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IEC 62087-2

Edition 1.0 2015-06

INTERNATIONAL STANDARD

colour inside

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

IEC 62087-2:2015-06(en)

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IEC 62087-2

Edition 1.0 2015-06

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2: Signals and media

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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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.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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 62087:2008[1] (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 62087:2011[2] (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

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.

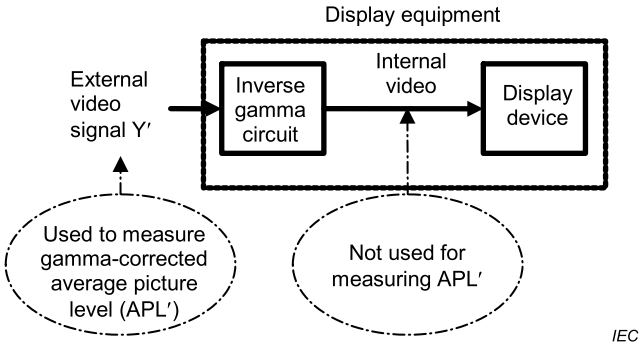

Figure 1 – Gamma-corrected average picture level (APL′)

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

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.

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.

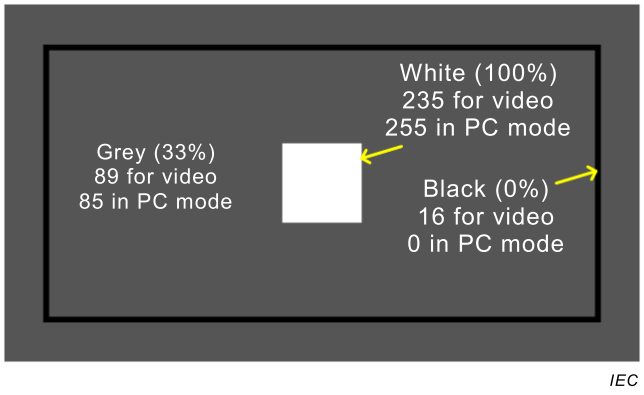

Figure 2 – Box and outline video signal, including signal drive values

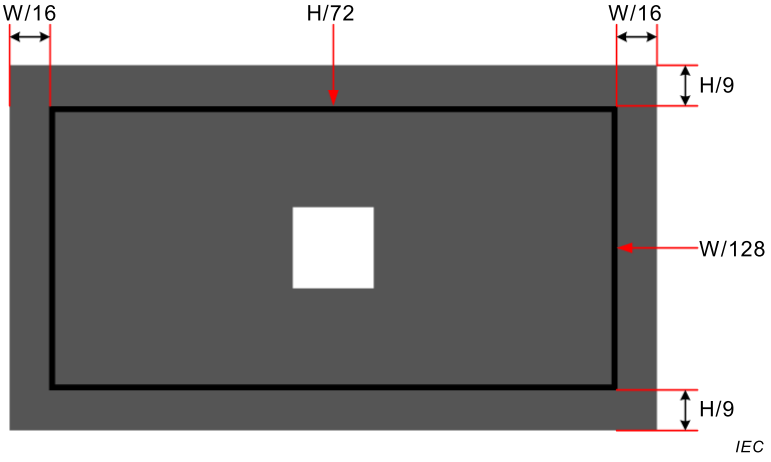

Figure 3 – Box and outline video signal, outline dimensions

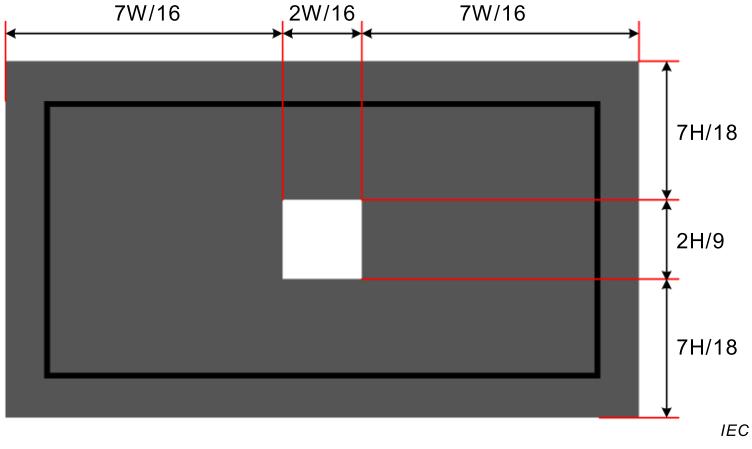

Figure 4 –Box and outline video signal, box size

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 (carrer 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+.

