

# INTERNATIONAL STANDARD

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**Single crystal wafers for surface acoustic wave (SAW) device applications –  
Specifications and measuring methods**





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**Single crystal wafers for surface acoustic wave (SAW) device applications –  
Specifications and measuring methods**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SINGLE CRYSTAL WAFERS FOR SURFACE  
ACOUSTIC WAVE (SAW) DEVICE APPLICATIONS –  
SPECIFICATIONS AND MEASURING METHODS**

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International Standard IEC 62276 has been prepared by IEC technical committee 49: Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection.

This third edition cancels and replaces the second edition of IEC 62276 published in 2012. It constitutes a technical revision.

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

- Corrections of Euler angle indications in Table 1 and axis directions in Figure 3.
- Definition of “twin” is not explained clearly enough in 3.3.3. Therefore it is revised by a more detailed definition.
- Etch channels maximum number at quartz wafer of seed which do not pass through from surface to back surface are classified for three grades in 4.2.13 a). Users use seed portions of quartz wafers for devices. They request quartz wafers with less etch channels

in seeds to reduce defects of devices. The classification of etch channels in seed may prompt a rise in quartz wafer quality.

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

CDV	Report on voting
49/1144/CDV	49/1170/RVC

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 website 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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

## INTRODUCTION

A variety of piezoelectric materials are used for surface acoustic wave (SAW) filter and resonator applications. Prior to an IEC meeting in 1996 in Rotterdam, wafer specifications were typically negotiated between users and suppliers. During this meeting, a proposal was announced to address wafer standardization. This standard has been prepared in order to provide industry standard technical specifications for manufacturing piezoelectric single crystal wafers to be used in surface acoustic wave devices.

# SINGLE CRYSTAL WAFERS FOR SURFACE ACOUSTIC WAVE (SAW) DEVICE APPLICATIONS – SPECIFICATIONS AND MEASURING METHODS

## 1 Scope

This document applies to the manufacture of synthetic quartz, lithium niobate (LN), lithium tantalate (LT), lithium tetraborate (LBO), and lanthanum gallium silicate (LGS) single crystal wafers intended for use as substrates in the manufacture of surface acoustic wave (SAW) filters and resonators.

## 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 60758:2016, *Synthetic quartz crystal – Specifications and guidelines for use*

ISO 2859-1: 1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1 Single crystals for SAW wafer

#### 3.1.1

##### **as-grown synthetic quartz crystal**

right-handed or left-handed single crystal quartz grown hydrothermally

Note 1 to entry: The term “as-grown” indicates a state prior to mechanical fabrication.

Note 2 to entry: See IEC 60758 for further information concerning crystalline quartz.

#### 3.1.2

##### **lithium niobate**

##### **LN**

single crystals approximately described by chemical formula  $\text{LiNbO}_3$ , grown by Czochralski (crystal pulling from melt) or other growing methods

#### 3.1.3

##### **lithium tantalate**

##### **LT**

single crystals approximately described by chemical formula  $\text{LiTaO}_3$ , grown by Czochralski (crystal pulling from melt) or other growing methods