IEC 62087-2

Edition 2.0 2023-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

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



IEC 62087-2:2023-02(en-fr)



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

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 33.160.10

ISBN 978-2-8322-6489-8

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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

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IEC 62087-2 has been prepared by technical area 19: Environmental and energy aspects for multimedia systems and equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) HDR and UHD video test signals have been added;
b) dynamic box and outline test signals have been added, replacing the static box and outline test signals;
c) all test signals are provided as media files for download from a specified IEC online repository, which replaces previous DVD and Blu-ray media.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3771/CDV	100/3848/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

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 multiple test signals downloadable from a specified IEC online repository, available at https://www.iec.ch/tc100/supportingdocuments. These files form an integral part of this standard.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

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INTRODUCTION

This document identifies test signals to be used to determine power consumption and related characteristics specified in some other parts of the IEC 62087 series.

IEC 62087:2008[1] (second edition) added methods for measuring On (average) mode power consumption of television sets, based on three video signal sets. These include static signals, dynamic broadcast content signals, 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.

IEC 62087-2:2015[3] (first edition) separates signals and media that are to be used for determining power consumption and related characteristics into a dedicated part. 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 set power consumption measurement programs.

This second edition of IEC 62087-2 adds HDR and UHD video test signals and dynamic box and outline test signals for TV power consumption testing. All test signals are available from a specified IEC online repository for download, replacing the former physical media distribution.

IEC 62087 series currently consists of the following 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
– Part 7: Computer monitors

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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*

3 IEC 62087-2:2015, *Audio, video, and related equipment – Determination of power consumption, Part 2: Signals and media*

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

Part 2: Signals and media

1 Scope

This part of IEC 62087 specifies the signals used to determine 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 set power consumption measurement programs. In addition, this part specifies equipment, interfaces, and accuracy related to signal generation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 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, *Sound system equipment – Part 1: General*

IEC 60315-1:1988, *Methods of measurement on radio receivers for various classes of emission. Part 1: General considerations and methods of measurement, including audio-frequency measurements*

IEC 60315-3, *Methods of measurement on radio receivers for various classes of emission – Part 3: Receivers for amplitude-modulated sound-broadcasting emissions*

IEC 60315-4:1997, *Methods of measurement on radio receivers for various classes of emission – Part 4: Receivers for frequency-modulated sound broadcasting emissions*

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

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

IEC 61938, *Multimedia systems – Guide to the recommended characteristics of analogue interfaces to achieve interoperability (GMT)*

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

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

Recommendation ITU-R BT.2100-2, *Image parameter values for high dynamic range television for use in production and international programme exchange*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
average picture level
APL
average level of all the pixels of a single video signal frame or a group thereof in the linear luminance domain

EXAMPLE Display equipment such as television sets or computer monitors that internally use linear encoding after undoing the non-linearity of the input signal.

Note 1 to entry: This note applies to the French language only.

3.1.2
backlit display
display that generates light from a source behind the display panel

EXAMPLE 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 CTA-770.3-E R-2017.

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 can carry analogue or digital uncompressed video

Note 1 to entry: This note applies to the French language only.

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

EXAMPLE PDP or OLED displays

3.1.8
average picture level based on non-linear input signal
APL′
average level of all pixels of a single video signal frame or a group thereof in the non-linear luminance domain

EXAMPLE Display equipment such as television sets or computer monitor receive input signals that encode luminance or brightness in a non-linear way. Examples for such non-linear encoding are PQ (absolute luminance) or HLG (brightness) EOTFs (ITU-R BT.2100-2).

Note 1 to entry: APL′ is 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 linear signal that might be available inside of some display equipment and delivered to the display device. The properties and their differences of the external and internal video signals are shown in Figure 1.

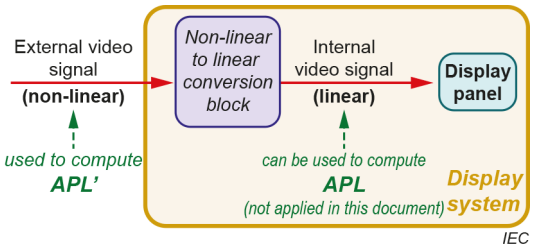


Figure 1 – Occurrence of linear and non-linear signal encodings in context of a typical display processing pipeline for computing APL and APL'

3.1.9
hybrid log-gamma
HLG
one set of transfer functions offering a degree of backwards compatibility by more closely matching the previously established television transfer curves

Note 1 to entry: Sets of transfer functions related to HDR signals are specified in Rec. ITU-R BT.2100-2.

