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**Audio, video, and related equipment – Determination of power consumption –
Part 2: Signals and media**

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**Appareils audio, vidéo et matériel connexe – Détermination de la consommation
de puissance –**
Partie 2: Signaux et supports

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Part 2: Signals and media** (standards.iteh.ai)

**Appareils audio, vidéo et matériel connexe – Détermination de la consommation
de puissance – Partie 2: Signaux et supports**

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**AUDIO, VIDEO, AND RELATED EQUIPMENT –
DETERMINATION OF POWER CONSUMPTION –****Part 2: Signals and media**

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International Standard IEC 62087-2 has been prepared by technical area 12: AV energy efficiency and smart grid applications, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This first edition of IEC 62087-2 together with IEC 62087-1 and IEC 62087-3 to IEC 62087-6 cancels and replaces IEC 62087:2011 in its entirety. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to Clause 11 of IEC 62087:2011.

- The signals included on the discs are now numbered generically, rather than being based on the subclause numbers within the text of the television test method.
- Video test patterns used to determine the peak luminance ratio are now included on the discs.
- Audio test signals are specified.

- The box and outline video signal has been added.

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

FDIS	Report on voting
100/2467/FDIS	100/2497/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.

A list of all parts in the IEC 62087 series, published under the general title *Audio, video, and related equipment – Determination of power consumption*, can be found on the IEC website.

This publication contains attached files in the form of DVDs and Blu-ray discs, as indicated in the list of normative references. These files form an integral part of this standard.

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 stability date indicated on the IEC website 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.

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INTRODUCTION

This standard identifies signals and media to be used to determine power consumption and related characteristics specified in some other parts of IEC 62087:2015. The media include Blu-ray Discs™ and DVDs.

IEC 62087:2008¹ (second edition) added methods for measuring On (average) mode power consumption of televisions, based on three video signal sets. These include static, dynamic broadcast-content, and Internet-content signals.

IEC 62087:2011² (third edition) revised methods for measuring power consumption of set top boxes. The signals and media were not changed in this third edition.

This edition of IEC 62087 separates the standard into parts, including this signals and media part which specifies signals that are to be used for determining power consumption and related characteristics. The three original video signal sets (static, dynamic broadcast-content, and Internet-content) are not changed. This edition adds signals for the purpose of determining the peak luminance ratio that is sometimes associated with television power consumption measurement programs.

IEC 62087 has been subdivided and currently consists of the following planned or published parts:

- Part 1: General
 - Part 2: Signals and media
 - Part 3: Television sets
 - Part 4: Video recording equipment
 - Part 5: Set top boxes
 - Part 6: Audio equipment
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¹ IEC 62087:2008, *Methods of measurement for the power consumption of audio, video and related equipment*

² IEC 62087:2011, *Methods of measurement for the power consumption of audio, video and related equipment*

AUDIO, VIDEO, AND RELATED EQUIPMENT – DETERMINATION OF POWER CONSUMPTION –

Part 2: Signals and media

1 Scope

This part of IEC 62087 specifies signals and media used in determination of the power consumption of audio, video, and related equipment, such as television sets and computer monitors. It also specifies signals for determining the peak luminance ratio that is sometimes associated with television power consumption measurement programs. In addition, this part specifies equipment, interfaces, and accuracy related to signal generation.

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.

IEC 60107-1:1997, *Methods of measurement on receivers for television broadcast transmissions – Part 1: General conditions* (Measurements at radio and video frequencies)

IEC 60268-1:1985, *Sound system equipment – Part 1: General*

IEC 60268-1:1985/AMD1:1988-01

IEC 60268-1:1985/AMD2:1988-06

IEC 60958-1:2008, *Digital audio interface – Part 1: General*

IEC 60958-1:2008/AMD1:2014

IEC 60958-3:2006, *Digital audio interface – Part 3: Consumer applications*

IEC 60958-3:2006/AMD1:2009

IEC 61938:2013, *Multimedia systems – Guide to the recommended characteristics of analogue interfaces to achieve interoperability*

IEC 62087-1:2015, *Audio, video, and related equipment – Determination of power consumption – Part 1: General*

IEC 62087:2015, video_content_DVD_50, *Video content for the IEC 62087:2015 series on DVD, 50 Hz vertical scan frequency*

IEC 62087:2015, video_content_DVD_60, *Video content for the IEC 62087:2015 series on DVD, 60 Hz vertical scan frequency*

IEC 62087:2015, video_content_BD_50, *Video content for the IEC 62087:2015 series on Blu-ray™ Disc, 50 Hz vertical scan frequency*

IEC 62087:2015, video_content_BD_60, *Video content for the IEC 62087:2015 series on Blu-ray™ Disc, 60 Hz vertical scan frequency*

IEC 62216:2009, *Digital terrestrial television receivers for the DVB-T system*

3 Terms, definitions, and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms, abbreviations, and definitions in IEC 62087-1:2015, as well as the following apply.

