

INTERNATIONAL STANDARD

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61606-2

First edition
2003-10

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

**Part 2:
Consumer use**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2: Consumer use

FOREWORD

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International Standard IEC 61606-2 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

IEC 61606-1 and this standard cancel and replace IEC 61606 (1997). This first edition of IEC 61606-2 constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
100/695/FDIS	100/716/RVD

Full information on the voting for the approval of this standard 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 61606 consists of the following parts under the general title *Audio and audiovisual equipment – Digital audio parts – Basic measurement methods of audio characteristics*:

Part 1: General

Part 2: Consumer use

Part 3: Professional use¹

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual edition may be issued at a later date.

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¹ Under consideration.

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

Part 2: Consumer use

1 Scope

This part of IEC 61606 deals with 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. Specific 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 61606-1, *Audio and audiovisual equipment – Digital audio parts – Basic measurement methods of audio characteristics – Part 1: General*

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

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

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 Definitions

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

3.1.1

analogue full-scale amplitude

the 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 measuring level

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

3.1.3

normal source impedance

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

3.1.4

normal load impedance

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

3.2 Explanation of terms

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

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

4.1 Environmental conditions

As in IEC 61606-1.

4.2 Power supply

As in IEC 61606-1.

4.3 Test signal frequencies

As in IEC 61606-1.

4.4 Standard setting

As in IEC 61606-1.

4.5 Preconditioning

As in IEC 61606-1.

4.6 Measuring instruments

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

4.6.1 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 fs . 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

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

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

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

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

$t \leq L/2$

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

4.6.2 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:

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

The total distortion D is obtained from the equation:

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

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

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

The methods of measurement described in the following subclauses 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.

5.1 Input/output characteristics

5.1.1 Maximum output amplitude

5.1.1.1 Input signal

Frequency: 997 Hz

Signal level: full-scale level

5.1.1.2 Procedures

Set the EUT to the standard setting specified in 4.4.

Apply the input signal to the EUT.

Adjust the level control and measure the maximum output voltage which does not show clipping and has total distortion of less than 1 %.

5.1.2 Gain difference between channels

5.1.2.1 Method of measurement

Connect the EUT and measured equipment as in Figure 1.

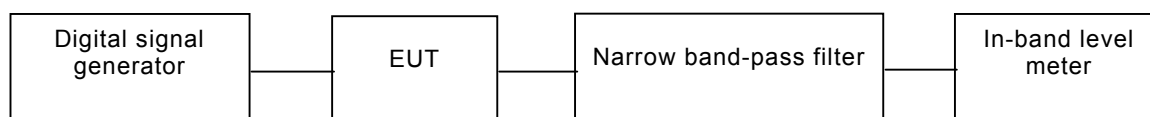


Figure 1 – Connection diagram of equipments

IEC 2407/03

5.1.2.1.1 Input signal

Frequency: 997 Hz.

Signal level: normal measuring level (-20 dB_{FS}).