



TECHNICAL SPECIFICATION

**Piezoelectric and dielectric devices for frequency control and selection –
Glossary –
Part 1: Piezoelectric and dielectric resonators**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

S

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	5
Figure 1 – Configuration of a dielectric resonator ($TE_{01\delta}$ mode type)	8
Figure 2 – Equivalent circuit of a piezoelectric vibrator (one-port resonator)	9
Figure 3 – Frequency characteristics of the impedance near resonance.....	11
Figure 4 – Equivalent circuit for a two-port SAW resonator	12
Figure 5 – Configuration of an interdigital transducer (IDT).....	13
Figure 6 – Configuration of a one port SAW resonator	16
Figure 7 – Configuration of a two port SAW resonator.....	21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PIEZOELECTRIC AND DIELECTRIC DEVICES
FOR FREQUENCY CONTROL AND SELECTION –
GLOSSARY –****Part 1: Piezoelectric and dielectric resonators**

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

IEC 61994-1, which is a technical specification, has been prepared by IEC technical committee 49: Piezoelectric and dielectric devices for frequency control and selection.

This second edition of IEC 61994-1 cancels and replaces the first edition published in 2003. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- definitions updated;
- terminology given in orderly sequence;

- drawings inserted for easier understanding.

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

Enquiry draft	Report on voting
49/761/DTS	49/766/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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 61994 consists of the following parts under the general title: *Piezoelectric and dielectric devices for frequency control and selection – Glossary*:

- Part 1: Piezoelectric and dielectric resonators
- Part 2: Piezoelectric and dielectric filters
- Part 3: Piezoelectric oscillators
- Part 4-1: Piezoelectric materials – Synthetic quartz crystal
- Part 4-2: Piezoelectric and dielectric materials – Piezoelectric ceramics
- Part 4-3: Materials for dielectric devices¹
- Part 4-4: Materials – Materials for Surface Acoustic Wave (SAW) devices

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

- transformed into an international standard;
- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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

¹ To be published.

PIEZOELECTRIC AND DIELECTRIC DEVICES FOR FREQUENCY CONTROL AND SELECTION – GLOSSARY –

Part 1: Piezoelectric and dielectric resonators

1 Scope

This technical specification gives the terms and definitions for piezoelectric and dielectric resonators representing the present state-of-the-art, which are intended for use in the standards and documents of IEC technical committee 49.

2 Normative references

The following referenced documents are indispensable for the application 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 60050(561):1991, *International Electrotechnical Vocabulary (IEV) – Chapter 561: Piezoelectric devices for frequency control and selection*
Amendment 1 (1995)

IEC 60122-1:2002, *Quartz crystal units of assessed quality – Part-1: Generic specification*

IEC 60642:1979, *Piezoelectric ceramic resonators and resonator units for frequency control and selection – Chapter I: Standard values and conditions – Chapter II: Measuring and test conditions*

IEC 61019-1:2004, *Surface acoustic wave (SAW) resonators – Part 1: Generic specification*

IEC 61338-1:2004, *Waveguide type dielectric resonators – Part 1: Generic specification*