5 Media

5.1 Packaged media

The packaged media includes four discs: a 50 Hz BD, a 60 Hz BD, a 50 Hz DVD, and a 60 Hz DVD. For all four discs, the signals are numbered as shown in Table 1.

Table 1 – Signal numbering

Subclause	Number on discs	Description
4.1.2.2	1.1.1	Black level video signal
4.1.2.3	1.1.2	White level video signal
4.1.2.4	1.1.3	Full field colour bar video signal
4.1.2.5	1.1.4	Three bar video signal
4.1.3	1.2	Dynamic broadcast-content video signal
4.1.4	1.3	Internet-content video signal
4.2.2.1	2.1	Three bar video signal
4.2.2.2	2.2	Box and outline video signal
4.2.2.1	3.1	Three bar video signal
4.1.2.4	3.2	Full field colour bar video signal
N/A	3.3	SMPTE colour bar signal (60 Hz only)

NOTE In addition to the three bar and full field colour bar signals, the 60 Hz DVD and 60 Hz BD attached to the present standard include the SMPTE colour bar signal (SMPTE EG 1:1990) for the user's convenience in calibrating equipment output levels.

5.2 Blu-ray Disc™

Two Blu-ray Discs™ are attached to the present standard, one authorized for 50 Hz systems, the other for 60 Hz systems. The 50 Hz BD is labelled IEC 62087-2:2015 video_content_BD_50. The 60 Hz BD is labelled IEC 62087-2:2015 video_content_BD_60. Both discs contain the signals defined in Clause 4.

5.3 DVD

Two DVDs are attached to the present standard, one authorized for 50 Hz systems, the other for 60 Hz systems. The 50 Hz DVD is labelled IEC 62087-2:2015 video_content_DVD_50. The 60 Hz DVD is labelled IEC 62087-2:2015 video_content_DVD_60. Both discs contain the signals defined in Clause 4.

6 Signal generation

6.1 Audio-visual signal generating equipment

The audio-visual signal generating equipment used during the test shall be capable of playing the media specified in this standard and shall be calibrated to conform with the accuracy required in 6.3. Depending on the input terminals used during the measuring procedure, the audio-visual signal generating devices shall provide the signals as specified in 6.2.

If connecting a particular model of audio-visual signal generating equipment to the UUT causes any settings of the UUT to change, an alternate model shall be used during the measuring procedure.

Some video sources with HDMI outputs have been shown to lead to anomalous television power consumption readings. Two possible causes have been identified: miscommunication between source and sink, and proprietary communications between source and sink.

To reduce the possibility of miscommunication, multiple models of signal generating equipment may be connected and a spot check of the power consumption may be performed with a static image. A model of signal generating equipment that produces anomalous results should not be used.

To reduce the likelihood of unwanted proprietary communications, signal generating equipment from a different manufacturer than that of the UUT should be used.

6.2 Interfaces

6.2.1 HDMI®

The version of any HDMI® source and HDMI® cable used for the purposes of this standard and its related parts shall be compatible with the HDMI® terminal of the UUT. It is recommended that the source device supports the latest available version of HDMI® compatible with the UUT.

NOTE At the time of preparation of this standard, the current version of HDMI® is HDMI Specification Ver. 2.0, which is backward compatible with all previous versions of the HDMI® specification.

6.2.2 DisplayPort

The version of any DisplayPort source and DisplayPort cable used for the purposes of this standard and its related parts shall be compatible with the DisplayPort terminal of the UUT. It is recommended that the source device supports the latest available version of DisplayPort compatible with the UUT.

6.2.3 Component analogue video

Any component analogue video source and component analogue video cable used for the purposes of this standard and its related parts shall be compatible with the component analogue video terminal of the UUT.

