



SLOVENSKI STANDARD

SIST EN 62047-5:2011

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Polprevodniški elementi - Mikroelektromehanski elementi - 5. del: Stikala RF MEMS

Semiconductor devices - Microelectromechanical devices - Part 5: RF MEMS switches

Dispositifs à semiconducteurs - Dispositifs microélectromécaniques - Partie 5 :
Commutateurs MEMS-RF

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ICS:

31.080.01	Polprevodniški elementi (naprave) na splošno	Semiconductor devices in general
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EUROPEAN STANDARD
NORME EUROPÉENNE
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**Semiconductor devices -
Micro-electromechanical devices -
Part 5: RF MEMS switches
(IEC 62047-5:2011)**

Dispositifs à semiconducteurs -
Dispositifs microélectromécaniques -
Partie 5: Commutateurs MEMS-RF
(CEI 62047-5:2011)

Halbleiterbauelemente -
Bauelemente der Mikrosystemtechnik -
Teil 5: Hochfrequenz-MEMS-Schalter
(IEC 62047-5:2011)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

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

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Foreword

The text of document 47F/83/FDIS, future edition 1 of IEC 62047-5, 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 62047-5 on 2011-08-17.

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) 2012-05-17
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-08-17

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62047-5:2011 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60747-1 + corr. August	2006 2008	Semiconductor devices - Part 1: General	-	-
IEC 60747-16-1	-	Semiconductor devices - Part 16-1: Microwave integrated circuits - Amplifiers	EN 60747-16-1	-
IEC 60747-16-4	2004	Semiconductor devices - Part 16-4: Microwave integrated circuits - Switches	EN 60747-16-4	2004
IEC 60749-5	-	Semiconductor devices - Mechanical and climatic test methods Part 5: Steady-state temperature humidity bias life test	EN 60749-5	-
IEC 60749-10	-	Semiconductor devices - Mechanical and climatic test methods - Part 10: Mechanical shock	EN 60749-10	-
IEC 60749-12	-	Semiconductor devices - Mechanical and climatic test methods - Part 12: Vibration, variable frequency	EN 60749-12	-
IEC 60749-27	-	Semiconductor devices - Mechanical and climatic test methods - Part 27: Electrostatic discharge (ESD) sensitivity testing - Machine model (MM)	EN 60749-27	-

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Semiconductor devices – Micro-electromechanical devices –
Part 5: RF MEMS switches**
(standards.iteh.ai)

**Dispositifs à semiconducteurs – Dispositifs microélectromécaniques –
Partie 5: Commutateurs MEMS-RF**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SEMICONDUCTOR DEVICES –
MICRO-ELECTROMECHANICAL DEVICES –**

Part 5: RF MEMS switches

FOREWORD

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International Standard IEC 62047-5 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/83/FDIS	47F/93/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 parts of the IEC 62047 series, under the general title *Semiconductor devices – Micro-electromechanical devices*, can be found in the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

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SEMICONDUCTOR DEVICES – MICRO-ELECTROMECHANICAL DEVICES –

Part 5: RF MEMS switches

1 Scope

This part of IEC 62047 describes terminology, definition, symbols, test methods that can be used to evaluate and determine the essential ratings and characteristic parameters of RF MEMS switches. The statements made in this standardization are also applicable to RF (Radio Frequency) MEMS (Micro-Electro-Mechanical Systems) switches with various structures, contacts (d.c. contact and capacitive contact), configurations (series and shunt), switching networks (SPST, SPDT, DPDT, etc.), and actuation mechanism such as electrostatic, electro-thermal, electromagnetic, piezoelectric, etc. The RF MEMS switches are promising devices in advanced mobile phones with multi-band/mode operation, smart radar systems, reconfigurable RF devices and systems, SDR (Software Defined Radio) phones, test equipments, tunable devices and systems, satellite, etc.

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 normative documents (including any amended documents) referred to applies.

- IEC 60747-1: 2006, *Semiconductor devices – Part 1: General*
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- IEC 60747-16-1, *Semiconductor devices – Part 16-1: Microwave integrated circuits – Amplifiers*
- IEC 60747-16-4:2004, *Semiconductor devices – Part 16-4: Microwave integrated circuits – Switches*
- IEC 60749-5, *Semiconductor devices – Mechanical and climatic test methods – Part 5: Steady-state temperature humidity bias life test*
- IEC 60749-10, *Semiconductor devices – Mechanical and climatic test methods – Part 10: Mechanical shock*
- IEC 60749-12, *Semiconductor devices – Mechanical and climatic test methods – Part 12: Vibration, variable frequency*
- IEC 60749-27, *Semiconductor devices – Mechanical and climatic test methods – Part 27: Electrostatic discharge (ESD) sensitivity testing – Machine model (MM)*

3 Terms and definitions

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

NOTE In the text of this standard, the term of switch is used instead of RF MEMS switch to improve the readability.

3.1 Switching operation

3.1.1

capacitive switch

switch whereby an RF signal is passed or blocked by a change of impedance ratio caused by the capacitive effect of making contact using a movable metal plate onto a dielectric film presented on a fixed metal plate

3.1.2

d.c. contact switch

switch whereby an RF signal is passed or blocked by a movable metal contact

3.2 Switching configuration

3.2.1

series switch

switch whereby an RF signal applied to the input port is directly passed to the output port when a movable plate makes contact with a fixed plate

3.2.2

shunt switch

switch whereby an RF signal applied to the input port is passed to the ground plane when a movable plate makes contact with a fixed plate

3.3 Actuating mechanism

3.3.1

electro-statically actuated switch

switch whereby a moving contact is pulled down onto the fixed plate by an electrostatic force caused by the applied d.c. bias voltage, the moving plate returns to its original position when the bias voltage is removed

NOTE Advantages are virtually zero power consumption, small electrode size, relatively short switching time, and relatively simple fabrication and disadvantage is higher actuation voltage.

3.3.2

electro-magnetically actuated switch

switch whereby a movable plate or armature is pulled down onto a fixed plate by a magnetic force generated by a permanent magnet or an energised electromagnet

NOTE Advantage is a low actuation voltage and disadvantages are complexity of fabrication and high power consumption.

3.3.3

electro-thermally actuated switch

switch whereby a movable plate constructed of two or more differing materials with differential thermal expansion coefficients deflects to contact a fixed plate or electrode

NOTE Advantages are nearly linear deflection-versus-power relations and environmental ruggedness and disadvantages are high power consumption, low bandwidth, and relatively complex fabrication.

3.3.4

piezo-electrically actuated switch

switch whereby a movable constructed of piezoelectric materials deflects to contact a fixed plate or electrode