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

GB/T 4937.18-2018

**Semiconductor devices -- Mechanical and climatic test methods
-- Part 18: Ionizing radiation (total dose)**

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Foreword

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

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- 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;
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- 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 18th 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 60749-18.2002 "Semiconductor device mechanical and climatic test methods Part 18.

Ionizing radiation (total dose).

1 Scope

This part of GB/T 4937 performs ⁶⁰Co gamma-ray source ionizing radiation on packaged semiconductor integrated circuits and semiconductor discrete devices.

The total dose test provides a test procedure.

This section provides an accelerated annealing test method to evaluate the effect of low dose rate ionizing radiation on the device. This annealing test for low dose rates

The application of radiation on devices that exhibit time-varying effects in certain applications is important.

This section applies only to steady-state irradiation and is not suitable for pulsed irradiation.

This section is primarily for military or space related applications.

This test may cause severe degradation of the electrical properties of the irradiated device and is therefore considered a destructive test.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1

Ionizing radiation effect
ionizing radiation effects

A change in electrical parameters of a discrete device or integrated circuit is caused by radiation induced charges.

Note. Also known as the total dose effect.

2.2

Testing in-flux
test in irradiation

Electrical testing of the device during irradiation.

2.3

Nonin-fluxtest in non-irradiation

Electrical testing of the device at any time other than during the irradiation period.

2.4

Excavation test remotetests

An electrical test of the device after removing the device from the irradiated position.

2.5

Time-dependent effect

After irradiation, significant degradation of the electrical parameters of the device is caused by the generation or (and) annealing of the radiation induced trap charge.

Note. A similar effect occurs in the device during irradiation.

2.6

Accelerated annealing test acceleratedannealingtest

A method of increasing the temperature to accelerate the time-varying effect.

3 test equipment

Equipment shall include radiation sources, electrical parameter test devices, test circuit boards, cables, patch panels or switch systems, suitable dosimetry systems