6.2.4 S-Video

Any S-Video source and S-Video cable used for the purposes of this standard and its related parts shall be compatible with the S-Video terminal of the UUT. It is recommended that the source device supports the latest available version of S-Video compatible with the UUT.

6.2.5 Composite analogue video

Any composite analogue video source and composite analogue video cable used for the purposes of this standard and its related parts shall be compatible with the composite analogue video terminal of the UUT.

6.2.6 Analogue terrestrial interface

In the case that the UUT is being tested with an analogue terrestrial RF input signal, the signals used shall conform to IEC 60107-1:1997, 3.3, and shall have the input signal level set at –39 dB(mW) when terminated with a 75 Ω resistor or at a level to provide a perceptually noise free and error free picture.

NOTE –39 dB(mW) corresponds to 70 dB(μV).

6.2.7 Cable television interface

In the case that the UUT is being tested with a cable television RF input signal, the signals used shall conform to the cable television specifications for the region, and shall have the input signal level set at –49 dB(mW) with the termination of a 75 Ω resistor or at a level to provide a perceptually noise free and error free picture for analogue signals.

NOTE –49 dB(mW) corresponds to 60 dB(μV).

6.2.8 Digital terrestrial interface

In the case that the UUT is being tested with a digital terrestrial RF input signal, the signals used shall conform to the broadcast specifications for the region, and shall have the input signal level set at –49 dB(mW) with the termination of a 75 Ω resistor or at a level to provide better than the picture failure point (PF) as defined in IEC 62216:2009 or a perceptually noise free picture.

6.2.9 Satellite interface

6.2.9.1 General

In the case that the UUT is being tested with a satellite input, the input signal level shall be set at –49 dB(mW) with the termination of a 75 Ω resistor or at a level to provide better than the picture failure point (PF) as defined in IEC 62216:2009 for digital signals or a perceptually noise free and error free picture for analogue signals.

6.2.9.2 Other interfaces

Signals provided to other input terminals of the UUT shall conform to the specifications for those inputs.

6.3 Accuracy of video signal levels

Analogue video signals provided by the signal generating device shall be accurate within 2 % of the full range of the video signal when terminated with a 75 Ω load. The accuracy of the black and white levels shall be confirmed with the three bar video signal specified in 4.1.2.5. The accuracy of the colour levels shall be confirmed with the full field colour bar video signal specified in 4.1.2.4. The accuracy may be confirmed with an oscilloscope, waveform monitor, vector scope or other appropriate measuring device.

Digital input signal levels shall be accurate within the resolution of the signal source equipment used.

NOTE In addition to the three bar and full field colour bar signals, the 60 Hz DVD and 60 Hz BD include the SMPTE colour bar signal (SMPTE EG 1:1990) for the user's convenience.

Annex A
(informative)

Description of video signals used for the determination of power consumption

A.1 General

Power consumption of some equipment, such as television sets, may vary depending on the APL′ of the displayed images.

Three video signals are available. These include:

– static video signals (4.1.2);
– dynamic broadcast-content video signals (4.1.3);
– Internet-content video signals (4.1.4).

Either the static video signals or the dynamic broadcast-content video signals are intended to be used when determining power consumption of equipment that typically uses broadcast-type video content, such as television sets. The Internet-content video signal is intended to emulate static, non-video content from the Internet.

NOTE The Internet-content video signal is not intended to emulate dynamic video material that is often downloaded or streamed from the Internet. Dynamic video is best represented by the dynamic broadcast-content video signal specified in 4.1.3.

A.2 Static video signals

The static video signal method was initially developed by JEITA in Japan for determining television power consumption.

Measurement of power consumption based on the static video signals might be chosen for the simplicity of the test. The static signals may also be appropriate for use with equipment that typically does not have a video input or is typically not capable of playing video streams.

Power consumption measurements using static signals can often be performed directly by means of a wattmeter.

A.3 Dynamic broadcast-content video signals

The APL′ of the dynamic broadcast-content video signal was chosen to best emulate actual APL′ determined internationally. During development of IEC 62087:2008, the project members measured at least 40 h of typical broadcast content, including a variety of genres from a variety of broadcast stations in Australia, Japan, the Netherlands, the United Kingdom and the United States. The captured APL′ curves were averaged to create a target APL′ curve, known as the master histogram.