Note 2 to entry: HLG is used both as a description of a dedicated transfer function and as a video format name.

3.1.10
high dynamic range video
HDR video
capability of components in a video pipeline to capture, process, transport or display luminance levels and tone gradations that exceed capabilities of conventional SDR imaging pipelines components

EXAMPLE An HDR video signal typically uses a greater bit depth, luminance and colour volume than standard dynamic range (SDR) video. It also typically utilizes different tone curves such as perceptual quantizer (PQ) or hybrid log gamma (HLG) as specified in ITU-R BT.2100 instead of gamma, as used with SDR. When the HDR video signal is rendered on an HDR display, it is possible to see greater luminance ranges and wider colour gamut

Note 1 to entry: HDR video can provide an enhanced viewer experience and can more accurately reproduce scenes that include, within the same image, deep dark areas, and bright highlights, such as emissive light sources and reflections.

Note 2 to entry: This note applies to the French language only.

3.1.11
high definition
HD
spatial video resolution ranging from 1 280 × 720 to 1 920 × 1 080

3.1.12
ultra-high definition
UHD
Ultra HD
spatial video resolution above 1 920 × 1 080

3.1.13
Universal Serial Bus
USB
digital interface that can be used to connect storage media and peripherals to digital devices like computers and TVs

Note 1 to entry: See USB specification.

Note 2 to entry: This note applies to the French language only.

3.1.14
High-Definition Multimedia Interface
HDMI®
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.

Note 2 to entry: This note applies to the French language only.

3.1.15
standard dynamic range video
SDR video
capability of components in a video pipeline to capture, process, transport or display luminance levels and tone gradations that can be characterized by the dynamic range, colour rendering and tone gradation capabilities essentially compatible with cathode ray tube (CRT) displays

EXAMPLE BT.709/BT.1886 and IEC 62966-2-1 (sRGB)

Note 1 to entry: This note applies to the French language only.

3.1.16
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 Abbreviated terms

′	prime (noting that the signal is non-linear, for example APL')
AM	amplitude modulation
AV	audio-visual
BD	Blu-ray Disc™[4]
BER	bit error ratio
C/N	carrier-to-noise ratio
DAB	digital audio broadcast
dB	decibel

[4] Blu-ray Disc™ is a trademark 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. Equivalent products may be used if they can be shown to lead to the same results.

DVD	digital versatile disc
EMF	electromotive force
EPA	Environmental Protection Agency
FM	frequency modulation
Hz	hertz
HDMI®	High Definition Multimedia Interface
JEITA	Japan Electronics and Information Technology industries Association
kb/s	kilo bits per second
LCD	liquid crystal display
LAN	local area network
Mb/s	Mega bits per second
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 (Sequential colour with memory)
SMPTE	Society of Motion Picture and Television Engineers
USB	Universal Serial Bus
UUT	unit under test

NOTE Other terminology used is device under test (DUT) or equipment under test (EUT).

4 Signals

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

4.1.1 Overview

For general information on SDR video signals, see 4.1.2, 4.1.3.2 and 4.1.4. For general information on HDR signals, see 4.1.3.3. The HDR video format HLG uses sets of transfer functions (EOTF) specified in Rec. ITU-R BT.2100-2 while the HDR video format HDR10 applies those transfer functions (EOTF) of SMPTE ST 2084 (see also 4.1.3.1 and 4.1.3.3).

In this document, all references to '60 Hz media' technically refer to 59,94 Hz coded video content; similarly, '24 Hz media' refers to 23,976 Hz media (see also Table A.1 to Table A.6).

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

4.1.2 Static video signals

4.1.2.1 General

The media includes five static video signals: black, white, full field colour bar and three bar video signals; see Table 1. All are SDR format. Additional information is available in Clause B.2.