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**NATIONAL STANDARD OF THE
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GB/T 42706.5-2023

**Electronic components - Long-term storage of electronic
semiconductor devices - Part 5: Die and wafer devices**

电子元器件 半导体器件长期贮存 第5部分：芯片和晶圆

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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 part 5 of GB/T 42706 "Long-term Storage of Electronic Components and Semiconductor Devices": GB/T 42706 has been published the following sections:

--- Part 1: General;

--- Part 2: Degradation mechanism;

--- Part 5: Chips and wafers: This document is equivalent to IEC 62435-5:2017 "Long-term storage of electronic components and semiconductor devices - Part 5: Chips and wafers": The following minimal editorial changes have been made to this document:

a) The abbreviation RH has been deleted in 3:2:

b) "IEC 60749-20-1" in footnote c of Table 1 and Table 2 is corrected to "IEC 60749-21" according to the original text:

c) Deleted "Note 2" in Table 2: Please note that some contents of this document may refer to patents: The issuing agency of this document assumes no responsibility for identifying patents: This document is proposed by the Ministry of Industry and Information Technology of the People's Republic of China: This document is under the jurisdiction of the National Semiconductor Device Standardization Technical Committee (SAC/TC78): This document is drafted by: The Thirteenth Research Institute of China Electronics Technology Group Corporation, Hebei Beixin Semiconductor Technology Co., Ltd., Anhui Anxin Electronic Technology Co., Ltd., Hebei Zhongdian Kehang Testing Technology Service Co., Ltd., Beijing Saidi Junxin Electronic Product Testing Laboratory Co., Ltd: Company, Shenzhen Institute of Standards and Technology, Mianyang Micro Micro Testing Technology Co., Ltd., Wuhan Gewuxin Technology Co., Ltd., Shandong Zhongzhi Branch Standardization

Research Institute Co., Ltd.; Guangdong Weizhaoye Photoelectric Energy Saving Co., Ltd:
The main drafters of this document: Yan Meng, Peng Hao, Jin Lihua, Wang Liangen, Shi Dongsheng, Zhang Xin, Liu Wei, Wei Bing, Zhao Peng, Yang Yang, Xu Xin, Mai Rirong, Gao Ruixin, Mi Cunyan, He Li, Yu Yang, Dong Hongliang:

This document describes an implementation method for long-term storage: Long-term storage refers to electronic components that are expected to be stored for more than 12 months storage: In recent years, the elimination of electronic components, especially integrated circuits, has become more and more serious: With the development of science and technology, and used in aviation, railway or energy Compared with industrial equipment in the source field, the life cycle of components is very short: Therefore, systematic storage of components is the solution to the elimination problem: main method: Long-term storage requires good implementation of storage procedures, especially the storage environment: It is recommended that all transport, maintenance care, storage and testing operations: This document proposes a method of delaying obsolescence to the greatest extent possible, but does not guarantee that components will be in perfect working condition after storage: operating status: Because some systems are very old, in some cases 40 years or more, how to perform repairs and obtain spare parts becomes a The problems that users and maintenance organizations need to solve: For example, some components required to service these systems cannot be used during the life of the system Spare parts obtained from the original supplier or used for assembly are produced at the beginning of production but require long-term storage: of this document The purpose is to provide guidance for long-term storage of components: GB/T 42706 "Long-term storage of electronic components and semiconductor devices" aims to ensure that after long-term storage of components, there is sufficient reliability: Encourage users to ask suppliers to provide technical parameters of related products to demonstrate the storage process that meets user needs: These labels The standard aims to provide relevant guidance for electronic components that require long-term storage: GB/T 42706 "Long-term storage of electronic components and semiconductor devices" is divided into 9 parts: Part 1~Part 4 applies to All long-term storage, and contains general requirements and guidance: Parts 5 to 9 apply to the storage of several specific product types: exist While meeting the general requirements of Parts 1 to 4, the requirements for specific product types must also be met: Beginning with Part 5, it deals with electronic components that require different storage conditions: GB/T 42706 "Long-term Storage of Electronic Components and Semiconductor Devices" corresponds to the IEC 62435 series standards and is proposed to be divided into the following part:

--- Part 1: General: The purpose is to specify the relevant terms, definitions and principles of long-term storage, and to provide effective long-term storage of components: Storage concepts, good working practices and general methods:

--- Part 2: Degradation mechanism: The purpose is to specify the degradation mechanisms and Mode of degradation, and guidance on test methods for assessing general degradation

mechanisms:

--- Part 3: Data: The purpose is to specify the requirements for all aspects of data storage during the long-term storage of electronic components, and to maintain traceability: traceability or data link integrity:

--- Part 4: Storage: The purpose is to specify the long-term storage method of electronic components, as well as related recommended conditions, including transportation, control control and storage facilities:

--- Part 5: Chips and wafers: The purpose is to specify single chips, parts of wafers or entire wafers, as well as metallized structures (introduced storage conditions and rules for chips, as well as general-purpose and special-purpose packaging products containing chips or wafers Provide operational guidance:

--- Part 6: Packaged or coated components: The purpose is to specify the long-term storage methods and recommended conditions for packaged or coated components, including including transport, containment, and storage facility security:

1 Scope

GB/T 42706.5-2023 is Part 5 of the Chinese series on the long-term storage of semiconductor devices, and covers bare die and wafers. Storing unpackaged silicon is the hardest case in the series: without a package there is nothing between the die and the atmosphere, the bond pads oxidise, the passivation absorbs moisture, and a single electrostatic event or particle destroys a part that cannot be replaced because the line that made it has closed. Storing wafers is how a programme keeps an obsolete process available for a decade. The standard sets the storage requirements including the assembly data to be retained, the prerequisites for storage, the damage mechanisms during storage, the mechanical protection, the storage environment, positive pressure packaging, electrostatic effects, radiation protection and the periodic inspection of stored die, followed by the long-term storage failure mechanisms. It took effect on 1 September 2023.

This document specifies the requirements for a single chip, part of a wafer or the entire wafer, and chips with metal structures (introducing metal layers, bumping, etc.) Storage conditions and rules, while providing handling guidance for general-purpose and special-purpose packaged products containing chips or wafers: This document applies to long-term storage of chips and wafers with expected storage times greater than 12 months:

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text: Among them, dated references For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document:

GB/T 42706:2-2023 Long-term storage of electronic components and semiconductor devices Part 2: Degradation mechanism (IEC 62435-2:2017, IDT)

3 Terms, Definitions and Abbreviations 3:

1 Terms and Definitions The following terms and definitions apply to this document: 3:1:1 storage environment storage environment A storage area that is specially controlled for temperature, humidity, atmospheric environment and other conditions according to the requirements of the product: 3:1:

2 Long-term storage long-termstorage; LTS In order to prolong the life cycle of products and meet the needs of later use, planned component storage is carried out: 3:1:3 desiccant desiccant A hygroscopic substance used to remove moisture from the atmosphere: 3:

2 Abbreviations The following abbreviations and symbols apply to this document: ESD electrostatic discharge (electro-static discharge)