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Edition 3.0 2018-11

TECHNICAL SPECIFICATION

Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection – Glossary –
Part 4-4: Piezoelectric materials – Single crystal wafers for surface acoustic wave (SAW) devices

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PIEZOELECTRIC, DIELECTRIC AND ELECTROSTATIC DEVICES AND ASSOCIATED MATERIALS FOR FREQUENCY CONTROL, SELECTION AND DETECTION – GLOSSARY –

Part 4-4: Piezoelectric materials – Single crystal wafers for surface acoustic wave (SAW) devices

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 61944-4-4, which is a technical specification, 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 of IEC 61994-4-4 cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

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

a) the new terms and definitions given in IEC 62276:2016 have been taken into account;
b) the general title has been changed according to the change in the title of TC 49 in 2009.
c) the part title has been changed according to the title of IEC 62276:2016.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
49/1283/DTS	49/1287/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61994 series, published under the general title *Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection – Glossary*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

PIEZOELECTRIC, DIELECTRIC AND ELECTROSTATIC DEVICES AND ASSOCIATED MATERIALS FOR FREQUENCY CONTROL, SELECTION AND DETECTION – GLOSSARY –

Part 4-4: Piezoelectric materials – Single crystal wafers for surface acoustic wave (SAW) devices

1 Scope

This part of IEC 61994 gives the terms and definition for single crystal wafers for surface acoustic wave (SAW) devices representing the state of the art.

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.

There are no normative references in this document.

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

[SOURCE: IEC 62276:2016, 3.1.1, modified – Notes 1 and 2 to entry have been removed.]

3.1.2
lanthanum gallium silicate
LGS
single crystals described by the chemical formula to $La_3Ga_5SiO_{14}$, grown by Czochralski (crystal pulling from melt) or other growing methods

[SOURCE: IEC 62276:2016, 3.1.5]

3.1.3
lithium niobate
LN
single crystals approximately described by chemical formula $LiNbO_3$, grown by Czochralski (crystal pulling from melt) or other growing methods

[SOURCE: IEC 62276:2016, 3.1.2]

3.1.4
lithium tantalate
LT
single crystals approximately described by chemical formula $LiTaO_3$, grown by Czochralski (crystal pulling from melt) or other growing methods

[SOURCE: IEC 62276:2016, 3.1.3]

3.1.5
lithium tetraborate
LBO
single crystals described by the chemical formula to $Li_2B_4O_7$, grown by Czochralski (crystal pulling from melt), vertical Bridgman, or other growing methods

[SOURCE: IEC 62276:2016, 3.1.4]

3.2 Terms and definitions related to LN and LT crystals

3.2.1
curie temperature
T_c
phase transition temperature between ferroelectric and paraelectric phases measured by differential thermal analysis (DTA) or dielectric measurement

[SOURCE: IEC 62276:2016, 3.2.1]

3.2.2
polarization process
electrical process used to establish a single domain crystal

[SOURCE: IEC 62276:2016, 3.2.3]

3.2.3
reduction process
REDOX reaction to increase conductivity to reduce the harmful effects of pyroelectricity

[SOURCE: IEC 62276:2016, 3.2.4]

3.2.4
reduced LN
LN treated with a reduction process

[SOURCE: IEC 62276:2016, 3.2.5, modified – Note 1 to entry has been removed.]

3.2.5
reduced LT
LT treated with a reduction process

[SOURCE: IEC 62276:2016, 3.2.6, modified – Note 1 to entry has been removed.]

3.2.6
single domain
ferroelectric crystal with uniform electrical polarization throughout (for LN and LT)

[SOURCE: IEC 62276:2016, 3.2.2]

3.3 Terms and definitions related to all crystals

3.3.1
congruent composition
chemical composition of a single crystal in a thermodynamic equilibrium with a molten solution of the same composition during the growth process

[SOURCE: IEC 62276:2016, 3.3.2]

3.3.2
lattice constant
length of unit cell along a major crystallographic axis measured by X-ray using the Bond method

[SOURCE: IEC 62276:2016, 3.3.1]

3.3.3
twin
two or more same single crystals which are combined together by the law of symmetrical plane or axis

[SOURCE: IEC 62276:2016, 3.3.3, modified – Notes 1 and 2 to entry have been removed.]

3.4 Flatness

3.4.1
fixed quality area
FQA
central area of a wafer surface, defined by a nominal edge exclusion, X, over which the specified values of a parameter apply

[SOURCE: IEC 62276:2016, 3.4.1, modified – Note 1 to entry has been removed.]

3.4.2
local thickness variation
LTV
variation determined by a measurement of a matrix of sites with defined edge dimensions

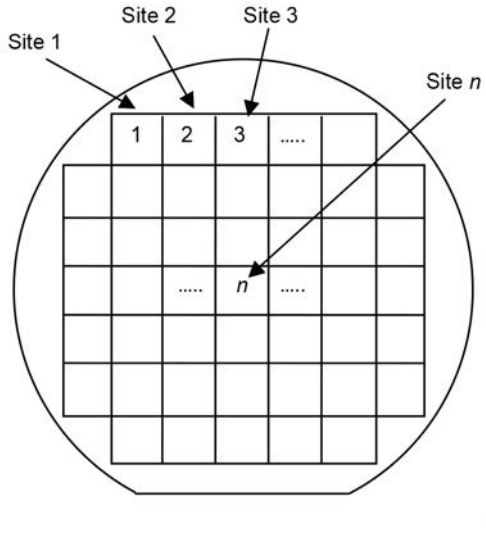

Figure 1 – Example of site distribution for LTV measurement