

BS EN 61606-2:2009



BSI Standards Publication

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

Part 2: Consumer use

bsi.

...making excellence a habit.
AVA Documents™
Document Sharing Hub

National foreword

This British Standard is the UK implementation of EN 61606-2:2009. It is identical to IEC 61606-2:2009. It supersedes BS EN 61606-2:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© BSI 2010

ISBN 978 0 580 60899 5

ICS 33.160.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2010

Amendments issued since publication

Amd. No.	Date	Text affected
----------	------	---------------

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61606-2

November 2009

ICS 33.160.01

Supersedes EN 61606-2:2004

English version

**Audio and audiovisual equipment -
Digital audio parts -
Basic measurement methods of audio characteristics -
Part 2: Consumer use
(IEC 61606-2:2009)**

Equipements audio et audiovisuels -
Parties audionumériques -
Méthodes fondamentales
pour la mesure
des caractéristiques audio -
Partie 2: Utilisation par le consommateur
(CEI 61606-2:2009)

Audio- und audiovisuelle Geräte -
Digitale Tonteile -
Grundlegende Messverfahren
der Audio-Eigenschaften -
Teil 2: Allgemeingebrauch
(IEC 61606-2:2009)

This European Standard was approved by CENELEC on 2009-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

© 2009 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Ref. No. EN 61606-2:2009 E

 **Documents**
Document Sharing Hub

Foreword

The text of document 100/1548/FDIS, future edition 2 of IEC 61606-2, prepared by IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61606-2 on 2009-09-01.

This European Standard supersedes EN 61606-2:2004.

The significant technical changes with respect to EN 61606-2:2004 are the following:

- changed the period of preconditioning;
- add A weighting filter in measuring instruments;
- correct the wrong reference number;
- some inappropriate descriptions have been improved.

This Part 2 is to be used in conjunction with EN 61606-1, General.

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement | (dop) | 2010-06-01 |
| – latest date by which the national standards conflicting
with the EN have to be withdrawn | (dow) | 2012-09-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61606-2:2009 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60268-2	– ¹⁾	Sound system equipment - Part 2: Explanation of general terms and calculation methods	HD 483.2 S2	1993 ²⁾
IEC 60958	Series	Digital audio interface	EN 60958	Series
IEC 61606-1	2009	Audio and audiovisual equipment - Digital audio parts - Basic measurement methods of audio characteristics - Part 1: General	EN 61606-1	2009
IEC 61672-1	– ¹⁾	Electroacoustics - Sound level meters - Part 1: Specifications	EN 61672-1	2003 ²⁾
IEC 61883-6	– ¹⁾	Consumer audio/video equipment - Digital interface - Part 6: Audio and music data transmission	EN 61883-6	2005 ²⁾
IEC 61938	– ¹⁾	Audio, video and audiovisual systems - Interconnections and matching values - Preferred matching values of analogue signals	EN 61938 + corr. February	1997 ²⁾ 1997

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

CONTENTS

1	Scope	7
2	Normative references	7
3	Terms, definitions, explanations and rated values	7
3.1	Terms and definitions	7
3.2	Explanation of terms “jitter”	8
3.3	Digital interface for measurement	8
3.4	Rated values	8
4	Measuring conditions	8
4.1	General	8
4.2	Environmental conditions	8
4.3	Power supply	8
4.4	Test signal frequencies	8
4.5	Standard setting	8
4.6	Preconditioning	9
4.7	Measuring instruments	9
4.7.1	General	9
4.7.2	Digital level meter	9
4.7.3	Distortion meter	9
4.7.4	Analogue weighting filter	10
4.7.5	Digital weighting filter	10
4.7.6	Digital spectrum analyzer	10
5	Methods of measurement (digital-in/analogue-out)	10
5.1	General	10
5.2	Input/output characteristics	10
5.2.1	Maximum output amplitude	10
5.2.2	Gain difference between channels	11
5.3	Frequency characteristics	11
5.3.1	Frequency response	11
5.3.2	Group delay (phase linearity)	12
5.4	Noise characteristics	13
5.4.1	Signal-to-noise ratio	13
5.4.2	Dynamic range	13
5.4.3	Out-of-band noise ratio	14
5.4.4	Channel separation	15
5.5	Distortion characteristics	16
5.5.1	Level non-linearity	16
5.5.2	Distortion and noise	17
5.5.3	Intermodulation	17
6	Methods of measurement (analogue-in/digital-out)	18
6.1	General	18
6.2	Input/output characteristics	18
6.2.1	Analogue to digital level calibration	18
6.2.2	Maximum allowable input amplitude	20
6.2.3	Gain difference between channel and tracking error	21
6.3	Frequency characteristics	23

