

TECHNICAL SPECIFICATION

Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection – Glossary – Part 3: Piezoelectric and dielectric oscillators

WITHDRAWN

IEC TS 61994-3:2011

<https://standards.iteh.ai/Catalogue/standards/iec/86727238-0d5d-43b8-9ff7-301fd289b749/iec-ts-61994-3-2011>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2011 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00



<https://standards.iteh.ai/>
<https://standards/iec/8a724238-0d5d-43b8-9ff7-301fd289b749/iec-ts-61994-3-2011>

TECHNICAL SPECIFICATION

Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection – Glossary – Part 3: Piezoelectric and dielectric oscillators

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

P

ICS 31.140; 01.040.31

ISBN 978-2-88912-556-2

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	5
Bibliography.....	16
Figure 1 – Characteristics of an output waveform.....	6
Figure 2 – Example of the use of frequency offset	8
Figure 3 – Typical frequency fluctuation characteristics	10
Figure 4 – Clock signal with phase jitter	11

Withholding

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

IEC TS 61994-3:2011

<https://standards.iteh.ai/standards/iec/86724238-0d5d-43b8-9ff7-301fd289b749/iec-ts-61994-3-2011>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PIEZOELECTRIC, DIELECTRIC AND
ELECTROSTATIC DEVICES AND ASSOCIATED MATERIALS
FOR FREQUENCY CONTROL, SELECTION AND DETECTION –
GLOSSARY –****Part 3: Piezoelectric and dielectric oscillators**

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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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.

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

IEC 61994-3, 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 second edition of IEC 61994-3 cancels and replaces the first edition published in 2004. 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,
- new terminologies are added,
- drawings inserted for easier understanding.

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

Enquiry draft	Report on voting
49/928/DTS	49/949/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.

A list of all parts of the IEC 61994 series, 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.

NOTE 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 next edition.

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

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

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

Part 3: Piezoelectric and dielectric oscillators

1 Scope

This part of IEC 61994 specifies the terms and definitions for piezoelectric dielectric oscillators representing the state-of-the-art, which are intended for use in the standards and documents of IEC TC 49.

2 Normative references

Void

3 Terms and definitions

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

3.1

adjustment frequency

frequency to which an oscillator must be adjusted, under a particular combination of operating conditions, in order to meet the frequency tolerance specification over the specified range of operating conditions, i.e. adjustment frequency = nominal frequency + frequency offset

[IEC 60679-1: 2007, 3:2.10]

3.2

Allan variance of fractional frequency fluctuation

unbiased estimate of the preferred definition in the time domain of the short-term stability characteristic of the oscillator output frequency:

$$\sigma_y^2(\tau) \cong \frac{1}{M-1} \sum_{k=1}^{M-1} \frac{(Y_{k+1} - Y_k)^2}{2}$$

where

Y_k are the average fractional frequency fluctuations obtained sequentially, with no systematic dead time between measurements;

τ is the sample time over which measurements is averaged;

M is the number of measurements.

NOTE The confidence of the estimate improves as M increases.

[IEC 60679-1: 2007, 3.2.23, modified]

3.3

amplitude modulation distortion

non-linear distortion in which the relative magnitudes of the spectral components of the modulating signal waveform are modified

NOTE This amplitude modulation distortion is also commonly known as frequency distortion, amplitude distortion and amplitude/frequency distortion.

[IEC 60679-1: 2007, 3.2.28, modified]

**3.4
crystal cut**

orientation of the crystal element with respect to the crystallographic axes of the crystal

NOTE This definition is included as it may be desirable to specify the cut (and hence the general form of the frequency/temperature performance) of a crystal unit used in an oscillator application. The choice of the crystal cut will imply certain attributes of the oscillator which may not otherwise appear in the detail specification.

[IEC 60679-1: 2007, 3.2.3]

**3.5
decay time
fall time**

time interval required for the trailing edge of a waveform to change between two defined levels

NOTE These two defined levels may be the logic levels V_{OH} and V_{OL} being at 90 % and 10 %, respectively, of the maximum amplitude (equaling $V_{HI} - V_{LO}$) of the waveform, or any other ratio as defined in the detail specification (see Figure 1),

where

- V_{OL} is the low level output voltage;
- V_{OH} is the high level output voltage;
- V_{HI} is the upper flat voltage of the pulse waveform;
- V_{LO} is the low flat voltage of the pulse waveform.

