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colour inside

Surface acoustic wave (SAW) and bulk acoustic wave (BAW) duplexers of assessed quality – Part 2: Guidelines for the use

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SURFACE ACOUSTIC WAVE (SAW) AND BULK ACOUSTIC WAVE (BAW) DUPLEXERS OF ASSESSED QUALITY –

Part 2: Guidelines for the use

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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IEC 62604-2 has been prepared by IEC technical committee 49: Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection. It is an International Standard.

This third edition cancels and replaces the second edition published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the term "cross-isolation" has been added to Clause 3;

b) multiplexers are described.

NOTE In this document, SAW and BAW duplexers are treated simultaneously because both duplexers are used in the same manner, especially in mobile phone systems and have the same requirements of characteristics, test method and so on.

The text of this International Standard is based on the following documents:

Draft	Report on voting
49/1361/CDV	49/1376/RVC

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.

A list of all parts in the IEC 62604 series, published under the general title *Surface acoustic wave (SAW) and bulk acoustic wave (BAW) duplexers of assessed quality*, can be found on the IEC website.

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INTRODUCTION

While in 2G systems mainly dielectric duplexers have been used, the ongoing miniaturization in 3G and 4G mobile communication systems promoted the development and application of acoustic wave duplexers due to their small size, light weight and good electrical performance. While standard surface acoustic wave (SAW) duplexers have been employed for applications with moderate requirements regarding the steepness of individual filters, applications with narrow duplex gap (e.g. Bands 2, 3, 8, 25), i.e., the frequency gap between receiving and transmitting bands, require the application of temperature-compensated (TC) SAW or bulk acoustic wave (BAW) technology, because of their better temperature characteristics and resonator Q-factors.

Standard specifications, such as those of IEC, of which these guidelines form a part, and national specifications or detail specifications issued by manufacturers will define the available combinations of centre frequency, pass bandwidth and insertion attenuation for each sort of transmitting and receiving filters and the isolation level between transmitter and receiver ports, etc. These specifications are compiled to include a wide range of SAW and BAW duplexers with standardized performances. It cannot be over-emphasized that the user should, wherever possible, select his duplexers from these specifications, when available, even if it can lead to making small modifications to his circuit to enable the use of standard duplexers. This applies particularly to the selection of the nominal frequency band.

SURFACE ACOUSTIC WAVE (SAW) AND BULK ACOUSTIC WAVE (BAW) DUPLEXERS OF ASSESSED QUALITY –

Part 2: Guidelines for the use

1 Scope

This part of IEC 62604 ~~concerns~~ applies to duplexers which can separate receiving signals from transmitting signals and are key components for two-way radio communications, and which are generally used in mobile phone systems compliant with CDMA systems such as N-CDMA in second generation mobile telecommunication systems (2G), W-CDMA / UMTS (3G) or LTE (4G). ~~While in 2G systems mainly dielectric duplexers have been used, the ongoing miniaturization in 3G and 4G mobile communication systems promoted the development and application of acoustic wave duplexers due to their small size, light weight and good electrical performance. While standard surface acoustic wave (SAW) duplexers have been employed for applications with moderate requirements regarding the steepness of individual filters, applications with narrow duplex gap (e.g. Bands 2, 3, 8, 25), i.e. the frequency gap between receiving and transmitting bands, require the application of temperature-compensated (TC) SAW or bulk acoustic wave (BAW) technology, because of their better temperature characteristics and resonator Q-factors.~~

~~It is neither the aim of these guidelines to explain theory, nor to attempt to cover all the eventualities which may arise in practical circumstances.~~ These guidelines draw attention to some ~~of the more~~ fundamental questions about the theory of SAW and BAW duplexers and how to use them, which ~~should~~ will be considered by the user before he places an order for SAW and BAW duplexers for a new application. Such a procedure will be the user's insurance against unsatisfactory performance. Because SAW and BAW duplexers have very similar performance for the usage, it is useful and convenient for users that both duplexers are described in one standard.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60862-1~~:2015~~, *Surface acoustic wave (SAW) filters of assessed quality – Part 1: Generic specification*

IEC 62575-1~~:2015~~, *Radio frequency (RF) bulk acoustic wave (BAW) filters of assessed quality – Part 1: Generic specification*

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INTERNATIONAL STANDARD

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Duplexeurs à ondes acoustiques de surface (OAS) et à ondes acoustiques de volume (OAV) sous assurance de la qualité – Partie 2: Lignes directrices d'utilisation



IEC 62604-2:2022-09(en-fr)

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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DUPLEXEURS À ONDES ACOUSTIQUES DE SURFACE (OAS) ET À ONDES ACOUSTIQUES DE VOLUME (OAV) SOUS ASSURANCE DE LA QUALITÉ –

Partie 2: Lignes directrices d'utilisation

AVANT-PROPOS

1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
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L'IEC 62604-2 a été établie par le comité d'études 49 de l'IEC: Dispositifs piézoélectriques, diélectriques et électrostatiques et matériaux associés pour la détection, le choix et la commande de la fréquence. Il s'agit d'une Norme internationale.

