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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 4937.201-2018

Replacing GB/T 4937.201-2018

**Semiconductor devices - Mechanical and climatic test methods - Part 20-1:
Handling, packing, labelling and shipping of surface-mount devices sensitive to
the combined effect of moisture and soldering heat**

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1.Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 20-1 of GB/T 4937 "Mechanical and Climatic Test Methods for Semiconductor Devices". GB/T 4937 has been published.

The following parts were included.

- Part 1.General Provisions;
- Part 2.Low Pressure;
- Part 3.External Visual Inspection;
- Part 4.Highly Accelerated Steady-State Damp Heat Test (HAST);
- Part 8.Sealing;
- Part 9.Marking Durability;
- Part 10.Mechanical Impact Devices and Components;
- Part 11.Rapid Temperature Change in Two-Liquid Tank Method;
- Part 12.Sweep Frequency Vibration;
- Part 13.Salt Spray;
- Part 14.Lead Strength (Lead Wire Secureness);
- Part 15.Solder Heat Resistance of Through-Hole Mounting Devices;

- Part 16. Particle Collision Noise Detection (PIND);
- Part 17. Neutron Irradiation;
- Part 18. Ionizing Radiation (Total Dose);
- Part 19. Chip Shear Strength;
- Part 20. Combined effects of moisture and soldering heat on molded surface mount devices;
- Part 20-1. Handling, Packaging, Marking, and Shipping of Surface Mount Devices Sensitive to the Combined Effects of Moisture and Solder Heat;
- Part 21. Solderability;
- Part 22. Bond Strength;
- Part 23. High-Temperature Operating Life;
- Part 24. Accelerated Moisture Resistance Test with Unbiased Strong Accelerated Stress;
- Part 25. Temperature Cycling;
- Part 26. Electrostatic Discharge (ESD) Sensitivity Testing Human Model (HBM);
- Part 27. Electrostatic Discharge (ESD) Sensitivity Testing Machine Model (MM);
- Part 28. Electrostatic Discharge (ESD) Sensitivity Testing of Charged Device Models (CDMs) at the Device Level;
- Part 29. Latch Test;
- Part 30. Pretreatment of Unsealed Surface Mount Devices Prior to Reliability Testing;
- Part 31. Flammability of Molded Devices (Internal Causes);
- Part 32. Flammability of Molded Devices (Externally Caused);
- Part 33. Accelerated Moisture-Resistant, Non-Biased High-Pressure Cooking;
- Part 34. Power Cycling;
- Part 35. Acoustic Microscopy Inspection of Plastic-Encapsulated Electronic Components;
- Part 36. Steady-state acceleration;
- Part 37. Plate drop test method using accelerometers;
- Part 38. Soft Fault Testing Methods for Semiconductor Devices with Storage;
- Part 39. Measurement of moisture diffusivity and water solubility of organic materials for semiconductor devices;
- Part 40. Plate Drop Test Method Using Strain Gauges;

---Part 41. Test methods for the reliability of non-volatile memory;

---Part 42. Temperature and Humidity Storage;

---Part 44. Test methods for single-event effects (SEE) by neutron irradiation on semiconductor devices.

This document replaces GB/T 4937.201-2018 "Mechanical and Climatic Testing Methods for Semiconductor Devices - Part 20-1. Tests for Mechanical and Climatic Effects on Devices in Moisture and..."

"Operation, Packaging, Marking and Transportation of Surface Mount Devices Sensitive to the Comprehensive Effects of Welding Heat" Compared with GB/T 4937.201-2018, except for the junction...

Aside from structural adjustments and editorial changes, the main technical changes are as follows.

---The term "batch reflow soldering" has been changed to "batch reflow soldering" (see 3.3,.2018 edition), and "in-package life" has been changed to "shelf life".

"Lifespan" (see 3.11,.2018 edition), "reflow soldering" changed to "reflow soldering" (see 3.13,.2018 edition);

---A water rinsing process has been added (see 4.1.5);

---Added requirements for some materials inside dry packaging (see 5.3.2);

---Added dry packaging precautions (see 5.3.5);

---Added conditions for resetting or pausing "Workshop Life" at the user site (see 6.1);

---A test method for humidity indicator cards used in electronic component packaging has been added (see Appendix C).

This document is equivalent to IEC 60749-20-1.2019 "Semiconductor devices - Mechanical and climatic testing methods - Part 20-1. Exposure to moisture"

The combined effects of welding heat and the handling, packaging, marking, and transportation of surface mount devices are all sensitive to these factors.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This document is under the jurisdiction of the National Semiconductor Device Standardization Technical Committee (SAC/TC78).

Introduction

Semiconductor devices are general-purpose basic products in the electronics industry chain and are the most basic units in electronic systems. GB/T 4937 "Semiconductor Devices"

The "Mechanical and Climate Test Methods for Semiconductor Devices" is a fundamental and universal standard for testing semiconductor devices, used for evaluating and assessing semiconductors.

The quality and reliability of the device play a crucial role, and it is proposed to consist of forty-four parts.

---Part 1.General Principles. The purpose is to establish general guidelines for mechanical and climatic testing methods for semiconductor devices.

---Part 2.Low Pressure. The purpose is to determine the ability of components and materials to avoid electrical breakdown failure.

---Part 3.External Visual Inspection. The purpose is to verify whether the materials, design, structure, markings, and manufacturing processes of semiconductor devices meet the required standards.

Requirements for procurement documents.

---Part 4.Strong Accelerated Steady-State Damp Heat Test (HAST). The purpose is to specify the Strong Accelerated Steady-State Damp Heat Test (HAST) to evaluate...

Reliability of non-hermetic packaged semiconductor devices in humid environments.

---Part 5.Steady-State Temperature and Humidity Offset Lifetime Test. The purpose is to specify the steady-state temperature and humidity offset lifetime test to evaluate non-hermetic systems.

Reliability of packaged semiconductor devices in humid environments.

---Part 6.High-Temperature Storage. The aim is to determine the effects of high-temperature storage on semiconductor devices without applying electrical stress.

---Part 7.Internal Moisture Measurement and Other Residual Gas Analysis. The purpose is to assess the quality of the packaging process and provide information on gas content.

Information on the long-term chemical stability of the substance within the shell.

---Part 8.Sealing. The purpose is to detect the leakage rate of semiconductor devices.

---Part 9.Marking Durability. The purpose is to test and verify the marking durability on semiconductor devices.

---Part 10.Mechanical Shock Devices and Components. The aim is to determine the ability