

Audio and audiovisual equipment — Digital audio parts — Basic measurement methods of audio characteristics —

Part 1: General

The European Standard EN 61606-1:2004 has the status of a British Standard

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National foreword

This British Standard is the official English language version of EN 61606-1:2004. It is identical with IEC 61606-1:2003. BS EN 61606-1:2004 and BS EN 61606-2:2004 supersede BS EN 61606:1997, which is withdrawn.

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**Audio and audiovisual equipment –
Digital audio parts –
Basic measurement methods of audio characteristics
Part 1: General
(IEC 61606-1:2003)**

Equipements audio et audiovisuels -
Parties audionumériques –
Méthodes fondamentales pour la mesure
des caractéristiques audio
Partie 1 : Généralité
(CEI 61606-1:2003)

Digitale Audio- und audiovisuelle Geräte -
Grundlegende Messverfahren
der Audio-Eigenschaften
Teil 1: Allgemeines
(IEC 61606-1:2003)

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CENELEC

European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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Foreword

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- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-12-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61606-1:2003 was approved by CENELEC as a European Standard without any modification.

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AUDIO AND AUDIOVISUAL EQUIPMENT – DIGITAL AUDIO PARTS – BASIC MEASUREMENT METHODS OF AUDIO CHARACTERISTICS –

Part 1: General

1 Scope

This part of IEC 61606 deals with the basic methods of measurement of the audio characteristics of the digital audio part of audio and audiovisual equipment for both consumer and professional use.

The common measuring conditions and methods, described in this standard, are used for the measurement of the performance characteristics of equipment having an audio bandwidth equal to approximately one-half of the sampling frequency of a system, where the audio information is processed in the form of digital data. CD players, DAT recorders, digital amplifiers, digital sound broadcast receivers and television broadcast receivers with digital sound are examples. Methods specified in this standard are not applicable to systems incorporating bit-rate reduced digital audio signals that have data loss.

This standard describes tests for equipment which has digital input with analogue output and analogue input with digital output. Future revisions of this standard will cover digital-in/digital-out and analogue-in/analogue-out tests.

This standard does not apply to power amplifiers.

NOTE 1 A digital audio system having an analogue input and an analogue output with digital signal processing may have different characteristics from those of a pure analogue audio system due to sampling of the audio signal and performance of incorporated A/D and D/A converters. Measurement methods described in IEC 60268-3 may not give correct results when applied to a digital system.

NOTE 2 The methods described are mostly based on sampling frequencies of 32 kHz and higher.

NOTE 3 For tests of those systems of digital-in – digital-out, and analogue-in – analogue-out test, refer to AES 17.

NOTE 4 This standard is planned to provide the industry with a harmonized set of methods of measurements for digital audio equipment as described in the first edition of IEC 61606 (1997), AES 17 and EIAJ CP-2150.

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 60038, *IEC standard voltages*

IEC 60107-5, *Recommended methods of measurement on receivers for television broadcast transmissions – Part 5: Electrical measurements on multichannel sound television receivers using the NICAM two-channel digital sound system*

IEC 60268-2, *Sound system equipment – Part 2: Explanation of general terms and calculation methods*

IEC 60268-3, *Sound system equipment – Part 3: Amplifiers*

IEC 60958 (all parts), *Digital audio interface*

IEC 61079-4, *Methods of measurement on receivers for satellite broadcast transmissions in the 12 GHz band – Part 4: Electrical measurements on sound/data decoder units for the digital sub-carrier NTSC system*

IEC 61079-5, *Methods of measurement on receivers for satellite broadcast transmissions in the 12 GHz band – Part 5: Electrical measurements on decoder units for MAC/packet systems*

IEC 61883-6, *Consumer audio/video equipment – Digital interface – Part 6: Audio and music data transmission protocol*

IEC 61938, *Audio, video and audiovisual systems – Interconnections and matching values – Preferred matching values of analogue signals*

ISO 266, *Acoustics – Preferred frequencies*

ITU-R BS 468-4, *Measurement of audio-frequency noise voltage level in sound broadcasting*

AES 17, *AES standard method for digital audio engineering – Measurement of digital audio equipment*

3 Terms, definitions, explanations and rated values

3.1 Terms and definitions

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

3.1.1

digital audio signal

series of digital signals expressed by sampled data

NOTE This data is constructed with LPCM (Linear Pulse Code Modulation) data.

