



NSAI
Standards

Irish Standard
I.S. EN 62761:2014

Guidelines for the measurement method of nonlinearity for surface acoustic wave (SAW) and bulk acoustic wave (BAW) devices in radio frequency (RF)

I.S. EN 62761:2014

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

EN 62761:2014

Published:

2014-05-23

*This document was published
under the authority of the NSAI
and comes into effect on:*

2014-07-01

ICS number:

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD

EN 62761

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2014

ICS 31.140

English Version

**Guidelines for the measurement method of nonlinearity for
surface acoustic wave (SAW) and bulk acoustic wave (BAW)
devices in radio frequency (RF)
(IEC 62761:2014)**

Lignes directrices pour la méthode de mesure des non-
linéarités pour les dispositifs à ondes acoustiques de
surface (OAS) et à ondes acoustiques de volume (OAV)
pour fréquences radioélectriques (RF)
(CEI 62761:2014)

Leitfaden zum Messverfahren für die Nichtlinearität von
Oberflächenwellen-(OFW-) und Volumenwellen-
(BAW-)Bauelementen für Hochfrequenzanwendungen
(IEC 62761:2014)

This European Standard was approved by CENELEC on 2014-03-26. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 49/1091/FDIS, future edition 1 of IEC 62761, prepared by IEC/TC 49 "Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62761:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-12-26
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-03-26

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

Endorsement notice

The text of the International Standard IEC 62761:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60862-1:2003	NOTE	Harmonized as EN 60862-1:2003 (not modified).
IEC 62047-7:2011	NOTE	Harmonized as EN 62047-7:2011 (not modified).
IEC 62575-2:2012	NOTE	Harmonized as EN 62575-2:2012 (not modified).



IEC 62761

Edition 1.0 2014-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Guidelines for the measurement method of nonlinearity for surface acoustic wave (SAW) and bulk acoustic wave (BAW) devices in radio frequency (RF)

Lignes directrices pour la méthode de mesure des non-linéarités pour les dispositifs à ondes acoustiques de surface (OAS) et à ondes acoustiques de volume (OAV) pour fréquences radioélectriques (RF)



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2014 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in 14 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

More than 55 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 14 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

Plus de 55 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 62761

Edition 1.0 2014-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Guidelines for the measurement method of nonlinearity for surface acoustic wave (SAW) and bulk acoustic wave (BAW) devices in radio frequency (RF)

Lignes directrices pour la méthode de mesure des non-linéarités pour les dispositifs à ondes acoustiques de surface (OAS) et à ondes acoustiques de volume (OAV) pour fréquences radioélectriques (RF)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

T

ICS 31.140

ISBN 978-2-8322-1425-1

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
3.1 General terms.....	6
3.2 Response related terms	8
3.3 Nonlinearity related terms	9
4 Basic properties of nonlinear system	10
4.1 Behaviours of nonlinear system	10
4.2 Measurement setup for nonlinearity	12
4.2.1 Harmonics measurement	12
4.2.2 IMD Measurement	14
4.3 Influence of circuit impedance for nonlinearity measurement.....	16
4.4 Influence of circuit nonlinearity.....	18
5 Nonlinearity measurement	18
5.1 Measurement equipment.....	18
5.1.1 Signal generator and power amplifier.....	18
5.1.2 Spectrum analyser.....	18
5.1.3 Network analyser (optional)	19
5.1.4 Accessories	19
5.2 Measurement Specifications	19
5.3 Measurement procedure	21
5.3.1 DUT check.....	21
5.3.2 Setup and check.....	21
5.3.3 Data acquisition.....	21
5.3.4 DUT final check	22
5.4 Report.....	22
Bibliography.....	23
Figure 1 – FBAR configuration	7
Figure 2 – SMR configuration.....	8
Figure 3 – Fundamental and harmonics output as a function of input signal power.....	12
Figure 4 – Basic setup for the harmonics measurement	13
Figure 5 – Practical setup for the harmonics measurement	13
Figure 6 – Setup when the circulator/isolator is used	14
Figure 7 – Practical setup for the IMD measurement (two-tone test)	15
Figure 8 – Practical setup for three-tone measurement	16
Figure 9 – Setup for IMD2 measurement of SAW/BAW antenna duplexers.....	16
Figure 10 – Range of deviation resulting from δ in dB	17
Figure 11 – Ideal IMD2 measurement setup for RF SAW/BAW duplexers.....	20
Figure 12 – Setup for the measurement of input signal intensity	22
Table 1 – Frequencies f_a and f_b of input signals and target frequency f_t	20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

