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

GB/T 46788-2025

**Environmental acceptance requirements for tin whisker
susceptibility of tin and tin alloy surface finishes on
semiconductor devices**

半导体器件表面镀涂锡和锡合金上的锡须的环境接收要求

(English Translation)

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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 equivalent to IEC 62483:2013 "Environmental acceptance requirements for tin whiskers on tin-plated surfaces and tin alloys on semiconductor devices".

This document adds a chapter on "Normative References".

The following minimal editorial changes have been made to this document.

a) Added examples of specific measures to delay tin whisker growth as described in section 5.4;

b) Added "n" in Table A.7 to represent "the total number of tin whiskers for each lead, lead-out, or sample inspection area".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was 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).

Introduction

To meet lead-free requirements, many electronics manufacturers have adopted tin-based surface plating. However, tin and tin alloy surface plating is prone to forming...

Tin whisker formation can reduce product reliability. Appropriate delay measures should be taken to reduce the tendency for tin whisker formation to meet acceptance conditions.

The test conditions and acceptance criteria given in Appendix A of this document are based on existing tin whisker data. These test conditions have not yet been adapted to those used in practice.

This is related to the long-term environmental exposure of the device. Therefore, there is currently no method to determine the relationship between the tin whisker length measured through short-term experiments as described in this document and the device's long-term environmental exposure.

Quantitative prediction of long-term tin whisker length. Currently, the fundamental mechanism of tin whisker growth is not fully understood, and this document does not

specify an acceleration factor. Therefore, the tests described in this document cannot guarantee whether tin whiskers will grow under field use conditions.

Tin and tin alloy plating on the surface of semiconductor devices Environmental acceptance requirements for tin whiskers

1 Scope

This document specifies environmental acceptance testing and methods for delaying tin whisker growth in tin-based plating on semiconductor device surfaces. This method may not be effective.

For applications with specific needs (such as military, aerospace, etc.), supplementary requirements should be specified in appropriate requirements or procurement documents.

This document does not apply to semiconductor devices with only bottom leads (such as square flat leadless devices and ball grid array devices, flip-chip bump devices).

(Point leads), because the entire plating surface of the leads of such devices will be wetted during the assembly process.

When using this document, the reporting requirements in Chapter 7 must also be met.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

base metal

Metal alloys located beneath all surface coatings and/or undercoatings, see Figure 1.

Figure 1. Cross-sectional view of the coating on the device surface

Tin-based coating on the outer surfaces of the device's external leads and other exposed metals.

In the device manufacturing process, the tendency of tin whisker growth is reduced by decreasing the internal compressive stress of the surface coating.