3.1.2

coding format

series of data bit stream with control information in accordance with the standard for which the EUT is designed, such as IEC 60958, IEC 61883-6 or some kind of AV interface

NOTE A coding word is arranged as a 2's_complimentary binary form in this standard.

3.1.3

digital interface for measurement

type of input or output digital interface which is used for measurement, such as IEC 60958, IEC 61883-6 or some kind of AV interface

NOTE Details are defined in IEC 61606-2 (consumer use) or IEC 61606-3 (professional use)¹

3.1.4

word length

the number of bits of a data element

NOTE The least significant bit of the data element should not be ignored.

3.1.5

sampling frequency

f_s

the number of samples of a signal taken per unit time

3.1.6

full-scale level

FS

signal level of a sine wave whose positive peak value reaches the positive digital full scale, leaving the negative maximum code unused

EXAMPLE The largest positive value is 7FFF_H and the largest negative value is 8001_H in 16 bit data.

3.1.7

signal level

dB_{FS}

the result obtained from the following equation:

$$\text{signal level (dB}_{\text{FS}}) = 20 \log_{10} (A/B)$$

where A is the r.m.s. value of the signal whose level is to be determined, and B is the r.m.s. value of a sine wave which corresponds to full-scale level in digital data or to analogue full-scale level in analogue signals

¹ Under consideration.

3.1.8**analogue full-scale amplitude**

nominal signal level at the analogue input of an EUT corresponding to the digital full-scale level

3.1.9**digital zero**

signal that has a value consisting of all zeros for all samples

3.1.10**normal measuring level**

signal level equal to $-20 \text{ dB}_{\text{FS}}$

3.1.11**normal source impedance**

impedance which is connected to input terminals of EUT. The concrete value is defined in IEC 61606-2 (consumer use) or IEC 61606-3 (professional use). For example, IEC 61938 is applied in IEC 61606-2

3.1.12**normal load impedance**

impedance which is connected to output terminals of EUT. The concrete value is defined in IEC 61606-2 (consumer use) or IEC 61606-3 (professional use). For example, IEC 61938 is applied in IEC 61606-2

3.1.13**folding frequency**

one half the sampling frequency of the digital system

NOTE Signals applied to the input with frequency components higher than this frequency are subject to aliasing.

3.1.14**in-band frequency range**

frequency range from 4 Hz to upper band-edge frequency (see 3.1.15)

3.1.15**upper band-edge frequency**

$f_{\text{S}} \times 0,46$

NOTE If f_{S} is higher than 44,1 kHz, the manufacturer may define the upper band-edge frequency between 20 kHz and $f_{\text{S}} \times 0,46$. In this case, the upper band-edge frequency should be stated in the system description by the manufacturer.

3.1.16

out-of-band frequencies

frequency range from folding frequency to 500 kHz.

NOTE Signals applied to the input in this frequency range are subject to aliasing.

3.1.17

aliasing components

frequency components produced below the folding frequency due to sampling of input signals above the folding frequency

3.1.18

digital signal generator

all types of digital generators, which including digital sine signal generators or package media or RF signal generators

3.1.19

equipment under test

EUT

equipment to be measured using the methods described in this standard

3.1.20

jitter

deviation of the timing of the transitions of a clock signal from their ideal or nominal times

3.2 Explanation of term “jitter”

The performance of conversion processes are potentially affected by jitter present on the synchronization input, the digital audio inputs, or both. For example, if the sampling clock for the analogue-to-digital converter inside the EUT is derived from or locked to either the synchronization input or a digital audio input, jitter present on that input can degrade conversion accuracy.

There are various types of jitter susceptibility to be considered such as analogue-to-digital jitter susceptibility, digital-to-analogue susceptibility, and digital-to-digital susceptibility. See AES 17 for detailed discussion on the subject.