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**NATIONAL STANDARD OF THE
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**Micro-electromechanical systems (MEMS) technology - Test
method of electrical characteristics after cyclic bending
deformation for flexible micro-electromechanical devices**

微机电系统（MEMS）技术 柔性微机电器件循环弯曲变形后电气特性测试方法
(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 62047-43:2024 "Semiconductor devices - Microelectromechanical components - Part 43: Flexible microelectromechanical devices - Cyclic osmosis".

Methods for testing electrical properties after bending deformation.

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

---To align with existing standards, the standard name has been changed to "Micro-Electro-Mechanical Systems (MEMS) Technology. Flexible Microelectromechanical Devices with Cyclic Bending Variation".

"Post-construction Electrical Characteristics Test Method";

---Added note 5.2.1 to supplement the measurement accuracy of the missing size range.

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 National Technical Committee on Standardization of Microelectromechanical Systems (SAC/TC336).

This document was prepared by the National Technical Committee on Standardization of Microelectromechanical Systems (SAC/TC336) and the National Technical Committee on Standardization of Integrated Circuits.

1 Scope

This document describes a testing method for the electrical properties of flexible electromechanical devices after cyclic bending deformation. These devices include those located on flexible thin films or...

Passive and active micro-components embedded in flexible thin films. The device dimensions typically range from 1mm to 300mm, and the thickness is usually...

The range is 10μm to 1mm. This test method aims to assess the performance of bending and weight through a performance-bending-cycle diagram (3D PSN diagram).

This document visualizes the overall performance degradation after cyclic bending deformation on the load space of the repeated cycle count. It also covers the performance degradation under certain cyclic conditions.

Estimating the safety margin and reliability of device operating cycles under bending deformation is crucial.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

3 Terms and Definitions

The following terms and definitions apply to this document.

d_{max}

The maximum distance between the two loading walls represents the minimum degree of bending applied to the device, as shown in Figure 1.

d_{min}

The minimum distance between the two loading walls represents the maximum degree of bending applied to the device, as shown in Figure 1.

Note 1: The degree of bending of a device is represented by the distance between two walls of the bent device that are close to each other, denoted as the bending distance.

Note 2: This measurement can be converted to the radius of curvature r , or to the bending strain ϵ around the bending axis. Under cyclic mechanical loading, strain is a measure of material damage.

One of the applicable parameters for injury; however, in this case, especially when the heterogeneity of the structure leads to uneven distribution of stiffness around the bending axis, the distance between the two walls...

The strain on the device may be non-uniform. The nominal value of the radius is proportional to the distance, while the bending strain is inversely proportional to the radius. Therefore, the maximum value of the nominal bending strain is...

It appears at the minimum bending distance.

$shuttle_{range}$

The travel distance of the movable loading wall is shown in Figure 1.