Cette troisième édition annule et remplace la seconde édition parue en 2017. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) ajout du terme "isolation de polarisation croisée" à l'Article 3;
b) description des multiplexeurs.

NOTE Dans le présent document, les duplexeurs à OAS et à OAV sont traités simultanément car ces deux duplexeurs sont utilisés de la même manière, en particulier dans les systèmes de téléphonie mobile; ils ont en outre les mêmes exigences de caractéristiques, de méthode d'essai, etc.

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
49/1361/CDV	49/1376/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

Une liste de toutes les parties de la série IEC 62604, publiées sous le titre général *Duplexeurs à ondes acoustiques de surface (OAS) et à ondes acoustiques de volume (OAV) sous assurance de la qualité*, se trouve sur le site web de l'IEC.

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INTRODUCTION

Alors que pour les systèmes 2G, les duplexeurs diélectriques sont majoritairement utilisés, la miniaturisation actuelle des systèmes de communication mobile 3G et 4G a encouragé le développement et l'application de duplexeurs à ondes acoustiques, en raison de leurs petites dimensions, de leur faible poids et de leurs bonnes performances électriques. Tandis que les duplexeurs à ondes acoustiques de surface (OAS) courants sont employés pour des applications dont les exigences sont modérées quant à l'inclinaison des filtres individuels, les applications dont l'écart de duplex est étroit (bandes 2, 3, 8, 25, par exemple), c'est-à-dire l'intervalle de fréquences entre les bandes de réception et d'émission, exigent l'application de technologies OAS ou OAV avec compensation de la température en raison de leurs meilleures caractéristiques de température et de meilleurs facteurs Q de résonateur.

Les spécifications comme celles de l'IEC dont les présentes lignes directrices font partie, les spécifications nationales ou les spécifications particulières des fabricants définissent les combinaisons disponibles de fréquence centrale, de largeur de bande passante et d'affaiblissement d'insertion pour chaque type de filtre d'émission et de réception ainsi que le niveau d'isolation entre les accès d'émission et les accès de réception, etc. Ces spécifications sont compilées afin d'intégrer une large plage de duplexeurs à OAS et à OAV présentant des performances normalisées. Il convient de ce fait de bien conseiller à l'utilisateur de choisir ses duplexeurs, dans la mesure du possible, à l'aide de ces spécifications lorsqu'elles sont disponibles même si cela peut impliquer des modifications mineures de son circuit pour permettre l'utilisation de duplexeurs normalisés. Ceci s'applique en particulier à la sélection de la bande de fréquence nominale.

DUPLEXEURS À ONDES ACOUSTIQUES DE SURFACE (OAS) ET À ONDES ACOUSTIQUES DE VOLUME (OAV) SOUS ASSURANCE DE LA QUALITÉ –

Partie 2: Lignes directrices d'utilisation

1 Domaine d'application

La présente partie de l'IEC 62604 s'applique aux duplexeurs qui peuvent séparer les signaux en réception des signaux en émission et constituent des composants essentiels pour les radiocommunications bilatérales. Ils sont généralement utilisés dans les systèmes de téléphonie mobile conformes aux systèmes d'accès multiple par répartition en code (AMRC) comme les systèmes N-CDMA des systèmes de télécommunication mobile de seconde génération (2G), les systèmes W-CDMA/UMTS (3G) ou les systèmes LTE (4G).

Les présentes lignes directrices attirent l'attention sur certaines des questions fondamentales concernant la théorie des duplexeurs à OAS et à OAV, et leurs modalités d'utilisation, qui sont à prendre en considération par l'utilisateur avant de commander un duplexeur à OAS ou à OAV pour une nouvelle application. Ainsi, l'utilisateur évite d'être confronté à des performances non satisfaisantes. Dans la mesure où les duplexeurs à OAS et à OAV présentent des performances très similaires dans leur utilisation, il est utile et pratique pour les utilisateurs que les deux types soient décrits dans une seule norme.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60862-1, *Filtres à ondes acoustiques de surface (OAS) sous assurance de la qualité – Partie 1: Spécification générique*

IEC 62575-1, *Filtres radiofréquences (RF) à ondes acoustiques de volume (OAV) sous assurance de la qualité – Partie 1: Spécification générique*