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

GB/T 45720-2025

**Semiconductor devices - Time dependent dielectric breakdown
(TDDB) test for gate dielectric films**

半导体器件 栅介质层的时间相关介电击穿 (TDDB) 试验
(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is equivalent to IEC 62374:2007 "Time-dependent dielectric breakdown (TDDb) test for gate dielectric layer of semiconductor devices". This document adds a chapter on "Normative References".

1 Scope

This document describes the time-dependent dielectric breakdown (TDDB) test method for the gate dielectric layer of semiconductor devices and the products that fail TDDB. Life time estimation method.

2 Normative references

This document has no normative references.

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 The gate oxide voltage is divided by the gate oxide thickness, see formula (1)

Note: $E_{ox} = V_{ox}/t_{ox}$ (1) Where. E_{ox} ---gate oxide electric field strength, in megavolts per centimeter (MV/cm);

V_{ox} ---gate oxide voltage; t_{ox} ---gate oxide thickness. t_{ox} should be determined by uniform, well-documented methods (physical analysis by scanning electron microscopy (SEM), transmission electron microscopy (TEM), or capacitance-voltage (CV) analysis).

It should be noted that the applied voltage is not necessarily the voltage on the gate oxide. Ultra-thin gate oxide has quantum confinement effects and gate electrode consumption.

Due to the exhaust effect, the gate oxide voltage will be lower than the applied voltage.

The method for measuring t_{ox} or the standard that specifies the measurement method is referenced in the data report.

3.2

Leakage current flowing in the gate lead of an insulated gate field effect transistor.

NOTE: Gate leakage current is usually represented by the letter " I_g ".

3.3

The leakage current in the gate lead of the insulating gate oxide when the operating voltage is applied before the stress voltage or stress electric field is applied.

3.4 Limit current compliance current

The maximum current that a voltage can drive a device.