The mean of the APL′ histogram is 34 %.

The project members acquired video content that was donated to the IEC by the content owners. A computer program was used to randomly select scenes that best matched the master histogram.

Figure A.1 shows the APL′ histograms of the test disc and the master video. The data is shown in Clause A.5.

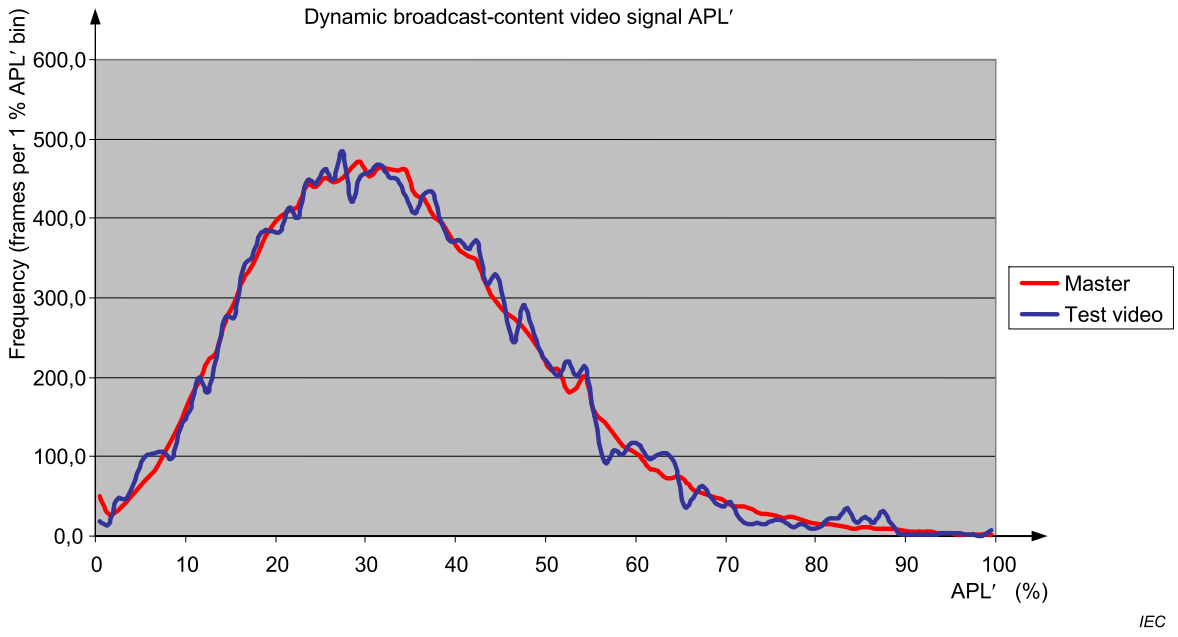

Figure A.1 – Dynamic broadcast-content video signal APL′

A.4 Internet-content video signals

The APL′ of the Internet-content video signal was chosen to best emulate the actual APL′ of popular web pages.

During development of IEC 62087:2008, the project members acquired screen shots of web-pages from US Government websites, including that of EPA Energy Star, because according to United States Code Title 17, Section 105, “copyright protection is not provided for any work produced by the United States Government”. The test images were chosen to best match the APL′ of the most popular 100 web-pages as determined during development of the standard.

The project members chose test images that were believed to be inoffensive. However, in order to ensure 100 % acceptability across all cultures internationally, some images were scrambled. Tests have confirmed that the scrambling has an inconsequential effect on the power consumed.

Figure A.2 shows the APL′ histograms of the Top-100 web-pages and test images, with a mean APL' of 81 %. In this figure, the solid line shows that the APL' histogram approximates an inverse chi-square distribution.

NOTE The Internet-content video signal is not intended to emulate dynamic video material that is often downloaded or streamed from the Internet. Dynamic video is best represented by the dynamic broadcast-content video signal specified in 4.1.3.

