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

GB/T 4937.13-2018

**Semiconductor devices -- Mechanical and climatic test methods
-- Part 13: Salt atmosphere**

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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 13th part of GB/T 4937.

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

This part uses the translation method equivalent to IEC 60749-13.2002 "Metal Devices and Mechanical Test Methods Part 13.

Salt spray.

The documents of our country that have a consistent correspondence with the international documents referenced in this part are.

GB/T 4937.14-2018 Methods of mechanical and climatic testing of semiconductor devices - Part 14

Solid) (IEC 60749-14.2003, IDT);

--- GB/T 2423.17-2008 Environmental testing of electric and electronic products - Part 2.

Test method test Ka. salt spray

(IEC 60068-2-11.1981, IDT).

1 Scope

This part of GB/T 4937 specifies the salt spray test method for semiconductor devices to determine the corrosion resistance of semiconductor devices. This test

The test is an accelerated test that simulates the effects of the harsh seaside atmosphere on the exposed surface of the device. Suitable for devices operating in the sea and coastal areas.

This test is a destructive test.

This test is generally in accordance with IEC 60068-2-11, but in accordance with the special requirements of semiconductor devices, the provisions of this section are used.

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.

Methods of mechanical and climatic test methods for semiconductor devices - Part 14.
Terminal strength (lead robustness) [Semi-

conductor devices-Mechanical and climatic test methods-Part

14. Robustness of terminations (lead

Integrity)]

IEC 60068-2-11 Environmental testing - Part 2. Test method test Ka. Salt spray
(Environmental testing-Part

3 test equipment

Equipment used in the salt spray test shall include.

- a) a temperature-controlled test chamber with a corrosion-resistant support fixture;
- b) Salt solution tank. the salt used should be anhydrous sodium chloride, the mass fraction of sodium iodide should not exceed 0.1%, and the total impurity content should not exceed

After 0.3%, the impurity content of distilled water (or other water used) shall not exceed 200×10^{-6} , and it shall be filtered to control the solution.

Impurity content, in order to achieve the sedimentation rate required by Chapter 4, the salt concentration of deionized water or distilled water salt solution should be

0.5%~3% (mass percentage);

- c) means for atomizing the salt liquid, including suitable nozzles and compressed air sources;

- d) a device that keeps the air moist at a temperature above the temperature inside the tank;

- e) Magnifying glass 1x~3x, 10x~20x.

4 procedures

After pretreatment according to the requirements of 4.1, the test samples shall be placed in the test chamber as follows so that they do not touch each other and are not covered by each other.

It is free to accept salt spray, and corrosion products and aggregates do not drip from one sample to another. Spray in the test chamber

The holding time shall be as required by the test conditions of 4.2. During the test, the temperature in the test chamber should be maintained at $(35 \pm 2) ^\circ \text{C}$, the concentration of salt spray

The degree and discharge rate should be adjusted so that the salt settling rate in the test area is $(30 \pm 10) \text{ g}/(\text{m}^2 \cdot \text{d})$. Salt solution when measured at not less than $35 ^\circ \text{C}$