[IEC 60679-1: 2007, 3.2.34, modified]

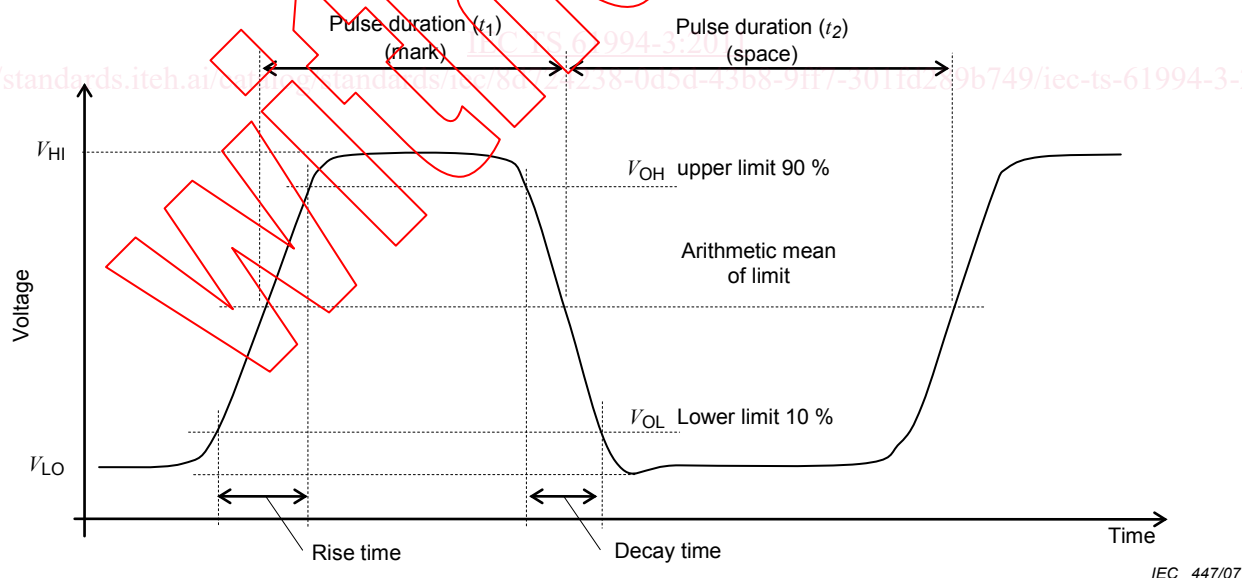


Figure 1 – Characteristics of an output waveform

**3.6
electrostatic discharge
ESD**

transfer of electric charge between bodies having different electrostatic potentials in proximity or through direct contact

[IEC 60050-161:1990, 161-01-22]

3.7

frequency adjustment range

range over which the oscillator frequency may be varied by means of some variable element, for the purpose of:

- a) setting the frequency to a particular value, or
- b) to correct the oscillator frequency to a prescribed value after deviation due to ageing, or other changed conditions

[IEC 60679-1: 2007, 3.2.11]

3.8

frequency/load coefficient

fractional change in output frequency resulting from an incremental change in electrical load impedance, other parameters remaining unchanged

[IEC 60679-1: 2007, 3.2.20]

3.9

frequency offset

frequency difference, positive or negative, which should be added to the specified nominal frequency of the oscillator, when adjusting the oscillator frequency under a particular set of operating conditions in order to minimise its deviation from nominal frequency over the specified range of operating conditions

[IEC 60679-1: 2007, 3.2.9]

NOTE In order to minimize the frequency deviation from nominal over the entire temperature range, a frequency offset may be specified for adjustment at the reference temperature (see Figure 2).

