Irish Standard
I.S. EN 62047-6:2010

Semiconductor devices - Micro-electromechanical devices -- Part 6: Axial fatigue testing methods of thin film materials (IEC 62047-6:2009 (EQV))

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English version

Semiconductor devices - Micro-electromechanical devices - Part 6: Axial fatigue testing methods of thin film materials

(IEC 62047-6:2009)

Dispositifs à semiconducteurs - Dispositifs microélectromécaniques - Partie 6: Méthodes d'essais de fatigue axiale des matériaux en couche mince (CEI 62047-6:2009)

Halbleiterbauelemente - Bauelemente der Mikrosystemtechnik - Teil 6: Prüfverfahren zur uniaxialen Dauerschwingfestigkeit von Dünnschicht-Werkstoffen (IEC 62047-6:2009)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 62047-6:2010 E

Foreword

The text of document 47F/15/FDIS, future edition 1 of IEC 62047-6, prepared by SC 47F, Micro-electromechanical systems, of IEC TC 47, Semiconductor devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62047-6 on 2010-03-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2010-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-03-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 62047-6:2009 was approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 62047-2	2006	Semiconductor devices - Micro-electromechanical devices - Part 2: Tensile testing methods of thin film materials	EN 62047-2	2006

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62047-6 has been prepared by subcommittee 47F: Micro-electromechanical systems, of IEC technical committee 47: Semiconductor devices.

The text of this standard is based on the following documents:

FDIS	Report on voting
47F/15/FDIS	47F/17/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62047 series, 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 publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

Part 6: Axial fatigue testing methods of thin film materials

1 Scope

This International Standard specifies the method for axial tensile–tensile force fatigue testing of thin film materials with a length and width under 1 mm and a thickness in the range between 0,1 μm and 10 μm under constant force range or constant displacement range. Thin films are used as main structural materials for MEMS and micromachines.

The main structural materials for MEMS, micromachines, etc., have special features, such as typical dimensions of a few microns, material fabrication by deposition, and test piece fabrication by means of non-mechanical machining, including photolithography. This International Standard specifies the axial force fatigue testing methods for micro-sized smooth specimens, which enables a guarantee of accuracy corresponding to the special features. The tests are carried out at room temperatures, in air, with loading applied to the test piece along the longitudinal axis.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62047-2:2006, *Semiconductor devices – Micro-electromechanical devices – Part 2: Tensile testing method of thin film materials*

3 Terms and definitions

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

3.1
maximum force
P_{max}
highest algebraic value of applied force in a cycle

NOTE Adapted from ASTM E 1823-05a [1][1].

3.2
minimum force
P_{min}
lowest algebraic value of applied force in a cycle

NOTE Adapted from ASTM E 1823-05a [1].

3.3
mean force
P_{mean}
algebraic average of the maximum and minimum forces in constant amplitude loading, or of individual cycles

NOTE Adapted from ASTM E 1823-05a [1].

[1] The figures between brackets refer to the Bibliography.