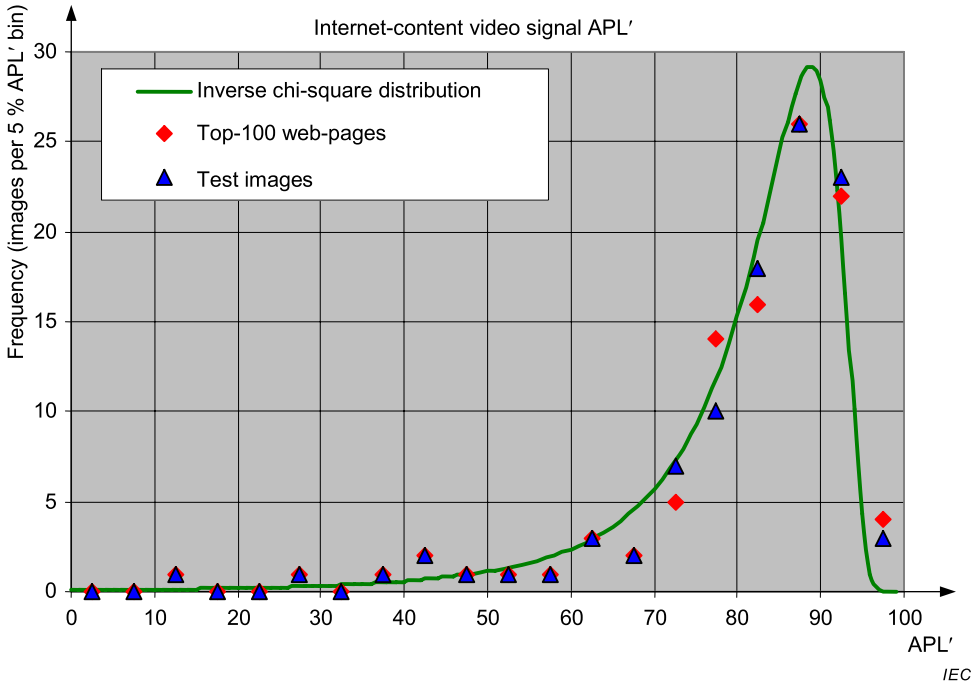

Figure A.2 – Internet-content video signal APL′

A.5 Dynamic broadcast-content data

Table A.1 shows the frequency of frames in the test video and the master video in 1 % APL′ bins. The percentage of master video frames in each bin is also shown. The scenes in the test video were chosen to best match the master video histogram.

Table A.1 – Dynamic broadcast-content data

APL′ bin %	Test video frequency	Master video frequency	Master video %
0,5	18	51,0	0,28
1,5	15	27,9	0,16
2,5	47	31,0	0,17
3,5	46	42,9	0,24
4,5	71	56,3	0,31
5,5	98	69,3	0,39
6,5	105	81,3	0,45
7,5	107	102,6	0,57
8,5	98	122,6	0,68
9,5	137	144,8	0,81
10,5	159	173,4	0,96
11,5	199	193,7	1,08
12,5	180	220,0	1,22
13,5	225	233,8	1,30
14,5	275	270,7	1,51
15,5	276	294,3	1,64
16,5	338	322,1	1,79

APL′ bin %	Test video frequency	Master video frequency	Master video %
17,5	352	340,2	1,89
18,5	382	365,9	2,03
19,5	383	389,3	2,16
20,5	384	402,9	2,24
21,5	413	410,8	2,28
22,5	400	415,6	2,31
23,5	447	441,8	2,46
24,5	443	439,7	2,44
25,5	462	450,3	2,50
26,5	449	445,4	2,48
27,5	485	451,4	2,51
28,5	421	463,7	2,58
29,5	453	471,1	2,62
30,5	458	453,3	2,52
31,5	468	464,0	2,58
32,5	452	462,1	2,57
33,5	450	460,2	2,56
34,5	426	460,4	2,56
35,5	406	431,0	2,40
36,5	430	424,8	2,36
37,5	432	403,9	2,25
38,5	394	394,2	2,19
39,5	371	375,5	2,09
40,5	372	359,7	2,00
41,5	362	352,5	1,96
42,5	370	345,1	1,92
43,5	319	315,9	1,76
44,5	328	294,4	1,64
45,5	283	280,6	1,56
46,5	244	274,7	1,53
47,5	291	262,6	1,46
48,5	262	247,9	1,38
49,5	231	231,3	1,29
50,5	214	209,7	1,17
51,5	202	209,2	1,16
52,5	219	182,8	1,02
53,5	201	185,9	1,03
54,5	212	200,9	1,12
55,5	151	156,9	0,87
56,5	94	143,6	0,80
57,5	109	128,8	0,72
58,5	102	113,7	0,63
59,5	118	108,1	0,60