IEC TS 61994-3:2011

<https://standards.iteh.ai/standards/iec/86724238-0d5d-43b8-9ff7-301fd289b749/iec-ts-61994-3-2011>

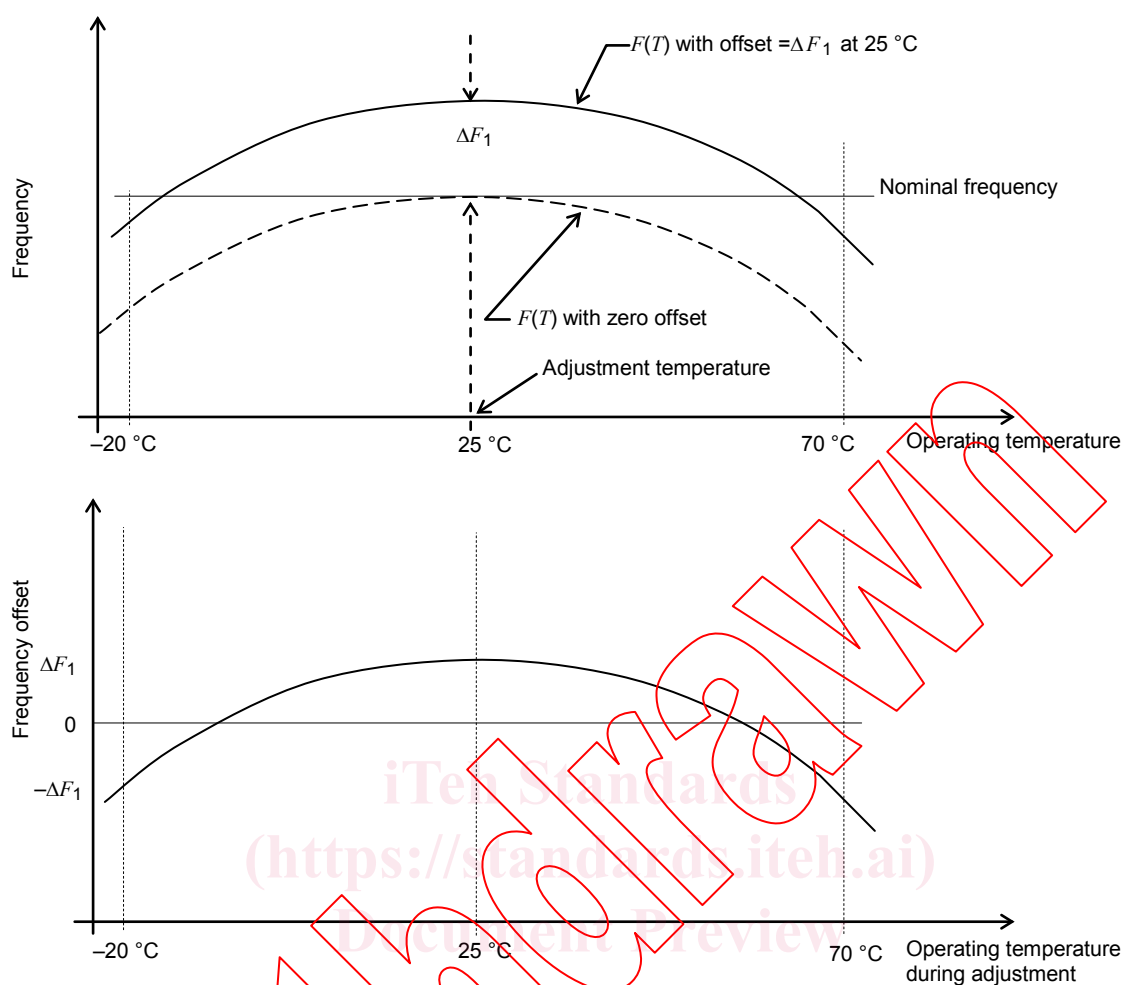


Figure 2 – Example of the use of frequency offset

3.10 frequency tolerance

maximum permissible deviation of the oscillator frequency from a specified nominal value when operating under specified conditions

[IEC 60679-1: 2007, 3.2.8]

NOTE Frequency tolerances are often assigned separately to specified ambient effects, namely electrical, mechanical and environmental. When this approach is used, it is necessary to define the values of other operating parameters as well as the range of the specified variable, that is to say:

- deviation from the frequency at the specified reference temperature due to operation over the specified temperature range, other conditions remaining constant;
- deviation from the frequency at the specified supply voltage due to supply voltage changes over the specified range, other conditions remaining constant;
- deviation from the initial frequency due to ageing, other conditions remaining constant;
- deviation from the frequency with specified load conditions due to changes in load impedance over the specified range, other conditions remaining constant.

In some cases, an overall frequency tolerance may be specified, due to any/all combinations of operating parameters, during a specified lifetime.