

ICS 31.080.01

CCS L 40



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

GB/T 4937.19-2018

**Semiconductor devices -- Mechanical and climatic test methods
-- Part 19: Die shear strength**

Issued on: September 17, 2018

Implemented on: January 1, 2019

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

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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 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;
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- 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 19th 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 60749-19.2010 "Semiconductor device mechanical and climatic test methods, part 19.

Chip shear strength.

1 Scope

This part of GB/T 4937 is used to determine the materials and process steps used to mount a semiconductor chip on a header or other substrate.

Integrity (for the purposes of this test method, the semiconductor chip in this section includes passive components).

This section applies to cavity packages and can also be used as process monitoring. Not applicable to chips larger than 10mm², as well as flip chip and

Flexible substrate.

Note 1. By measuring the magnitude of the force applied to the chip or component, observe the type of failure generated under the force (if failure occurs) and the residual chip attached

The material and substrate/sleeve metallization layer shape are used to determine if the device is receiving.

Note 2. For cavity packaging, the chip shear strength test is to determine the chip adhesion strength in the cavity. For non-cavity packages, such as plastic packaging, chip bonding is

In order to prevent the chip from being displaced before the resin mold is completely formed.

There is no need to provide a description of the chip shear strength and the minimum area of chip bonding after molding, except in the following cases.

- a) there is an electrical connection between the chip and the pad;
- b) The heat of the chip needs to be dissipated through the bond.

2 Description of the test equipment

The test equipment is a stress-applying instrument, a linear motion force meter or a circular dynamometer with a lever arm. In addition,

The device should also have the following capabilities.

a) The contact tool applies force evenly to one edge of the chip, perpendicular to the chip mounting plane of the header or substrate (see Figure 3).

A soft material can be used on the contact tool to ensure uniform stress (see Figure 1);

Note. The soft material interface of the contact tool distributes the force evenly across the irregular edges of the chip.

Figure 1 Soft material interface on the contact tool (plan view)

b) the accuracy is 5% or $\pm 0.5\text{N}$ of full scale, whichever is greater;

c) indicating the amount of stress applied;

d) Amplifying device with light source (such as 10 times magnification), used to observe the chip and contact tool during the test;

e) The chip contact tool and the header/substrate fixture have relative rotation so that the contact tool is parallel to the entire edge of the chip.