GUIDELINES FOR THE MEASUREMENT METHOD OF NONLINEARITY FOR SURFACE ACOUSTIC WAVE (SAW) AND BULK ACOUSTIC WAVE (BAW) DEVICES IN RADIO FREQUENCY (RF)

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62761 has been prepared by IEC technical committee 49: Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection.

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

FDIS	Report on voting
49/1091/FDIS	49/1098/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.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Radio frequency (RF) surface acoustic wave (SAW) and bulk acoustic wave (BAW) devices such as filters and duplexers are now widely used in various communication systems. Due to their small physical size, energy concentration causes generation of nonlinear signals even when relatively small electric power is applied, and they may interfere with the communications.

The features of these RF SAW/BAW devices are their small size, light weight, omission of impedance and/or frequency tuning, high stability and high reliability. Nowadays, RF SAW/BAW devices with low insertion attenuation are widely used in various applications in the RF range.

In such applications, suppression of transmission and generation of unnecessary signals is highly demanded. Since nonlinearity in the RF SAW/BAW devices will generate such signals, its ultimate suppression is always crucial. In the same time, measurement method of nonlinear signals should be well established from industrial points of view.

In passive filters like RF SAW/BAW ones, frequency selectivity is realized by impedance matching/mismatching with peripheral circuitry. Thus impedance of peripheral circuitry shall be set as specified for reliable and reproducible filter characterization. This is also true for non-linear characteristics. It should be noted that even-order non-linearity, which is not common in general passive electronic components, may occur in RF SAW/BAW devices employing piezoelectric materials for electrical excitation and detection of SAWs/BAWs. This is because crystallographic asymmetry is necessary for existence of piezoelectricity. Therefore, measurement methods should be specifically established for non-linear behavior of RF SAW/BAW devices.

This standard has been compiled in response to a generally expressed desire on the part of both users and manufacturers for general Information on test condition guidance of RF SAW/BAW filters, so that the filters may be used to their best advantage. To this end, general and fundamental characteristics have been explained in this standard.

GUIDELINES FOR THE MEASUREMENT METHOD OF NONLINEARITY FOR SURFACE ACOUSTIC WAVE (SAW) AND BULK ACOUSTIC WAVE (BAW) DEVICES IN RADIO FREQUENCY (RF)

1 Scope

This International Standard gives the measurement method for nonlinear signals generated in the radio frequency (RF) surface acoustic wave (SAW) and bulk acoustic wave (BAW) devices such as filters and duplexers, which are used in telecommunications, measuring equipment, radar systems and consumer products.

The IEC 62761 includes basic properties of non-linearity, and guidelines to setup the measurement system and to establish the measurement procedure of nonlinear signals generated in SAW/BAW devices.

It is not the aim of this standard to explain theory, nor to attempt to cover all the eventualities which may arise in practical circumstances. This standard draws attention to some of the more fundamental questions, which the user has to consider before he/she places an order for an RF SAW/BAW device for a new application. Such a procedure will be the user's insurance against unsatisfactory performance.

2 Normative references

None

3 Terms and definitions

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

3.1 General terms

3.1.1

BAW duplexer

antenna duplexer composed of RF BAW resonators

3.1.2

BAW filter

filter characterised by a bulk acoustic wave which is usually generated by a pair of electrodes and propagates along a thin film thickness direction

3.1.3

bulk acoustic wave

BAW

acoustic wave, propagating between the top and bottom surface of a piezoelectric structure and traversing the entire thickness of the piezoelectric bulk

Note 1 to entry: The wave is excited by metal electrodes attached to both sides of the piezoelectric layer.

3.1.4

cut-off frequency

frequency of the pass-band at which the relative attenuation reaches a specified value

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- Looking for additional Standards? Visit Intertek Inform Infostore
 - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-