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Moisture/reflow sensitivity classification for nonhermetic solid state surface mount devices

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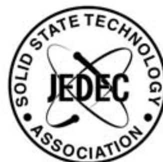

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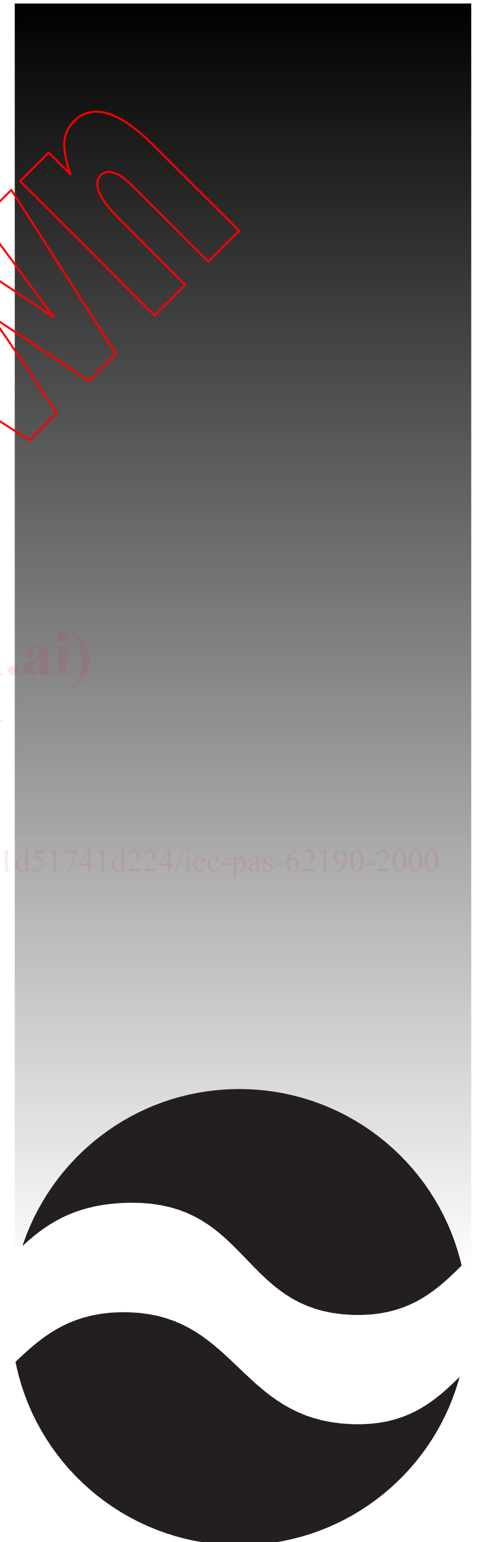

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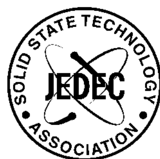

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MOISTURE/REFLOW SENSITIVITY CLASSIFICATION FOR NONHERMETIC SOLID STATE SURFACE MOUNT DEVICES

FOREWORD

A PAS is a technical specification not fulfilling the requirements for a standard, but made available to the public and established in an organization operating under given procedures.

IEC-PAS 62190 was submitted by JEDEC and has been processed by IEC technical committee 47: Semiconductor devices.

The text of this PAS is based on the following document:	This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document:
Draft PAS	**Report on voting**
47/1475/PAS	47/1511/RVD

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MOISTURE/REFLOW SENSITIVITY CLASSIFICATION FOR NONHERMETIC SOLID STATE SURFACE MOUNT DEVICES

Contents

Page

1 Pupose 1

2 Scope 1

3 Background 2

4 Applicable documents 2

5 Apparatus 2
5.1 Temperature humidity chambers 2
5.2 Solder Rreflow Equipment 3
5.3 Ovens 3
5.4 Microscopes 3
5.5 Cross-sectioning 3
5.6 Electrical test 3
5.7 Weighing apparatus (Optional) 4

6 Classification/reclassification 4
6.1 Reclassification 4

7 Procedure 5
7.1 Sample requirements 5
7.2 Electrical test 6
7.3 Initial inspection 6
7.4 Bake 6
7.5 Moisture soak 6
7.6 Reflow 7
7.7 External visual 8
7.8 Electrical test 8
7.9 Acoustic microscopy 8