3.1.1

average picture level

APL

average luminance level of an internal video signal after the inverse gamma correction within display equipment, such as a television set or computer monitor

3.1.2

backlit display

display that generates light from a source behind the display panel, for instance a liquid-crystal display (LCD)

3.1.3

component analogue video

baseband analogue video interface that carries a standard or high definition colour video signal over three signal lines

Note 1 to entry: See CEA-770.3-E.

3.1.4

composite analogue video

baseband analogue video interface that carries a standard definition colour video signal over a single signal line

Note 1 to entry: See SMPTE ST 170M:2004 for the 59,94 Hz version, and ITU-R BT.470-5 for the 50 Hz version.

3.1.5

digital visual interface

DVI

video interface that is capable of carrying analogue or digital uncompressed video

3.1.6

DisplayPort

digital display interface developed by the Video Electronics Standards Association

3.1.7

emissive display

display that generates light directly from each sub-pixel, for instance a PDP or OLED display

3.1.8

gamma-corrected average picture level

APL'

average luma (Y') level of an external video input signal that may be applied to display equipment, such as a television set or computer monitor

Note 1 to entry: APL' is determined during the active scanning time integrated over a frame period, defined as a percentage of the range between reference black and reference white level.

Note 2 to entry: This is not a measure of the inverse gamma-corrected signal that might be available inside of some display equipment and delivered to the display device. The external and internal video signals are shown in Figure 1.

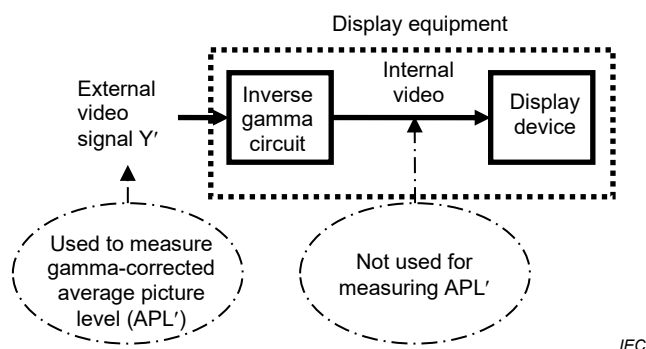


Figure 1 – Gamma-corrected average picture level (APL')

3.1.9

high definition multimedia interface

HDMI®³

audio-visual interface that is capable of carrying uncompressed video data, compressed or uncompressed digital audio data, and other information

Note 1 to entry: See HDMI specification.

3.1.10

luma

Y'

gamma-corrected video signal that represents brightness

3.1.11

S-video

baseband analogue video interface that carries a standard definition colour video signal using two signal lines

Note 1 to entry: See IEC 60933-5.

3.2 Abbreviations

'	Prime
AM	Amplitude Modulation
APL	Average Picture Level
APL'	Gamma-Corrected Average Picture Level
AV	Audio-visual
BD	Blu-ray Disc™ ⁴
BER	Bit Error Ratio
DAB	Digital Audio Broadcast
dB	decibel
DVD	Digital Versatile Disc
EPA	Environmental Protection Agency
FM	Frequency Modulation
Hz	Hertz

³ HDMI® is a registered trade mark of HDMI Licensing, LLC. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named.

⁴ Blu-ray Disc™ is a trade mark of the Blu-ray Disc Association. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named.

HDMI®	High Definition Multimedia Interface
JEITA	Japan Electronics and Information Technology industries Association
LCD	Liquid Crystal Display
NTSC	National Television Standards Committee
OLED	Organic Light-Emitting Diode
OOI	Acoustic Onset Of Impairment
PAL	Phase Alternating Line
PDP	Plasma Display Panel
RF	Radio Frequency
rms	root mean square
SECAM	Séquentiel Couleur à Mémoire
SMPTE	Society of Motion Picture and Television Engineers
US	United States of America

4 Signals

4.1 Audio-visual signals used for the determination of power consumption

4.1.1 Overview

A general description of the video signals is provided in Annex A.

4.1.2 Static video signals

4.1.2.1 General

[IEC 62087-2:2015](https://standards.iteh.ai/catalog/standards/sist/d8d3aa5c-8a18-4101-b47e-70c0a851b087/iec-62087-2-2015)

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The media include four static video signals: black, white, full field colour bar, and three bar video signals. Additional information is available in Clause A.2.

4.1.2.2 Black level video signal

In this case the entire part of the signal representing the active picture shall be black (0 %), as defined in IEC 60107-1:1997, 3.2.1.5.

