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JOINT INDUSTRY STANDARD

Handling, Packing,
Shipping and Use of
Moisture/Reflow
Sensitive Surface
Mount Devices



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For Technical Information Contact:

JEDEC
Solid State Technology Association
3103 North 10th Street, Suite 240-S
Arlington, VA 22201-2107
Tel 703 907.0026
Fax 703 907.7501

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, Illinois
60015-1249
Tel 847 615.7100
Fax 847 615.7105

Please use the Standard Improvement Form shown at the end of this document.



IPC/JEDEC J-STD-033C-1

Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

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

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

Contact:

JEDEC
Solid State Technology Association
3103 North 10th Street, Suite 240-S
Arlington, VA 22201-2107
Tel 703 907.0026
Fax 703 907.7501

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, Illinois
60015-1249
Tel 847 615.7100
Fax 847 615.7105

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IPC Plastic Chip Carrier Cracking Task Group, B-10a

Chairman
Steven Martell
Sonoscan, Inc.

JEDEC JC 14.1 Committee

Chairman
Jack McCullen
Intel Corporation

JEDEC JC 14

Chairman
Nick Lycoudes
Freescale Semiconductor

Joint Working Group Members

Doug Derry, AccuAssembly
Ranjit Gannamani, Advanced Micro Devices
Joseph Smetana, Alcatel-Lucent
Russell Nowland, Alcatel-Lucent
Bradley Smith, Allegro MicroSystems Inc.
Maurice Brodeur, Analog Devices Inc.
Bill Strachan, ASTA - Portsmouth University
Lyle Burhenn, BAE Systems Platform Solutions
Mary Bellon, Boeing Research & Development
Tim Chaudhry, Broadcom Corporation
Glenn Koscal, Carsem
Kevin Weston, Celestica
Jasbir Bath, Christopher Associates Inc.
Francois Monette, Cogiscan Inc.
Erich Goertler, Continental Automotive GmbH
Michael Blazier, Delphi Electronics and Safety
Michael Pepples, Delphi Electronics and Safety
Stuart Longgood, Delphi Electronics and Safety
David Gallos, DLG Technical Engineering
Debbie Shipe, DSM Engineering Plastics
Ralph Justus, EIA - Electronic Industries Alliance
Glenn Dearing, Endicott Interconnect Technologies Inc.

Dongkai Shanguan, Flextronics International
Nicholas Lycoudes, Freescale Semiconductor
Deepak Pai, General Dynamics Info. Sys., Inc
Gergely Csohany, Harman/Becker Automotive Systems Kft.
Srinivas Chada, Henkel Corporation
Keith Newman, Hewlett-Packard Company
Jennie Hwang, H-Technologies Group
Charles Reynolds, IBM Corporation
Mario Interrate, IBM Corporation
Paul Krutec, IBM Corporation
Curtis Grosskopf, IBM Corporation
James Maguire, Intel Corporation
Jack McCullen, Intel Corporation
Mark Kwoka, Intersil Corporation
Kerry Oren, ITT
Quyen Chu, Jabil Circuit, Inc.
Marty Rodriguez, Jabil Circuit, Inc. (HQ)
Girish Wable, Jabil Circuit, Inc. (HQ)
Julie Carlson, JEDEC
Ken McGhee, JEDEC
Akikazu Shibata, JPCA-Japan Electronics Packaging and Circuits Association
Leland Woodall, Keihin Carolina System Technology
Leo Feinstein, Leo Feinstein Associates
James Mark Bird, MBird and Associates

Kurk Kan, Murat, Power Solutions, Inc.
Paul Melville, NXP Semiconductors
Jon Burke, Optichron Inc.
Heidi Reynolds, Oracle America, Inc.
Mamta Bora, Peregrine Semiconductor
Arnold Offner, Phoenix Contact
Timothy Pitsch, Plexus Corporation
Elvira Preecha, Qualcomm Inc.
Richard Iodice, Raytheon Company
James Robbins, Raytheon Company
Jeff Shubrooks, Raytheon Company
Christian Klein, Robert Bosch GmbH
Scott Anson, Rochester Institute of Technology
Michelle Ogihara, Seika Machinery Inc.
Francis Classe, Spansion
Brent Beamer, Static Control Components, Inc.
Raymond Cirimele, STI Electronics, Inc.
Christine Blair, STMicroelectronics Inc.
Amol Kirtikar, Sud-Chemie Inc. Performance Packaging
Michelle Martin, Sud-Chemie Performance Package
Robert DiMaggio, Sud-Chemie Performance Package
Larry Nye, Texas Instruments Inc.
Joseph Thomas, ZN Technologies
James Whitehouse

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Handling, Packing, Shipping, and Use of Moisture/Reflow and/or Process Sensitive Components

1 FOREWORD

The advent of surface mount devices (SMDs) introduced a new class of quality and reliability concerns regarding damage from the solder reflow process, such as cracks and delamination. 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 and J-STD-075 define the classification procedure and JEP113 defines the labeling requirements.

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 infrared (IR), convection/IR, convection, vapor phase reflow (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 infrared (IR), convection/IR, convection, and vapor phase reflow (VPR) processes. It does not apply to bulk solder reflow processes that immerse the component bodies in molten solder (e.g., wave soldering bottom mounted components). Such processes are not allowed for many SMDs and are not covered by the component 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. (Refer to Clause 6.)

1.3.3 Socketed Components 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.