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

GB/T 4023.1-2026

Replacing GB/T 12560-1999

**Discrete semiconductor devices - Part 1: Sectional
specification**

半导体分立器件 第1部分：分规范

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Table of Contents

1	Scope
4	Technical Requirements
4.2	Functional Characteristics Requirements
4.8	Mark
4.18	Structural Similarity Determination
5	Test Methods
5.2	Testing and Verification of Functional Characteristics
5.3	Electrical stress resistance test
5.4	Environmental stress resistance test
5.5	Mechanical Stress Resistance Test
6	Inspection Rules
7	Packaging, Transportation and Storage

1 Scope

GB/T 4023.1-2026 is the Chinese national standard covering the sectional specification for discrete semiconductors - the general requirements, the test and measurement conditions and the quality assessment procedures common to diodes, transistors and thyristors, on which each blank detail specification builds. It replaces GB/T 12560-1999 and has been in force since 1 October 2026, with the letter symbol standard GB/T 11499-2026 and the blank detail specifications revised in the same batch. It was issued on 31 March 2026 and takes effect on 1 October 2026, replacing GB/T 12560-1999. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document specifies the terms and definitions, technical requirements, test methods, and inspection rules for semiconductor discrete devices (hereinafter referred to as "devices"). And packaging, transportation and storage requirements. This document applies to semiconductor discrete devices other than optoelectronic devices and discrete device modules.

4 Technical Requirements

4.1 General Requirements The technical requirements of the devices shall meet the requirements of GB/T 4589.1-2006 and this document.

4.2 Functional Characteristics Requirements

4.2.1 Maximum Rated Parameters The maximum rated parameters and conditions of the device should be specified.

4.2.2 Main Electrical Characteristic Parameters The main electrical characteristic parameters and conditions of the device should be specified.

4.2.3 Parameter Curve The parameter curves of the device should be specified.

4.2.4 Thermal properties The steady-state thermal resistance and transient thermal resistance of the device should be specified.

4.3 Electrical stress resistance requirements The device should be able to withstand the electrical stress encountered during operation.

4.4 Environmental stress resistance requirements The device should be able to withstand environmental stresses encountered during transportation, installation, and operation.

4.5 Requirements for resistance to mechanical stress The device should be able to withstand the mechanical stress encountered during transportation, installation, and operation.

4.6 Recommended (preferred) operating temperature values The recommended operating temperature of the device should comply with the provisions of GB/T 17573.

4.7 Recommended (Preferred) Values for Voltage and Current The recommended voltage and current values for the device should comply with the provisions of GB/T 17573.

4.8 Mark

4.8.1 Markings on the device When the device area allows, the following markings should be made on the device.

- a) Lead-out identification mark;
- b) Model and quality assurance level.
- c) Manufacturer's name, trademark, or factory identification code.
- d) Inspection lot identification code;
- e) Where applicable, indicate any special precautions. When the area of a device does not allow for the marking of all of the above, the minimum marking requirements should be given in the preferred order described above.

4.8.2 Markings on packaging The following markings should appear on the initial packaging, which serves as the first protection or packaging for delivery.

- a) All marks listed in

4.8.1 except for the lead-out mark;

b) Special considerations, such as warning signs, etc.

4.8.3 Lead-out polarity marker 4.8.3,

1 Diode The polarity of a diode can be clearly indicated using one of the following methods.

a) Rectifier diode graphic symbol. the arrow points to the cathode end.

b) Color mark. For smaller devices, mark a distinct color band or dot on the cathode end; when the device size is even smaller, mark the cathode end... When color codes may be confused with model markings, the latter can be omitted. For larger devices, use color bands (lines) to mark the cathode.

4.18 Structural Similarity Determination

4.18.1 General Rules Devices with similar structures refer to those that are ultimately packaged on the same production line, manufactured using the same production process, and have the same device type and packaging. Devices with the same or similar shape and materials, differing only in electrical performance. The classification of different device models should be determined according to sections

4.18.2 to 4.18.6. The determination is made based on the similarity of the structures of the devices.

4.18.2 Device Categories Devices with similar structures should belong to the same category.

Note. Device categories include low-power negative-positive-negative (NPN) bipolar transistors, low-power positive-negative-positive (PNP) bipolar transistors, and high-power NPN bipolar transistors. Transistors, high-power PNP bipolar transistors, N-channel field-effect transistors, P-channel field-effect transistors, rectifier diodes, switching diodes, transient diodes Voltage suppression diodes, thyristors, insulated gate bipolar transistors (IGBTs), etc.

4.18.3 Chip Design Devices with similar structures share the same chip layout design rules and the same units that implement basic functions. The largest [unit/component] within a group of structurally similar devices... The area ratio to the smallest chip should not exceed 2.

4.18.4 Wafer Manufacturing For devices with similar structures, their wafer manufacturing should comply with the following regulations.

a) The basic technologies and processes are the same;

b) Same passivation type;

c) Same manufacturing method, materials, and properties;

d) The substrate material and its properties are the same.

4.18.5 Chip Installation For devices with similar structures, the chip mounting method should comply with the following regulations.

- a) The chip sintering materials are the same;
- b) The chip sintering methods are the same;
- c) The chip sintering temperature is the same;

5 Test Methods

5.1 General Provisions The devices shall be tested in accordance with GB/T 4937 (all parts) and the provisions of this document.

5.2 Testing and Verification of Functional Characteristics

5.2.1 Verification of maximum rated parameters The verification of the maximum rated parameters of a device should be based on the device category according to GB/T 4023, GB/T 4023.3, GB/T 4023.4, It shall be carried out in accordance with the provisions of GB/T 4586, GB/T 4587 or GB/T 29332.

5.2.2 Electrical Parameter Testing The electrical parameter testing of devices should be conducted according to the device category and in accordance with GB/T 4023, GB/T 4023.3, GB/T 4023.4, GB/T 4586, It shall be carried out in accordance with the provisions of GB/T 4587 or GB/T 29332.

5.2.3 Steady-state thermal resistance test Steady-state thermal resistance testing of devices should be conducted according to the device category and in accordance with GB/T 4023, GB/T 4023.3, GB/T 4023.4, GB/T 4586, It shall be carried out in accordance with the provisions of GB/T 4587 or GB/T 29332.

5.3 Electrical stress resistance test

5.3.1 High Temperature and High Humidity Reverse Polarization The high temperature and high humidity reverse polarity test shall be conducted in accordance with IEC 60749-5.

5.3.2 Steady-state operating life The steady-state working life test shall be conducted in accordance with section

5.2.3.1 of GB/T 4937.23-2023.

5.3.3 Intermittent Operating Life Test (Power Cycle) Intermittent working life test (power cycle) shall be conducted in accordance with test condition 3 of GB/T 4937.34-2024.

5.3.4 High Temperature Reverse Bias The high-temperature reverse polarity test shall be conducted in accordance with section