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

GB/T 42709.12-2026

**Semiconductor devices - Micro-electromechanical devices -
Part 12: Bending fatigue testing method of thin film materials
using resonant vibration of MEMS structures**

半导体器件 微电子机械器件 第12部分：采用MEMS结构谐振法的薄膜材料弯曲疲劳试验方法

(English Translation)

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References

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 12 of GB/T 42709 "Semiconductor Devices - Microelectromechanical Devices". GB/T 42709 has been published as follows.

Part 2.

- Part 2: Tensile Testing Methods for Thin Film Materials;
- Part 3: Standard test pieces for tensile testing of thin films;
- Part 5: Radio Frequency MEMS Switches;
- Part 6: Axial fatigue testing methods for thin film materials;
- Part 8: Bending Test Methods for Measuring the Tensile Properties of Strip Films;
- Part 12: Bending fatigue testing method for thin film materials using MEMS structural resonance method;
- Part 19: Electronic Compass;
- Part 21: Methods for Measuring Poisson's Ratio in MEMS Thin Film Materials;
- Part 22: Electromechanical Tensile Testing Methods for Conductive Thin Films on Flexible Substrates;
- Part 29: Electromechanical relaxation test methods for suspended conductive films at room temperature;
- Part 35: Methods for testing the electrical properties of flexible MEMS devices under bending deformation;
- Part 36: Environmental and Dielectric Permeability Testing Methods for MEMS Piezoelectric Thin Films;
- Part 38: Test Method for Adhesion Strength of Metal Powder Paste in MEMS Interconnects;
- Part 40: Threshold testing method for MEMS inertial shock switches.

This document is equivalent to IEC 62047-12:2011 "Semiconductor devices - Microelectromechanical devices - Part 12: Semiconductor devices using MEMS junctions".

A structural resonance method for testing the bending fatigue of thin film materials.

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

---The index numbers for Figures 1, A.2, B.2, and C.2 are included in the figures.

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.

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(SAC/TC336) are jointly under the jurisdiction of the State Administration of Taxation.

Introduction

GB/T 42709 "Semiconductor Devices and Microelectromechanical Devices" is proposed to consist of the following parts.

---Part 2: Tensile Testing Methods for Thin Film Materials. The purpose is to specify tensile testing methods for MEMS thin film materials.

---Part 3: Standard Test Pieces for Tensile Testing of Thin Films. The purpose is to specify the test pieces for tensile testing of MEMS thin film materials.

Relevant requirements.

---Part 5: Radio Frequency MEMS Switches. The purpose is to define the terminology and definitions, characteristic requirements, and testing procedures for radio frequency MEMS switches.

Methods, etc.

---Part 6: Axial Fatigue Testing Methods for Thin Film Materials. The purpose is to specify axial fatigue testing methods for MEMS thin film materials.

method.

---Part 7: MEMS Bulk Acoustic Filters and Duplexers for RF Control and Selection. The purpose is to specify MEMS bulk acoustic filters and duplexers.

Terminology and definitions, characteristic requirements, and test methods for acoustic resonators, filters, and duplexers.

---Part 8: Bending Test Method for Measuring the Tensile Properties of Strip Films. The purpose is to specify the method for measuring the tensile properties of strip films.

A bending test method for sexuality.

---Part 9: Measurement of inter-wafer bonding strength. The purpose is to specify the testing methods for the bonding strength of MEMS wafers.

---Part 11: Test method for the linear thermal expansion coefficient of materials in suspended microelectromechanical systems. The purpose is to specify the linear thermal expansion coefficient of materials in suspended microelectromechanical systems.

Method for testing the linear thermal expansion coefficient of MEMS materials.

Methods for testing the bending fatigue of membrane materials.

---Part 13: Bending and Shear Test Methods for Bond Strength of MEMS Structures. The purpose is to specify the bonding strength of MEMS structures.