6.3.1	Frequency response	23
6.3.2	Group delay.....	24
6.4	Noise characteristics	25
6.4.1	Signal-to-noise ratio (idle channel noise).....	25
6.4.2	Dynamic range	27
6.4.3	Folded noise.....	28
6.4.4	Cross-talk.....	29
6.4.5	Channel separation	31
6.5	Distortion characteristics	33
6.5.1	Level non-linearity	33
6.5.2	Distortion and noise.....	34
6.5.3	Intermodulation.....	35
Figure 1 – Connection diagram of equipment		11
Figure 2 – Connection diagram of equipment		11
Figure 3 – Connection diagram of equipment		12
Figure 4 – Connection diagram of equipment		13
Figure 5 – Connection diagram of equipment		14
Figure 6 – Connection diagram of equipment		14
Figure 7 – Connection diagram of equipment		15
Figure 8 – Connection diagram of equipment		16
Figure 9 – Connection diagram of equipment		17
Figure 10 – Connection diagram of equipment		17
Figure 11 – Connection diagram of equipment		18
Figure 12 – Connection diagram of equipment		19
Figure 13 – Connection diagram of equipment		20
Figure 14 – Connection diagram of equipment		20
Figure 15 – Connection diagram of equipment		21
Figure 16 – Connection diagram of equipment		22
Figure 17 – Connection diagram of equipment		23
Figure 18 – Connection diagram of equipment		23
Figure 19 – Connection diagram of equipment		24
Figure 20 – Connection diagram of equipment		24
Figure 21 – Connection diagram of equipment		25
Figure 22 – Connection diagram of equipment		26
Figure 23 – Connection diagram of equipment		27
Figure 24 – Connection diagram of equipment		27
Figure 25 – Connection diagram of equipment		28
Figure 26 – Connection diagram of equipment		28
Figure 27 – Connection diagram of equipment		30
Figure 28 – Connection diagram of equipment		30
Figure 29 – Connection diagram of equipment		31
Figure 30 – Connection diagram of equipment		32
Figure 31 – Connection diagram of equipment		33
Figure 32 – Connection diagram of equipment		33

Figure 33 – Connection diagram of equipment	34
Figure 34 – Connection diagram of equipment	34
Figure 35 – Connection diagram of equipment	35
Figure 36 – Connection diagram of equipment	36
Table 1 – Levels for measurement	16
Table 2 – Interfering frequency	29

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

Part 2: Consumer use

1 Scope

This part of IEC 61606 is applicable to the basic measurement methods of the audio characteristics of the digital audio part of audio and audiovisual equipment for consumer use.

The common measuring conditions and methods are described in IEC 61606-1. This International Standard specifies conditions and methods of measurement for consumer equipment are given in this standard.

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

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

IEC 61606-1:2009, *Audio and audiovisual equipment – Digital audio parts – Basic measurement methods of audio characteristics – Part 1: General*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

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*

3 Terms, definitions, explanations and rated values

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61606-1 as well as the following apply.

3.1.1

analogue full-scale amplitude

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

NOTE In order to accommodate the EUT in an audio system, it is recommended that the analogue full scale amplitude has the value defined in IEC 61938. In the case of general purpose audio for consumer equipment, the amplitude is 2 V r.m.s.

3.1.2**normal load impedance**

value defined in IEC 61938, or in the case of general purpose audio for consumer equipment, 22 k Ω

3.1.3**normal measuring level**

analogue signal level equal to –20 dB of analogue full-scale amplitude

3.1.4**normal source impedance**

value defined in IEC 61938, or in the case of general purpose audio for consumer equipment, 2,2 k Ω

3.2 Explanation of terms “jitter”

See 3.2 of IEC 61606-1.

3.3 Digital interface for measurement

This standard can be applied to IEC 60958 or IEC 61883-6.

Other interfaces having the same specification as in 3.1 of IEC 61606-1 may also be used.

3.4 Rated values

For a full explanation of these terms, see IEC 60268-2. The following are rated conditions for digital audio equipment which should be specified by the manufacturer:

- rated supply voltage;
- rated supply frequency;
- rated pre-emphasis and de-emphasis characteristics;
- rated digital input word length;
- rated sampling frequencies.

