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JOINT INDUSTRY STANDARD

Handling, Packing, Shipping and Use of Moisture, Reflow, and Process Sensitive Devices

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IPC/JEDEC J-STD-033D

Handling, Packing, Shipping and Use of Moisture, Reflow, and Process Sensitive Devices

A joint standard developed by the JEDEC JC-14.1 Committee on Reliability Test Methods for Packaged Devices and the B-10a Plastic Chip Carrier Cracking Task Group of IPC

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

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Handling, Packing, Shipping and Use of Moisture, Reflow, and Process Sensitive Devices

1 FOREWORD

The advent of surface mount devices (SMDs) introduced a new class of quality and reliability concerns regarding damage such as ''cracks and delamination'' from the solder reflow process. This document describes the standardized levels of floor-life exposure for moisture/reflow sensitive SMDs along with the handling, packing and shipping requirements necessary to avoid moisture/reflow related failures. Companion documents J-STD-020, J-STD-075 and JEP113 define the classification procedure and the labeling requirements, respectively.

For moisture sensitivity, moisture from atmospheric humidity enters permeable packaging materials by diffusion. Assembly processes used to solder SMDs to printed circuit boards (PCBs) expose the entire package body to temperatures higher than 200 °C. During solder reflow, the combination of rapid moisture expansion, materials mismatch, and material interface degradation can result in cracking and/or delamination of critical interfaces within the device.

Typical solder reflow processes of concern for all devices are convection, convection/IR, infrared (IR), vapor phase (VPR), hot air rework tools, and wave solder, including full immersion.

Non-semiconductor devices may exhibit additional process sensitivities beyond moisture sensitivity such as thermal sensitivity, flux sensitivity or cleaning process sensitivity.

1.1 Purpose The purpose of this document is to provide manufacturers and users with standardized methods for handling, packing, shipping, and use of moisture/reflow and process sensitive devices that have been classified to the levels defined in J-STD-020 or J-STD-075. These methods are provided to avoid damage from moisture absorption and exposure to solder reflow temperatures that can result in yield and reliability degradation. By using these procedures, safe and damage-free reflow can be achieved. The dry-packing process defined herein provides a minimum shelf life of 12 months from the seal date.

1.2 Scope This standard applies to all devices subjected to bulk solder reflow processes during PCB assembly, including plastic encapsulated packages, process sensitive devices and other moisture sensitive devices made with moisture-permeable materials (epoxies, silicones, etc.) that are exposed to the ambient air.

1.3 Assembly Processes

1.3.1 Mass Reflow This standard applies to bulk solder reflow assembly by convection, convection/IR, infrared (IR), and vapor phase (VPR) processes. It does not apply to bulk solder reflow processes that immerse the device bodies in molten solder (e.g., wave soldering bottom mounted devices). Such processes are not allowed for many SMDs and are not covered by the device qualifications standards used as a basis for this document.

1.3.2 Localized Heating This standard also applies to moisture/reflow sensitive SMD packages that are removed or attached singly by local ambient heating, i.e., ''hot air rework.'' See Clause 6.

1.3.3 Socketed Devices

This standard does not apply to SMD packages that are socketed and not exposed to solder reflow temperatures during either bulk reflow or rework of adjacent devices. Such SMD packages are not at risk and do not require moisture precautionary handling.

1.3.4 Point-to-Point Soldering This standard does not apply to SMD packages in which only the leads are heated to reflow the solder, e.g., hand-soldering, hot bar attach of gull wing leads, and through hole by wave soldering. The heat absorbed by the package body from such operations is typically much lower than for bulk surface mount reflow or hot air rework and moisture precautionary measures are typically not needed.

1.3.5 Aqueous Cleaning For non-cavity SMDs typical short term aqueous cleaning processes will not impact the floor life (internal moisture content). Special consideration should be given to non-hermetic cavity packages.