

# INTERNATIONAL STANDARD

**Semiconductor devices – Micro-electromechanical devices –  
Part 45: Silicon based MEMS fabrication technology – Measurement method of  
impact resistance of nanostructures**



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INTERNATIONAL  
ELECTROTECHNICAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES –  
MICRO-ELECTROMECHANICAL DEVICES –

**Part 45: Silicon based MEMS fabrication technology –  
Measurement method of impact resistance of nanostructures**

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The text of this International Standard is based on the following documents:

| Draft        | Report on voting |
|--------------|------------------|
| 47F/497/FDIS | 47F/504/RVD      |

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

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## SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

### Part 45: Silicon based MEMS fabrication technology – Measurement method of impact resistance of nanostructures

#### 1 Scope

This part of IEC 62047 specifies the requirements and testing method to measure the impact resistance of nanostructures which are fabricated by micromachining technology used in silicon-based micro-electromechanical system (MEMS).

This document is applicable to the in-situ impact resistance measurement of nanostructures manufactured by microelectronic technology process and other micromachining technology.

In the production of MEMS devices, due to the micro/nano size, the non-ideal effect of fabrication is greatly amplified compared with the macroscale. Surface defects, line width loss, and residual stress can occur in the fabricated object, resulting in severe fluctuations in the mechanical strength of MEMS devices. This document specifies an in-situ measurement method for the impact resistance of nanostructures based on MEMS technology to extract the impact strength of actual manufactured structures. This test method does not need intricate instruments (such as scanning probe microscopy and nano-indenter) and special test specimens.

Since the in-situ on-chip tester in this document can be implanted in device fabrication as a standard detection pattern, this document can provide a bridge, by which the fabrication part can give some quantitative reference for the design part.

#### 2 Normative references

There are no normative references in this document.

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
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##### 3.1 testing structure

nanostructure (for example, cantilever beam or fixed beam) specially made to measure the properties of materials

##### 3.2

##### testing device

microstructure that transmits force or displacement to a testing structure and the force or displacement can be read out at the same time