4.1.2.3 White level video signal

In this case the entire part of the signal representing the active picture shall be white (100 %), as defined in IEC 60107-1:1997, 3.2.1.5.

4.1.2.4 Full field colour bar video signal

In this case the active part of the signal shall be a full field colour bar signal. For 50 Hz systems, the (100/0/75/0) colour bar signal for PAL and SECAM receivers as defined in IEC 60107-1:1997, 3.2.1.2 shall be used. In the case of a 60 Hz system the top section of the (75/0/75/0) colour bar signal for NTSC defined in IEC 60107-1:1997, 3.2.1.2 shall be used and shall cover the full field of the display.

NOTE The 50 Hz signal has eight bars (including black), and the 60 Hz signal has seven bars (white, yellow, cyan, green, magenta, red and blue, in this order).

4.1.2.5 Three bar video signal

In this case the active picture area of the signal shall be three bars of white (100 %) over a black (0 %) background as defined in IEC 60107-1:1997, 3.2.1.3.

4.1.3 Dynamic broadcast-content video signal

The media include a dynamic broadcast-content video signal.

The dynamic broadcast-content video signal shall be generated from one of the discs available from IEC in a format compatible with the input terminal type under test. These discs include IEC 62087-2:2015 video_content_DVD_50 through IEC 62087-2:2015 video_content_BD_60. The duration of the audio-visual signal is 10 min.

Additional information is available in Clause A.3.

4.1.4 Internet-content video signal

The media include an Internet-content video signal.

The Internet-content video signal shall be generated from one of the discs available from IEC in a format compatible with the input terminal type under test. These discs include IEC 62087-2:2015 video_content_DVD_50 through IEC 62087-2:2015 video_content_BD_60. The duration of the audio-visual signal is 10 min.

Additional information is available in Clause A.4.

4.1.5 Audio signal associated with video signals

Sine-wave signals at a frequency of 1 kHz, or if 1 kHz cannot be used, signals at the centre frequency of the transfer range, as specified by the manufacturer of the UUT. For digital inputs the level of the signal shall be 18 dB below full scale. For analogue inputs the signal shall be 20 dB below reference level or greater with a suggested signal level of 500 mV rms.

IEC 62087-2:2015

The video signals described in 4.1.2, 4.1.3, and 4.1.4 are stored on the associated discs with an accompanying 1 kHz tone with a level of 18 dB below full scale.

4.2 Video signals used for the determination of the peak luminance ratio

4.2.1 General

The use of signals defined in 4.2.2 shall be limited to determining the peak luminance ratio between picture settings and should not be used for determining absolute screen luminance.

NOTE 1 Such luminance comparisons are sometimes associated with TV energy efficiency programs.

NOTE 2 For more information about choosing the signal for determining the peak luminance ratio, see Annex B.

4.2.2 Video signals

4.2.2.1 Three bar video signal

The three bar video signal is specified in 4.1.2.5.

4.2.2.2 Box and outline video signal

The box and outline video signal includes a white (100 %) square on a grey (33 %) background, with a black (0 %) bar near the outer part of the picture. An overview of the picture with signal levels (and drive values) is shown in Figure 2. The width of the white block is $2/16$ times the nominal horizontal width (W) of the picture. The height of the white block is $2/9$ times the nominal vertical height (H) of the picture. The width of the black bar is $W/128$ pixels and the height of the black bar is $H/72$ lines. The position of the black bar is $1/16$ times the nominal horizontal width (W) from the picture edge and $1/9$ times the nominal vertical height (H) from the picture edge. The dimensions of the outline are shown in Figure 3. The size of the white box is shown in Figure 4.

