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

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**Micro-electromechanical systems (MEMS) technology -
Forming limit measuring method of metallic film materials**

微机电系统（MEMS）技术 金属膜材料成形极限测量方法

(English Translation)

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Table 1 List of alphabetical symbols

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 is required.

This document is equivalent to IEC 62047-14:2012 "Semiconductor devices - Microelectromechanical devices - Part 14: Forming limits of metal film materials" Measurement Methods.

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

To coordinate with the existing standards, the name of the standard was changed to "Measurement of forming limit of metal film materials in micro-electromechanical systems (MEMS) technology" method";

Deleted the description of the purpose and significance of using this document in "Scope";

Added the "Notes" to 3.1.3 and 3.1.4; -Added informative reference to ISO 21920-2:2021 (see 4.2); -the symbol for sample length "h" is changed to "l";

Added the markings of d0, d1, and d2 in Figure 3 and Figure D.2, and deleted the formula in Figure D.2 in IEC 62047-14:2012;

Added the label of "inkjet head" in Figure B.2, and added B.3 c). -

1 Scope

This document describes a method for measuring the forming limit of metallic film materials with thicknesses ranging from 0.5 μm to 300 μm .

This document is applicable to metal film materials used to manufacture electronic components and MEMS through molding processes such as embossing.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies.

In this document.

IEC 62047-1 Semiconductor devices Microelectromechanical devices Part 1: Terms and definitions Micro-electromechanical devices-Part 1: Terms and definitions) Note. GB/T 26111-2023 Microelectromechanical Systems (MEMS) Technical Terminology (IEC 62047-1:2016, MOD)

3.1 Terms and Definitions

For the purposes of this document, the terms and definitions defined in IEC 62047-1 and the following apply.

3.1.1

circular grid

Grid used to measure the local deformation of the sample within the circle.

3.1.2

grid patterns

A pattern marked on the surface of a test material to directly measure the formability of a metal film material.

NOTE: The grid consists of a pattern of circles and squares.

3.1.3

major axis

The longest possible line segment connecting two points on the deformed ellipse passes through the two foci of the ellipse.

Note: See d1 in Figure 3.

3.1.4

minor axis

The longest line segment connecting two points on the deformed ellipse and perpendicular to the major axis.

Note: See d2 in Figure 3.

3.1.5

square grid

A square grid used to measure the overall deformation of a test material.