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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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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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CONTENTS

FOREWORD 4

1 Scope 6

2 Normative references 6

3 Terms and definitions 6

4 Test bed of MEMS piezoelectric thin film 7

- 4.1 General 7
- 4.2 Functional blocks and components 9
  - 4.2.1 General 9
  - 4.2.2 Displacement meter 10
  - 4.2.3 Power source 10
  - 4.2.4 Electric measurement instrument 10

5 Microcantilever under testing 11

- 5.1 General 11
- 5.2 Measurement principle 11
- 5.3 Measuring procedures of converse transverse piezoelectric coefficient 12
- 5.4 Measuring procedures of direct transverse piezoelectric coefficient 12

6 Test report 13

Annex A (informative) Example of measuring method of piezoelectric MEMS cantilever 15

- A.1 General 15
- A.2 Measurement procedure 15
  - A.2.1 Structure of piezoelectric microcantilevers 15
  - A.2.2 Microfabrication process 15
  - A.2.3 Mechanical properties of piezoelectric and non-piezoelectric layers 16
  - A.2.4 Electric properties and resonance frequency of microcantilever 17
  - A.2.5 Input displacement of microcantilever for direct piezoelectric coefficient $e^{\mathrm{d}}_{31,\mathrm{f}}$ 18
- A.3 Measurement results 19
  - A.3.1 Converse piezoelectric measurement 19
  - A.3.2 Direct piezoelectric measurement 19
- A.4 Test report 20

Bibliography 22

Figure 1 – Test bed of piezoelectric MEMS unimorph cantilever 7

Figure 2 – Setup for measurement of converse piezoelectric effect 9

Figure 3 – Setup for measurement of direct piezoelectric effect 10

Figure A.1 – Structure and photograph of piezoelectric microcantilevers under testing 15

Figure A.2 – Fabrication process of piezoelectric microcantilevers 16

Figure A.3 – Frequency response of tip displacement of each piezoelectric microcantilevers 18

Figure A.4 – Tip displacement and converse piezoelectric coefficient as a function of applied voltage 19

Figure A.5 – Direct piezoelectric coefficient as a function of input tip displacement of piezoelectric microcantilevers 19

Table 1 – Symbols and designations of test bed 8

Table A.1 – Mechanical properties of piezoelectric layer 16
Table A.2 – Mechanical properties of non-piezoelectric layer 17
Table A.3 – Electric properties of microcantilever 17
Table A.4 – Resonance frequencies of microcantilever 17
Table A.5 – Input displacement for direct piezoelectric coefficient $e^{\mathrm{d}}_{31,\mathrm{f}}$ 18
Table A.6 – Test report 20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES –
MICRO-ELECTROMECHANICAL DEVICES –

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

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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.

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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 database 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 films 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