INTERNATIONAL STANDARD

IEC 62389

First edition
2005-10

Methods of measurement for DVD players

Reference number
IEC 62389:2005(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

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Commission Electrotechnique Internationale
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Международная Электротехническая Комиссия

PRICE CODE M

For price, see current catalogue

INTERNATIONAL ELECTROTECHNICAL COMMISSION

METHODS OF MEASUREMENT FOR DVD PLAYERS

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

CDV	Report on voting
100/903/CDV	100/983/RVC

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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

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- withdrawn;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

A bilingual version of this publication may be issued at a later date.

METHODS OF MEASUREMENT FOR DVD PLAYERS

1 Scope

This International Standard specifies measurement methods of electrical characteristics for consumer-use DVD players. This standard is applicable for use in the description of performances for catalogues and brochures of the products.

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

IEC 61672-2, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

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

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

ITU-R BT.471-1, *Nomenclature and description of colour bar signals*

SMPTE EG 1,1990, *Alignment colour bar test signal for television picture monitors*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61606-1 and IEC 61606-2, as well as the following, apply.

3.1
video signal
composite video signal including synchronization signal

3.2
S video signal
video signal separately transferred by Y signal and C signal

NOTE The Y signal is composed of the luminance signal and the synchronization signal from the composite video signal and does not include the chrominance signal. The C signal is the modulated chrominance signal.

3.3
component signal
set of three kinds of signals, Y signal and two chrominance signals

3.4
V or H synchronized sweep signal
video test signals that frequency is swept within a certain frequency range by vertical or horizontal synchronization timing.

3.5
525i
expression of the video signal format which has 525 scanning lines in a frame and is interlaced

3.6
video signal level
voltage value of the video signal measured from sync tip to white peak

3.7
EUT
equipment under test

3.8
horizontal resolution
visible limit of horizontal resolution calculated by the horizontal frequency characteristics of the luminance signal and expressed by the number of TV lines

3.9
video signal-to-noise ratio
ratio of noise r.m.s. value to reference level of 100 %, 0,714 V r.m.s. in NTSC, 0,7 V r.m.s. in PAL, at the flat area of the luminance signal

3.10
video signal output level
peak-to-peak value of the reference video output signal at reference load impedance

3.11
audio output signal level
output voltage of playback reference signal

4 Measuring conditions

4.1 Conditions for both audio and video

4.1.1 Power supplies

4.1.1.1 Voltage

The a.c. power voltage supplied shall be the fixed value of the region where the device under test (DUT) is used and the supplied d.c. power voltage shall be the fixed value specified by the manufacturer. The tolerance shall be within ±1 % in both cases; the power-supply voltage can be within ±5 % if this tolerance does not affect the results of measurement.

4.1.1.2 Frequency

The frequency of the a.c. power supply shall be 50 Hz or 60 Hz and the fluctuation shall be within ±2 %.

4.1.1.3 Waveform distortion

4.1.1.3.1 AC power supply

The waveform of the a.c. power supply shall be a sine wave of which the harmonic content is 2 % or less.

4.1.1.3.2 DC power supply

The ripple voltage shall be 0,1 % or less.

4.1.2 Environmental conditions

4.1.2.1 Environmental air condition

The environmental conditions for measurements shall be as follows.

Ambient temperature: from 15 °C to 35 °C

Relative humidity: 60 % ± 15 %

Air pressure: 96 kPa ± 10 kPa

4.1.2.2 Warm-up

The DUT shall have the power on 5 min before starting the test. This is negligible if the warm-up does not affect the results of the measurement.

4.2 Standard video settings

Video settings, such as picture sharpness control, shall be set at the position specified by the manufacturer, normally the centre position if there is no special indication, and the functions which affect the results of measurement, for example, the video enhancer, shall be switched off.

4.3 Standard audio settings

The test configuration for the audio measurement shall refer to the general configuration for the equipment under test (EUT) specified by IEC 61606-1.

5 Measuring instruments

5.1 Test disc

The test disc specified in Annex A shall be used for measurements.

5.2 Video part

The measuring instruments specified by Table 1 shall be used. The test disc specified in Annex A shall be used for measurements.

Table 1 – Measuring instruments

No.	Measuring instrument	Specification
1	Oscilloscope	Frequency bandwidth: d.c. to over 60 MHz Vertical sensitivity: below 10 mV/div Vertical scale accuracy: within ±5 % Input impedance: over 1 MΩ
2	Video noise meter	Frequency bandwidth: 100 kHz to over 6 MHz Frequency band width settings HPF: 100 kHz LPF: 6 MHz SC (subcarrier) trap: ON/OFF Weight: ON/OFF Indication: 0 dB = 0,714 V r.m.s. (NTSC) / 0,700 V r.m.s. (PAL) with RMS voltmeter
3	Display monitor	The internal 75 Ω terminator shall be OFF
4	Terminator	75 Ω ± 1 %

5.3 Audio part

5.3.1 Weighing filter

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

5.3.2 Other instruments

Other instruments, such as analogue in-band level meter or low-pass filter or analogue distortion meter, are defined in IEC 61601-1.

