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

GB/T 4587-2023

Replacing GB/T 4587-1994

**Semiconductor devices - Discrete devices - Part 7: Bipolar
transistors**

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Table of Contents

Preface	
Introduction	
1 Scope	1
2 Normative reference documents	1
3 Terms and Definitions	1
4 text symbols	6
4.1 Overview	6
4.2 Supplementary subscript	6
4.3 List of character symbols	6
4.3.1 Overview	6
4.3.2 Voltage	7
4.3.3 Current	7
4.3.4 Power	8
4.3.5 Electrical parameters	8
4.3.6 Frequency parameter	11
4.3.7 Switch parameters	12
4.3.8 Loss	13
4.3.9 Other parameters	13
4.3.10 Paired bipolar transistors	14
4.3.11 Resistor biased transistor	14

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1. Structure and Drafting Rules of Standardization Documents"

Drafting.

This document is Part 7 of "Semiconductor Devices Discrete Devices". "Semiconductor Devices Discrete Devices" has released the following parts.

---Part 1. General provisions;

---Part 2. Rectifier diodes;

---Part 2-1. Blank detailed specification for ambient or case rated rectifier diodes (including

avalanche rectifier diodes) below 100A;

---Part 2-2.Greater than 100A, environmental and case rated rectifier diodes (including avalanche rectifier diodes) blank details

specification;

---Part 3.Signal (including switching) diodes and adjustment diodes;

---Part 3-1.Blank detailed specifications for signal diodes, switching diodes and controllable avalanche diodes;

---Part 3-2.Signal (including switching) diodes and adjustment diodes Voltage adjustment diodes Voltage reference diodes (not included

Temperature Compensated Precision Reference Diode) Blank Detailed Specification;

---Part 4.Microwave devices;

---Part 4-1.Detailed specifications for microwave diodes and transistors microwave field effect transistors;

---Part 6.Thyristors;

---Part 6-1.Blank detailed specification for three-pole thyristor transistors rated for environments below 100A or case rating;

---Part 6-2.Blank detailed specifications for environmental or case-rated bidirectional three-pole thyristors below 100A;

---Part 6-3.Blank detailed specification for reverse blocking three-pole thyristors with current greater than 100A and environmental and case ratings;

---Part 7.Bipolar transistors;

---Part 7-1.Blank detailed specification for bipolar transistors rated for high and low frequency amplification environments;

---Part 7-2.Blank detailed specification for low-frequency amplifier case-rated bipolar transistors;

---Part 7-3.Blank detailed specification for bipolar transistors for switches;

---Part 7-4.Blank detailed specification for high-frequency amplifier case rated bipolar transistors;

---Part 8.Field effect transistors;

---Part 8-1.Blank detailed specifications for single-gate field effect transistors below 1GHz and 5W;

---Part 8-3.Blank detailed specification for field effect transistors for case-rated switches;

---Part 9. Insulated gate bipolar transistor (IGBT);

---Part 10. General Specifications for Discrete Devices and Integrated Circuits;

---Part 11. Specifications for discrete devices.

This document replaces GB/T 4587-1994 "Semiconductor Discrete Devices and Integrated Circuits Part 7. Bipolar Transistors" and is consistent with

Compared with GB/T 4587-1994, in addition to file structure adjustments and editorial changes, the main technical changes are as follows.

a) The scope explicitly excludes microwave transistors and adds resistive bias transistors (see Chapter 1).

b) Terms and definitions.

1) Removed transistor types, common terms, circuit configuration, collector series resistance, emitter series resistance, extrinsic base

Terms and definitions of resistance, Allais voltage and S-parameters (see 1, 2, 3, 4.4, 4.5, 4.7, Chapter II of the.1994 edition

4.20, 5);

2) Added "specific functional area" (see 3.1), "turn-on time" and "off time" (see 3.3.7.2, 3.3.7.3), "collector-

Emitter sustaining voltage" (see 3.3.8), "turn-on loss" and "turn-off loss" (see 3.3.9, 3.3.10), "resistance bias crystal

The terms and definitions of "management" (see 3.2, 3.3.15~3.3.21).

c) Text symbols.

1) Delete the "breakdown voltage" in the voltage parameters (see Chapter II 6.4.1 of the.1994 edition) and the "inherent voltage" in the static parameters.

No. forward current transfer ratio" (see Chapter II 6.4.4.1 of the.1994 edition), "emitter depletion layer capacitance,

Collector depletion layer capacitance" (see Chapter II 6.4.6 of the.1994 edition) and "External circuit parameters" (see Chapter II of the.1994 edition

Chapter 6.4.8) text symbols;

2) Added text symbols for "turn-on loss", "turn-off loss", "power increase efficiency" and "resistance biased transistor" (see

4.3.8, 4.3.9, 4.3.11).

d) Basic ratings and characteristics.

1) Deleted the "high frequency parameters" of small signal transistors (see Chapter III, Section 1, 3.9, 3.11 of the.1994 edition); amplification and oscillation

The maximum collector-emitter voltage (VCES) when the base and emitter of a high-frequency power transistor are short-circuited and the base is open-circuited

The highest collector-emitter voltage (VCEO) when and/or the highest collector-emitter voltage when the external resistance is the specified value

"Voltage (VCER)" (see Chapter III, Section 3, 5.3, 5.4, 5.5 of the.1994 edition);

"Computer-aided circuit design of switching transistors"

"Additional features of the design" (see Chapter III, Section 4, 3.4 of the.1994 edition);

2) All types of transistors have specified requirements for "thermal resistance" or "thermal characteristics" (see 5.2.2.11, 5.3.2.8, 5.4.2.11,

5.5.2.11, 5.6.2.8), paired bipolar transistors in small-signal transistors increase the "collector current ratio" (see

5.2.2.12), the switching transistor increases the "collector-emitter sustaining voltage, safe operating area, switching losses" (see

5.5.1.2.4, 5.5.1.4, 5.5.2.6, 5.5.2.7);

3) Added "resistance bias transistor" (see 5.6).

e) Test method.

1) Delete the "Test method for expressions of h-parameters of common base and common emitter" in the general test method (see the.1994 edition

Chapter IV, Section 1, 9.5), "Verification method of secondary breakdown current rating" (see Chapter IV, Section 1 of the.1994 edition

10.3), "Real part of common-emitter short-circuit input impedance $Re(h_{11e})$ " (see Chapter IV, Section 1, 13.4 of the.1994 edition), and

"Benchmark testing methods" (see Chapter IV, Section 2 of the.1994 edition);

2) Added the verification method of rated value (limit value). convert collector-base voltage, emitter-base voltage and collector-emitter

The test method of extreme sustaining voltage is adjusted to the verification method of rated value (see 6.2.6, 6.2.7, 6.2.8, 6.2.11); added

"Verification of current ratings, verification of reverse bias safe operating area and short circuit safe operating area" (see 6.2);

3) Added "Test methods for switching time and switching loss when the load is inductive" (see 6.3.1, 6.3.2), "Base-emitter