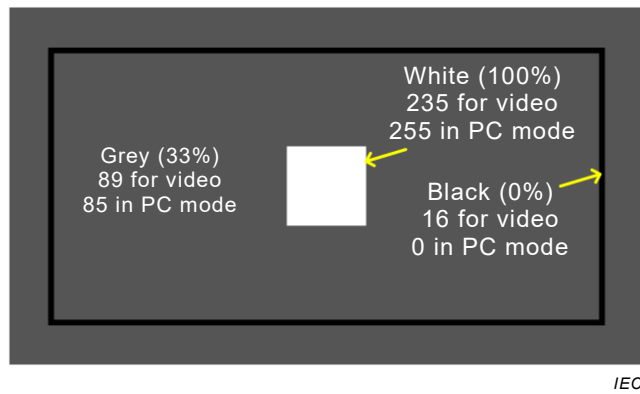


Figure 2 – Box and outline video signal, including signal drive values

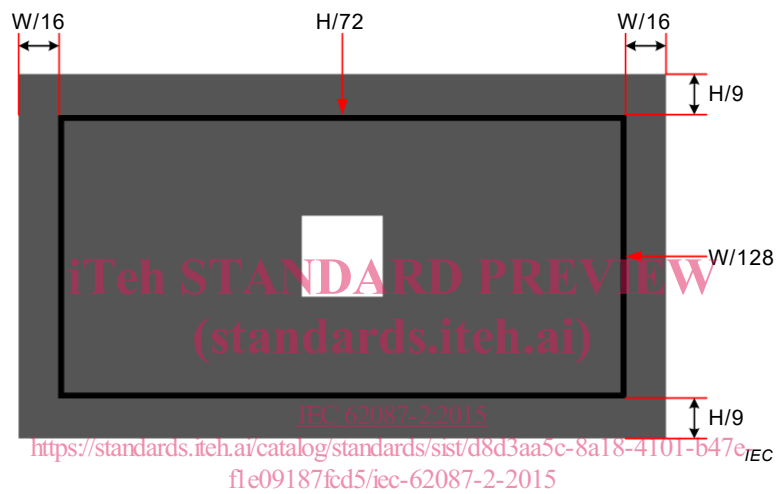


Figure 3 – Box and outline video signal, outline dimensions

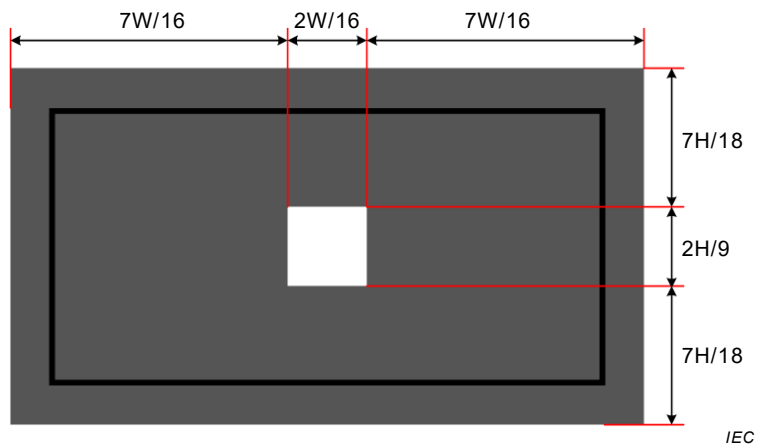


Figure 4 – Box and outline video signal, box size

4.3 Audio signals used for determination of audio power consumption

4.3.1 Audio signals

4.3.1.1 Sine wave signal

The signal shall be a sine-wave at a frequency of 1 kHz or, if 1 kHz cannot be used, the sine wave frequency shall be at the centre of the frequency range specified by the manufacturer.

4.3.1.2 Simulated programme signal

A simulated programme signal shall have a mean power spectral density that closely resembles the average of mean power spectral densities of a wide range of programme material, according to IEC 60268-1.

Such a signal may be obtained from pink noise, band-limited by a filter whose response conforms to that given in IEC 60268-1. The crest factor of a noise source should fall between 3 and 4 to avoid clipping of amplifiers.

The simulated programme signal is not included in the media supplied in Clause 5.

4.3.2 Signal levels

4.3.2.1 Audio signal level, analogue

For baseband analogue inputs, the input signal shall be at a level of 500 mV rms, according to the rated source e.m.f of IEC 61938.

4.3.2.2 Audio signal level, digital

For digital inputs, the input signal shall be at a level of 12 dB below reference full scale, according to IEC 61938, IEC 60958-1 and IEC 60958-3.

4.3.2.3 Audio signal level, RF

For FM radio tuners, the input signal shall be at an aerial input terminal at a level of 40 dB (pW). The modulation factor shall be 54 %, according to IEC 61938.

For AM radio tuners, the input signal shall be at an aerial input terminal with an induced electromagnetic field (e.m.f.) of 1 mV. The modulation factor shall be 30 %, according to IEC 61938.

In the case of non-detachable aerial antennas the RF signal level for FM and AM radio tuners shall be high enough to reproduce a noise-free audio signal.

For DAB and DAB+ the OOI point is sharply defined as the receiver C/N (carrier to noise ratio) degrades and BER increases, so this may be used as a means to assess the signal requirement of the receiver. The OOI method may be implemented so that it is equivalent to a BER of 10^{-4} . The method involves monitoring (by a human observer or if available, automated equipment) of an encoded 1 kHz audio sinewave from the audio output source (speaker, headphone, etc) and setting the RF signal level where the onset of audio defects (dropouts, burbles, "chirps", etc.) can just be heard in the sinewave in a 10 second listening period. This RF level is the OOI threshold for sensitivity.

In the case of a non-detachable aerial antenna the RF signal level shall be high enough to reproduce an audibly defect-free audio signal for DAB and DAB+.

NOTE ETSI EN 300 401, Clause 7 and ETSI TS 102 563 provide additional information about DAB and DAB+.