8 Criteria 9
8.1 Failure criteria 9
8.2 Criteria requiring further evaluation 9
8.3 Failure verification 11

9 Moisture/reflow sensitivity classification 11

10 Optional weight gain/loss analysis 12
10.1 Weight gain 12
10.2 Absorption curve 12
10.3 Desorption curve 13

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(https://standards.iteh.ai)
Document Preview
IEC PAS 62190:2000
https://standards.iteh.ai/catalog/standards/iec/61ad314a-7b9f-4aab-a470-81d51741d224/iec-pas-62190-2000

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Contents (concluded)

Page

11 Additions and exceptions 14

Annex A Classification flow 15

Tables
1 Package reflow conditions 5
2 Moisture sensitivity levels 7
3 Classification reflow profiles 8

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MOISTURE/REFLOW SENSITIVITY CLASSIFICATION FOR NONHERMETIC SOLID STATE SURFACE MOUNT DEVICES

(From JEDEC Board Ballot JCB-98-104, formulated under the cognizance of the IPC Plastic Chip Carrier Cracking Task Group, B-10a, and the JEDEC JC-14.1 Subcommittee on Reliability Test Methods for Packaged Devices.)

1 Purpose

The purpose of this standard is to identify the classification level of nonhermetic solid state Surface Mount Devices (SMDs) that are sensitive to moisture-induced stress so that they can be properly packaged, stored, and handled to avoid subsequent thermal/mechanical damage during the assembly solder reflow attachment and/or repair operation.

This standard may be used to determine what classification level should be used for initial reliability qualification.

If an initial qualification exists and no major changes have been made, this method may be used for reclassification to an improved level (longer floor life up to level 2). The reclassification level cannot be improved by more than one level without additional reliability testing.

No components classified as moisture sensitive by any previous version of JESD22-A112, IPC-SM-786 or J-STD-020 may be reclassified as non-moisture sensitive (level 1) without additional reliability stress testing, e.g., JESD22-A113 and JESD47 or the semiconductor manufacturer's in-house procedures.

Passing the reject criteria in this test method is not sufficient by itself to provide assurance of long term reliability.

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2 Scope

The classification procedure applies to all nonhermetic solid state Surface Mount Devices (SMDs) in packages which, because of absorbed moisture, could be sensitive to damage during solder reflow. The term SMD as used in this document means plastic encapsulated packages and other packages made with moisture-permeable materials. The categories are intended to be used by SMD producers to inform users (board assembly operations) of the level of moisture sensitivity of product devices, and by board assembly operations to ensure that proper handling precautions are applied to moisture/reflow sensitive devices.

NOTE The procedures in this document may be used on packaged devices not included in the scope. The failure criteria for such packages must be agreed upon by the device supplier and the end user.

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3 Background

The vapor pressure of moisture inside a plastic package increases rapidly when the package is exposed to the high temperature of solder reflow. Under certain conditions, this pressure can cause internal delamination of the plastic from the die and/or leadframe, internal cracks that do not extend to the outside of the package, bond damage, wire necking, bond lifting, die lifting, thin film cracking, or cratering beneath the bonds. In the most severe case, the stress can result in external package cracks. This is commonly referred to as the "popcorn" phenomenon because the internal stress causes the package to bulge and then crack with an audible "pop". SMDs are more susceptible to this problem than through-hole parts because they are exposed to higher temperatures during reflow soldering. The reason for this is that the soldering operation must occur on the same side of the board as the SMD device. For through-hole devices, the soldering operation occurs under the board that shields the devices from the hot solder. Also, SMDs have a smaller minimum plastic thickness from the chip or mount pad interface to the outside package surface that has been identified as a critical factor in determining moisture sensitivity.

4 Applicable documents

EIA 625	Requirements for Handling Electrostatic Discharge Sensitive (ESD) Devices
IPC-TM-650	Test Methods Manual
IPC-SM-786	Procedures for Characterizing and Handling of Moisture/Reflow Sensitive ICs
JEP113	Symbol and Labels for Moisture Sensitive Devices
JESD 47	Stress Test Driven Qualification Specification
JESD22-A112	Moisture Induced Stress Sensitivity for Plastic Surface Mount Devices
JESD22-A113	Preconditioning Procedures of Plastic Surface Mount Devices Prior to Reliability Testing
J-STD-035	Acoustic Microscopy for Nonhermetic Encapsulated Electronic Components

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5 Apparatus

5.1 Temperature humidity chambers

Moisture chamber(s), capable of operating at 85 °C/85% RH, 85 °C/60% RH, 60 °C/60% RH, and 30 °C/60% RH. Within the chamber working area, temperature tolerance must be ± 2 °C and the RH tolerance must be ± 3% RH.