4 Measuring conditions**4.1 General**

The measuring conditions applied in this part are the same as those given in IEC 61606-1, together with those given below.

4.2 Environmental conditions

As specified in 4.1 of IEC 61606-1.

4.3 Power supply

As specified in 4.2 of IEC 61606-1.

4.4 Test signal frequencies

As specified in 4.3 of IEC 61606-1.

4.5 Standard setting

As specified in 4.4 of IEC 61606-1.

4.6 Preconditioning

As specified in 4.5 of IEC 61606-1.

4.7 Measuring instruments

4.7.1 General

All specifications given in IEC 61606-1 are applicable, together with those given below.

4.7.2 Digital level meter

The r.m.s. signal level, V_{total} is calculated from the digital data within the in-band frequency range.

One method of calculation is as follows:

When the frequency components are calculated by the FFT method, the signal level is calculated as follows. All of the frequency components which are within the in-band frequency range are calculated using the following equation:

$$V_{\text{total}} = (V_{f1}^2 + V_{f2}^2 + V_{f3}^2 + \dots + V_{fn}^2)^{1/2}$$

The signal level S in dB_{FS} is calculated from the following equation:

$$S \text{ dB}_{\text{FS}} = 20 \log_{10} (V_{\text{total}} / V_{\text{full}})$$

where V_{full} is the r.m.s. value of the full-scale amplitude of a 1 kHz signal.

The number of data points for the FFT calculation is greater than the value of f_s . The window used for the measurement shall be the minimum window having the following parameters:

$$W(t) = 1/L [a_0 + a_1 \cos(2\pi t/L) + a_2 \cos(4\pi t/L) + a_3 \cos(6\pi t/L)]$$

where

L is the number of data points,

$$a_0 = 0,363\,491\,2,$$

$$a_1 = 0,489\,268\,2,$$

$$a_2 = 0,136\,508\,8,$$

$$a_3 = 0,010\,731\,8,$$

and $t \leq L/2$.

NOTE If the signal level is calculated directly using digital data, it should be filtered to the in-band frequency range before the calculation.

4.7.3 Distortion meter

Calculate the ratio of the total signal output to the noise and distortion component.

NOTE One measurement method is as follows.

The r.m.s. signal level, V_{total} is calculated from the resultant in-band frequency components of the fast Fourier Transformation (FFT) of the processed input signal:

$$V_{\text{total}} = (V_{f1}^2 + V_{f2}^2 + V_{f3}^2 + \dots V_{fn}^2)^{1/2}$$

V_N , is obtained by the FFT for frequency ranges from 4 Hz to f_L , which is 1/1,5 of the measuring frequency and f_H which is 1,5 times the measuring frequency to the upper limit frequency f_{MAX} , V_N is derived from the following equation:

$$V_N = ((V_{f1}^2 + V_{f2}^2 + V_{f3}^2 + \dots V_{fL}^2) + (V_{fH}^2 + V_{fH+1}^2 + V_{f\text{MAX}}^2))^{1/2}$$

The total distortion D is obtained from the equation:

$$D = V_N / V_{\text{total}} \times 100 \quad \%$$

The conditions for the measurement are the same as those for the digital level meter.

4.7.4 Analogue weighting filter

The weighing filter used shall have A-weighting characteristics with tolerances ± 1 dB as specified for sound level measurements in IEC 61672-1.

4.7.5 Digital weighting filter

The characteristics of weighing filter shall comply with A-weighting characteristics with tolerances ± 1 dB as specified for sound level measurements in IEC 61672-1.

4.7.6 Digital spectrum analyzer

A digital spectrum analyzer computes the Fast Fourier transform (FFT) of the input digital signal.

5 Methods of measurement (digital-in/analogue-out)

5.1 General

The methods of measurement described in the following sub-clauses apply to the equipment where the input signal is a digital audio signal and the output signal is an analogue signal. All the specifications described in IEC 61606-1 which correspond to this standard are applied to these subclauses.

These subclauses specify the details of measurement methods for consumer use equipment.

If the EUT provides two or more channels, all channels should be measured in the same way. The word length and sampling frequency shall be stated in the expression of the results of the measurement.

5.2 Input/output characteristics

5.2.1 Maximum output amplitude

5.2.1.1 Input signal

Frequency: 997 Hz

Signal level: full-scale level.