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INTERNATIONAL STANDARD

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Semiconductor devices – Micro-electromechanical devices – Part 42: Measurement methods of electro-mechanical conversion characteristics of piezoelectric MEMS cantilever

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Part 42: Measurement methods of electro-mechanical conversion characteristics of piezoelectric MEMS cantilever

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IEC 62047-42 has been prepared by subcommittee 47F: Micro-electromechanical systems, of IEC technical committee 47: Semiconductor devices. It is an International Standard.

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

Draft	Report on voting
47F/414/FDIS	47F/417/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.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 62047 series, published under the general title *Semiconductor devices – Micro-electromechanical devices*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

Part 42: Measurement methods of electro-mechanical conversion characteristics of piezoelectric MEMS cantilever

1 Scope

This part of IEC 62047 specifies measuring methods of electro-mechanical conversion characteristics of piezoelectric thin film on microcantilever, which is typical structure of actual micro sensors and micro actuators. In order to obtain actual and precise piezoelectric coefficient of the piezoelectric thin films with microdevice structures, and this document reports the schema to determine the characteristic parameters for consumer, industry or any other applications of piezoelectric devices. This document applies to piezoelectric thin films on microcantilever fabricated by MEMS process.

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 terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
unimorph microcantilever
micro-scale cantilever composed of piezoelectric thin film and non-piezoelectric material, typically thin silicon layer

Note 1 to entry: The piezoelectric thin films are deposited on bottom electrode. Top electrodes are prepared on the piezoelectric thin film, and input voltage are applied between top and bottom electrodes. Platinum is often used as top and bottom electrodes for piezoelectric MEMS devices. The thickness of both top and bottom electrodes should be thinner than that of piezoelectric thin film and non-piezoelectric layer of microcantilever. In case of direct piezoelectric measurements, output signal is measured between bottom electrode and sensing top electrode as described in 5.4.

3.2
converse transverse piezoelectric coefficient
transverse piezoelectric coefficient of the piezoelectric thin film calculated from strain or stress caused by electric field or voltage

3.3
direct transverse piezoelectric coefficient
transverse piezoelectric coefficient of the piezoelectric thin film calculated from generated charge or voltage caused by strain or stress