APL′ bin %	Test video frequency	Master video frequency	Master video %
60,5	114	100,0	0,56
61,5	96	86,1	0,48
62,5	103	81,5	0,45
63,5	104	73,2	0,41
64,5	87	75,0	0,42
65,5	37	70,0	0,39
66,5	48	58,6	0,33
67,5	63	54,0	0,30
68,5	48	51,0	0,28
69,5	37	46,6	0,26
70,5	43	39,8	0,22
71,5	22	38,2	0,21
72,5	14	35,2	0,20
73,5	16	30,5	0,17
74,5	15	27,6	0,15
75,5	21	26,6	0,15
76,5	19	22,7	0,13
77,5	11	23,9	0,13
78,5	14	20,9	0,12
79,5	10	17,5	0,10
80,5	12	14,6	0,08
81,5	23	14,4	0,08
82,5	23	14,0	0,08
83,5	35	11,7	0,06
84,5	16	9,9	0,06
85,5	25	10,6	0,06
86,5	17	9,1	0,05
87,5	31	8,9	0,05
88,5	15	8,4	0,05
89,5	1	8,0	0,04
90,5	2	5,9	0,03
91,5	2	5,3	0,03
92,5	1	5,5	0,03
93,5	1	4,5	0,03
94,5	3	3,4	0,02
95,5	3	2,4	0,01
96,5	1	1,6	0,01
97,5	2	1,9	0,01
98,5	0	1,9	0,01
99,5	8	1,7	0,01
Frequency is the number of frames per 1 % APL′ bin.			

A.6 Internet-content data

Table A.2 shows the frequency of the test images and the “Top 100” images in 5 % APL′ bins. The scenes in the test images were chosen to best match the “Top 100” histogram.

Table A.2 – Internet-content data

APL′ bin %	Top 100 frequency	Test images frequency
2,5	0	0
7,5	0	0
12,5	1	1
17,5	0	0
22,5	0	0
27,5	1	1
32,5	0	0
37,5	1	1
42,5	2	2
47,5	1	1
52,5	1	1
57,5	1	1
62,5	3	3
67,5	2	2
72,5	5	7
77,5	14	10
82,5	16	18
87,5	26	26
92,5	22	23
97,5	4	3
Frequency is the number of frames per 5 % APL′ bin.		

Annex B
(informative)

Description of video signals used for the determination of the peak luminance ratio

B.1 General

When choosing the signal to be used for the determination of the peak luminance ratio, the APL of the signal should be considered. Emissive display technologies are known to employ power limiting circuits that reduce display luminance under high APL conditions. Backlit display technologies may also vary their output based on signal APL.

For each of these signals, a single measurement in the centre of the display is recommended for determining luminance in each picture setting of interest.

B.2 Three bar video signal

The Energy Star program and some North American regulations use the three bar video signal described in 4.2.2.1 for determining the peak luminance ratio. This signal has a relatively high APL and is likely to trigger power limiting circuits. IEC 62087:2008 made this signal available for determination of power consumption, so it has been convenient to use for determination of peak luminance values as well.

B.3 Box and outline video signal

The box and outline video signal described in 4.2.2.2 is introduced in this edition of this standard and is intended to eliminate the effects of power limiting circuits. However, no single applicable video signal can guarantee the absence of power limiting for all models of equipment.

NOTE The box and outline video signal is likely to be used in Europe for measuring the peak luminance ratio related to energy labelling and ecodesign requirements for televisions.

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5 The former editions of IEC 62087 are given for the sake of backwards traceability, and since they are referred to in this edition.

6 To be published.

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