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

**GB/T 4937.21-2018**

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**Semiconductor devices -- Mechanical and climatic test methods  
-- Part 21: Solderability**

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## Table of Contents

Foreword

1 Scope

2 Normative references

3 test device

3.1 solder bath

3.2 Infiltration device

3.3 Optical equipment

3.4 Water vapor aging equipment

3.5 Lighting equipment

3.6 Materials

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3.7 SMD reflow soldering equipment

4 procedures

4.1 Backward compatibility

4.2 Pretreatment

4.3 Immersion and observation of weldability test procedures

## Foreword

GB/T 4937 "Mechanical and Climatic Test Methods for Semiconductor Devices" consists of the following components.

--- Part 1. General;

--- Part 2. Low pressure;

--- Part 3. External visual inspection;

--- Part 4. Strongly accelerated steady-state damp heat test (HAST);

---Part 5. Steady-state temperature and humidity bias life test;

---Part 6. High temperature storage;

--- Part 7. Internal water vapor content test and other residual gas analysis;

--- Part 8. Sealing;

---Part 9. Logo durability;

- Part 10. Mechanical shock;
- Part 11. rapid temperature change double tank method;
- Part 12. Sweeping vibration;
- Part 13. Salt spray;
- Part 14. Terminal strength (lead robustness);
- Part 15. Resistance to soldering 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. The combined effects of moisture-resistant and soldering heat on plastic surface mount devices;
- Part 20-1. Operation, packaging, marking and transport of surface mount devices sensitive to the combined effects of moisture and soldering heat;
- Part 21. Solderability;
- Part 22. Bonding strength;
- Part 23. High temperature working life;
- Part 24. Accelerated moisture-resistant and non-biased strong accelerated stress test (HSAT);
- Part 25. Temperature cycling;
- Part 26. Electrostatic discharge (ESD) sensitivity test human body model (HBM);
- Part 27. Electrostatic discharge (ESD) sensitivity test mechanical model (MM);
- Part 28. Electrostatic discharge (ESD) sensitivity test, charged device model (CDM), device level;
- Part 29. Latch test;
- Part 30. Pre-treatment of unsealed surface mount devices prior to reliability testing;
- Part 31. Flammability of plastic encapsulated devices (internal);
- Part 32. Flammability of plastic encapsulated devices (external);
- Part 33. Accelerated moisture resistance without bias high pressure cooking;
- Part 34. Power cycling;

- Part 35. Acoustic scanning microscopy of plastic electronic components;
- Part 36. Constant acceleration;
- Part 37. Plate-level drop test method using accelerometers;
- Part 38. Soft error test methods for semiconductor memory devices;
- Part 39. Measurement of moisture diffusivity and water dissolution rate of raw materials for semiconductor components;
- Part 40. Plate-level drop test method using tension meter;
- Part 41. Reliability test methods for non-volatile memory devices;
- Part 42. Storage of temperature and humidity;
- Part 43. Guide to the reliability identification scheme for integrated circuits (ICs);
- Part 44. Test method for neutron beam irradiation single particle effect of semiconductor devices.

This part is the 21st part of GB/T 4937.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This section uses the translation method equivalent to IEC 60749-21.2011 "Semiconductor device mechanical and climatic test methods Part 21.

Solderability.

## 1 Scope

This part of GB/T 4937 specifies the solderability test of the lead-out of the component package soldered with lead-tin solder or lead-free solder.

Test procedures.

This test method specifies the "immersion and observation" solderability test procedures for through-hole, axial and surface mount devices (SMDs), and optional

The SMDs board-level solderability test program is used to simulate the soldering process used in the use of components. This test method also specifies

Aging condition, which is optional.

This test is a destructive test except as otherwise provided in the relevant documents.

Note 1. This test method is basically the same as GB/T 2423, but due to the special requirements of semiconductor components, this test method is adopted.

Note 2. This test method does not evaluate the thermal stress effects that may occur during

the welding process. See IEC 60749-15 or IEC 60749-20.

## 2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

IEC 61190-1-2:2007 Connecting materials for electronic components - Part 1-2. Requirements for solders for high quality interconnections of electronic components (Attachment materials for electronic assembly - Part 1-2. Requirements for soldering pastes for high-quality interconnections in electronic assembly)

IEC 61190-1-3:2007 Connecting materials for electronic components - Part 1-3. Electron soldering alloys and solders

Solder-free solid solder requirements (Attachment materials for electronic assembly - Part 1-3. Requirements for Electronic grade solder alloys and fluxed and non-fluxed solid solders for electronics soldering applications)

### 3.1 solder bath

The solder bath depth should be no less than 40mm, the capacity should be no less than 300mL, and can accommodate at least 1kg of solder. The device should be able to warm the solder

The degree is kept within  $\pm 5^{\circ}\text{C}$  of the specified temperature value.

### 3.2 Infiltration device

A mechanical wetting device should be used which controls the rate at which the lead is immersed and raised in the solder bath, as well as the residence time in the bath.

(Total time to stay at the specified infiltration depth).

### 3.3 Optical equipment

An optical microscope that provides a magnification of 10 to 20 times should be used.