6 Methods of measurement

6.1 Video part

6.1.1 Horizontal resolution

6.1.1.1 Block diagram

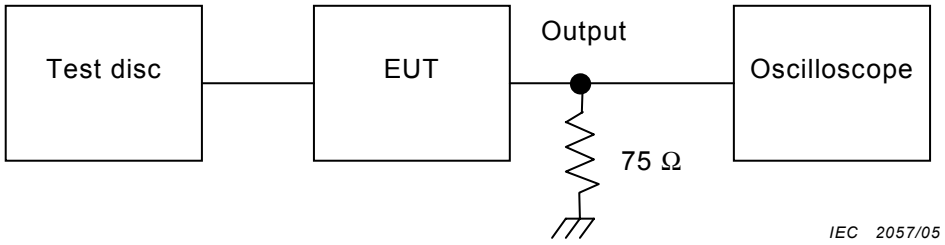


Figure 1 – Block diagram for horizontal resolution measurement

6.1.1.2 Test signal

The V or H synchronized sweep signal, amplitude of 100 % and frequency range of 100 kHz to 6,75 MHz with frequency markers.

6.1.1.3 Measurement

a) Set the EUT to the standard settings for the video part described in 4.2.

b) Play back the V or H sweep signal of the test disc and read the frequency at which the signal level becomes 1/10 (-20 dB) of the level of 1 MHz by oscilloscope with one decimal unit of MHz. Calculate the horizontal resolution, R_h, by the following formula.

$$R_h = (3/4) \times 2 \times (1 - \alpha) \times (f_0 \times 10^6 / f_H) \approx 80 \times f_0 \text{ (TV lines)}$$

where

f_H is the horizontal line frequency (in Hz);

α is the blanking duration rate of the horizontal line (0,17);

f_0 is the frequency which signal level is becoming to 1/10 (-20 dB) of the level of 1 MHz (in MHz).

NOTE 1 In the case where the level of 6,75 MHz, the end-point of the sweep signal, is greater than 1/10 (-20 dB) of the level of 1 MHz, the horizontal resolution is reported to 540 TV lines.

NOTE 2 In the case where the envelope of the sweep signal appears double, the lower level should be read as the measuring value. In the case where the envelope has a ripple, the dip-point level is read as the measuring value.

6.1.2 Video signal-to-noise ratio

6.1.2.1 Block diagram

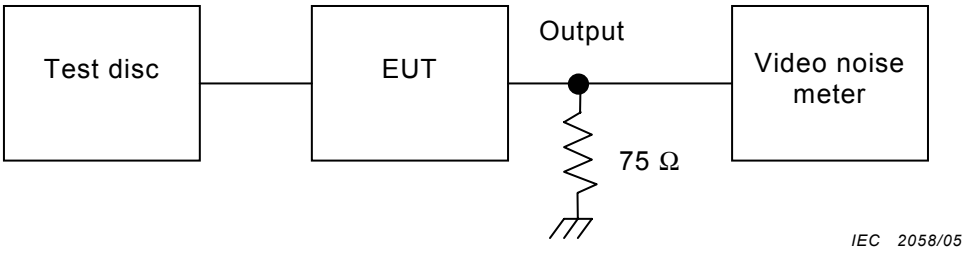


Figure 2 – Block diagram for video signal-to-noise ratio

6.1.2.2 Test signal

50 % white signal.

6.1.2.3 Measurement

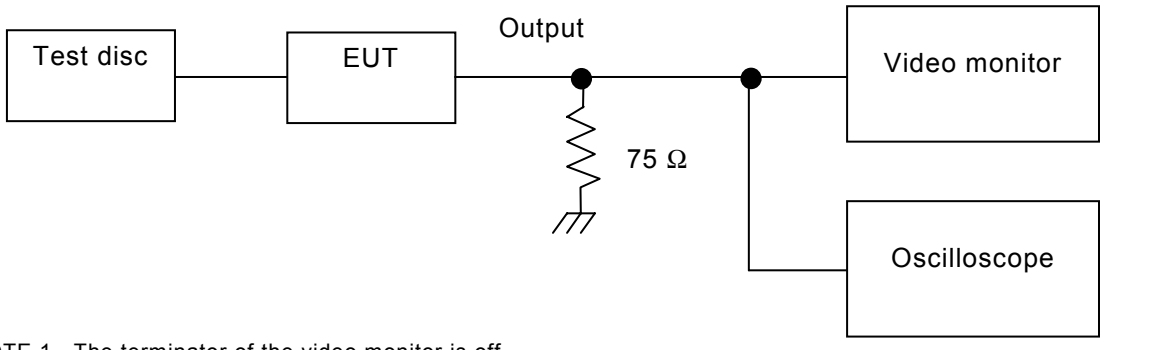
a) Set the EUT to the standard settings for the video part described in 4.2.
b) Play back the 50 % white signal of the test disc.
c) Set the video noise meter as follows.
d) Adjust the input level of the video noise meter to 0,357 V in NTSC, 0,35 V in PAL.
e) Read the value of the noise meter.

