, *Acoustic Microscopy for Non-Hermetic Encapsulated Electronic Components*