Transitions, pulses and related waveforms - Terms, definitions and algorithms (IEC 60469:2013)

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN 60469:2013 sisaldab Euroopa standardi EN 60469:2013 ingliskeelset teksti.	This Estonian standard EVS-EN 60469:2013 consists of the English text of the European standard EN 60469:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 28.06.2013.	Date of Availability of the European standard is 28.06.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 01.040.17, 17.220.20

EUROPEAN STANDARD

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English version

Transitions, pulses and related waveforms - Terms, definitions and algorithms

(IEC 60469:2013)

Transitions, impulsions et formes d'ondes associées - Termes, définitions et algorithmes (CEI 60469:2013)

Übergänge, Impulse und zugehörige Schwingungsabbilder - Begriffe, Definitionen und Algorithmen (IEC 60469:2013)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 85/409/CDV, future edition 1 of IEC 60469, prepared by IEC/TC 85 "Measuring equipment for electrical and electromagnetic quantities" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60469:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-02-28
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-05-28

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Endorsement notice

The text of the International Standard IEC 60469:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

ISO 9000:2005	NOTE	Harmonised as EN ISO 9000:2005 (not modified).
ISO 10012:2003	NOTE	Harmonised as EN ISO 10012:2003 (not modified).

CONTENTS

INTRODUCTION

The purpose of this standard is to facilitate accurate and precise communication concerning parameters of transition, pulse, and related waveforms and to establish the techniques and procedures for measuring them. Because of the broad applicability of electrical pulse technology in the electronics industries (such as computer, telecommunication, and test instrumentation industries), the development of unambiguous definitions for pulse terms and the presentation of methods and/or algorithms for their calculation is important for communication between manufacturers and consumers within the electronics industry. The availability of standard terms, definitions, and methods for their computation helps improve the quality of products and helps the consumer better compare the performance of different products. Improvements to digital waveform recorders (including oscilloscopes) have facilitated the capture, sharing, and processing of waveforms. Frequently these waveform recorders have the ability to process the waveform internally and provide pulse parameters. This process is done automatically and without operator intervention. This standard can be applied in many more scientific and engineering applications than mentioned above, such as optics, cosmology, seismology, medicine, etc., and ranging from single events to highly repetitive signals and from signals with bandwidths less than 1 Hz to those exceeding 1 THz. Consequently, a standard is needed to ensure that the definitions and methods of computation for pulse parameters are consistent.

IEC 60469-1 dealt with terms and definitions for describing waveform parameters and IEC 60469-2 described the waveform measurement process. The purpose of this standard is to combine the contents of IEC 60469-1 and IEC 60469-2, update terminology, correct errors, add algorithms for computing values of pulse parameters, and add a newly-developed method for computing state levels. This standard reflects two major changes compared to IEC 60469-1 and IEC 60469-2, which are the parameter definitions and algorithms. Changes to the definitions included adding new terms and definitions, deleting unused terms and definitions, expanding the list of deprecated terms, and updating and modifying existing definitions. This standard contains definitions for approximately 100 terms commonly used to describe the waveform measurement and analysis process and waveform parameters. Many of the terms in standards IEC 60469-1 and IEC 60469-2 have been deleted entirely or deprecated. Deprecated terms were kept in this standard to provide continuity between this standard and IEC 60469-1 and IEC 60469-2. Terms are deprecated whenever they cannot be defined unambiguously or precisely. Development of a set of agreed-upon terms and definitions presented the greatest difficulty because of the pervasive misuse, misrepresentation, and misunderstanding of terms. Legacy issues for instrumentation manufacturers and terms of common use also had to be addressed. This standard also resulted in the development of algorithms for computing the values of certain waveform parameters in all cases where these algorithms could be useful or instructive to the user of the standard. The purpose of adding these algorithms, which are recommended for use, was to provide industry with a common and communicable reference for these parameters and their computation. Heretofore, this was not available and there existed much debate and misunderstanding between various groups measuring the same parameters. Similarly, this is the reason for including several examples of basic waveforms, with formulae, in Annex A. The algorithms focus on the analysis of two-state, single-transition waveforms. The analysis of compound waveforms (waveforms with two or more states and/or two or more transitions) is accomplished by first decomposing the compound waveform into its constituent two-state single-transition waveforms. A method for performing this decomposition is provided.

Algorithms for the analysis of fluctuation and random jitter of waveforms were also introduced into this standard. These algorithms describe the computation of the mean and standard deviation of jitter and fluctuation. This standard also contains methods to estimate the *accuracy* of the standard deviation and to correct its value.

TRANSITIONS, PULSES AND RELATED WAVEFORMS – TERMS, DEFINITIONS AND ALGORITHMS

1 Scope

This International Standard provides definitions of terms pertaining to transitions, pulses, and related waveforms and provides definitions and descriptions of techniques and procedures for measuring their parameters. The waveforms considered in this standard are those that make a number of transitions and that remain relatively constant in the time intervals between transitions. Signals and their waveforms for which this standard apply include but are not limited to those used in: digital communications, data communications, and computing; studies of transient biological, cosmological, and physical events; and electrical, chemical, and thermal pulses encountered and used in a variety of industrial, commercial, and consumer applications.

This standard does not apply to sinusoidally-varying or other continuously-varying signals and their waveforms.

The object of this standard is to facilitate accurate and precise communication concerning parameters of transitions, pulses, and related waveforms and the techniques and procedures for measuring them.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

None.

3 Terms, definitions and symbols

3.1 General

Along with the recommended terms and their definitions, this clause also contains a number of deprecated but widely used terms. These deprecated terms and the reason for their deprecation are given after the definition of the recommended term.

Throughout this standard, time is taken to be an independent variable, symbolized with the letter *t*. "Waveform value" is used to refer to the dependent variable, symbolized by $y(t)$. For particular waveforms, "waveform value" will be synonymous with terms such as "voltage", "current", "power", or some other quantity. All defined terms are italicized in this document.

3.2 Terms and definitions

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