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

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EUROPEAN STANDARD

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EN 62761

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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)

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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
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IEC 60862-1:2003	NOTE	Harmonized as EN 60862-1:2003 (not modified).
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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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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)

IEC 62761:2014-02(en-fr)

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

FOREWORD

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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

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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