Table 2 – Settings of the video noise meter

Setting items	Video output	S video terminal, component, D-connector
HPF	100 kHz	100 kHz
LPF	6 MHz	6 MHz
SC Trap	On	Off
Weight	Off	Off

6.1.3 Video signal output level

6.1.3.1 Block diagram



NOTE 1 The terminator of the video monitor is off.

NOTE 2 The video monitor can be omitted if there is no doubt.

Figure 3 – Block diagram for video signal output level measurement

6.1.3.2 Test signal

NTSC SMPTE colour bar signal or 100 % full colour bar signal (ITU-R BT.471(100/0/100/0) colour bar).

6.1.3.3 Measurement

a) Set the EUT to the standard settings for the video part described in 4.2.

b) Play back the colour bar signal of the test disc and measure the peak-to-peak value of the video output signal by oscilloscope.

NOTE 1 In the case of the C signal of the S video output, the burst signal level is measured.

NOTE 2 The value between the centre of bright points of the waveform is measured.

NOTE 3 In the case where the signal waveform has ripples, the flattest portion is measured. In the case where the synchronization pulse signal is slanted, the lower level is used as the sync level.

6.2 Audio part

6.2.1 General

The following characteristics are defined. The methods of basic measurement are specified by IEC 61606; others are specified by this standard.

6.2.2 Audio-frequency characteristics

6.2.2.1 Methods of measurement

Apply IEC 61606-2, 5.2.1.

6.2.2.2 Test signal

Apply IEC 61606-1, Table 1, for the frequencies 48 kHz, 96 kHz and 192 kHz.

6.2.3 Audio distortion and noise

Apply IEC 61606-2, 5.4.2.

6.2.4 Audio dynamic range

Apply IEC 61606-2, 5.3.2.

6.2.5 Audio signal-to-noise ratio

Apply IEC 61606-2, 5.3.1.

6.2.6 Audio output signal level

6.2.6.1 Block diagram

IEC 2060/05

Figure 4 – Block diagram for audio output level measurement

6.2.6.2 Test signal

The frequency is 1 kHz; the signal level is full-scale.

6.2.6.3 Measurement

a) Set the EUT to the standard settings for the audio part described in 4.3.

b) Play back the reference full-scale signal of the test disc.

c) Set the analogue in-band level meter.

d) Read the value of the analogue in-band level meter.

Annex A
(normative)

Test disc specification

A.1 Introduction

This annex gives the specification of the test disc used for DVD player measurement.

A.2 Measuring items and test signal criteria

A.2.1 Horizontal resolution

V or H synchronized sweep signal, amplitude of 100 % and frequency range of 100 kHz to 6,75 MHz with frequency markers. Highest frequency 6,75 MHz is the theoretical limit frequency of sampling frequency 13,5 MHz.

A.2.2 Video signal-to-noise ratio

50 % white signal.

A.2.3 Video output signal level

NTSC SMPTE colour bar signal or 100 % full colour bar signal (ITU-R BT.471(100/0/100/0) colour bar)

A.2.4 Audio test signal

Test signals should satisfy the definitions specified by IEC 61606-1, 3.1.

A.2.5 Audio-frequency characteristics

Frequency points should be about 10 points including lowest and highest frequencies of in-band frequencies of sampling frequencies 48 kHz, 96 kHz and 192 kHz.

In-band frequencies of DVD-video are 4 Hz to 22 kHz of sampling frequency 48 kHz and 4 Hz to 44 kHz of sampling frequency 96 kHz. In-band frequencies of DVD-audio should be 4 Hz to 22 kHz of sampling frequency 48 kHz, 4 Hz to 44 kHz of sampling frequency 96 kHz, and 4 Hz to 88 kHz of sampling frequency 192 kHz. The lowest frequency may be less than 4 Hz, for example, 2 Hz.

A.2.6 Audio total distortion

The test signal should be frequency 997 Hz (1 kHz) full-scale signal and other frequency test signals can be applied.

A.2.7 Audio dynamic range

The test signal should be frequency 997 Hz (1 kHz), signal level –60 dB_{FS}.

A.2.8 Audio signal-to-noise ratio

The test signal should be frequency 997 Hz (1 kHz) full-scale signal and digital zero signal.

A.2.9 Audio output signal level

The test signal should be frequency 997 Hz (1 kHz) full-scale signal, and other frequency test signals can be applied.

A.3 Audio frequency corresponding to sampling frequency

IEC 61606-1, Figure 1, defines the actual audio frequencies for sampling frequencies 48 kHz, 96 kHz and 192 kHz.

A.4 Indication

The test disc applied in this standard should indicate the following.

a) Type
b) Applied specification IEC 62389
c) Title No., chapter No. and contents of test signal for DVD-video disc
d) Group No., track No. and contents of test disc for DVD-audio disc
e) Time (test signal time should be indicated)
f) Manufacturer name or code.
g) Other required items
    1) Frequency (actual)
    2) Level (actual)

Bibliography

IEC 61041-5, *Non-broadcast video tape recorders – Methods of measurement – Part 5: High-band video tape recorders, including those equipped with Y/C video connectors (NTSC/PAL)*

EIAJ CP-4120, *Interface between digital tuner and television receiver using D-connector*

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ISBN 2-8318-8256-7

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Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND