

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Audio, video and related equipment – Determination of power consumption –
Part 5: Set top boxes (STB)

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Appareils audio, vidéo et matériel connexe – Détermination de la consommation
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Partie 5: Boîtiers décodeurs



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iee62087-5-2015
918ab4d4f3e9/iec-62087-5-2015

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.160.10

ISBN 978-2-8322-5400-4

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**AUDIO, VIDEO AND RELATED EQUIPMENT –
DETERMINATION OF POWER CONSUMPTION –****Part 5: Set top boxes (STB)**

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International Standard IEC 62087-5 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 bilingual version (2018-02) corresponds to the monolingual English version, published in 2015-06.

This first edition of IEC 62087-5 cancels and replaces Clause 8 of IEC 62087:2011. This standard together with IEC 62087-1 to IEC 62087-4 and IEC 62087-6 cancels and replaces IEC 62087:2011. This International Standard constitutes a technical revision.

This edition does not include any significant technical changes with respect to Clause 8 of IEC 62087:2011. It was developed as a member of the new multipart series of IEC 62087 standards.

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

FDIS	Report on voting
100/2470/FDIS	100/2500/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.

The French version of this standard has not been voted upon.

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 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,
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INTRODUCTION

This part of IEC 62087 specifies methods for measurement of the power consumption of set top boxes for consumer use.

IEC 62087:2011¹ (third edition) revises methods for measuring power consumption of set top boxes in the On mode and Partial On modes. These modes correspond to the active modes which are defined in IEC 62542:2013.

This standard has been divided into multiple parts. At the time of publication of this part, the following parts are planned or published:

- Part 1: General
- Part 2: Signals and media
- Part 3: Television sets
- Part 4: Video recording equipment
- Part 5: Set top boxes (STB)
- Part 6: Audio equipment

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¹ 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 5: Set top boxes (STB)

1 Scope

This part of IEC 62087 specifies methods of measurement for the power consumption of set top boxes (STBs). It specifies the different modes of operation which are relevant for measuring power consumption.

The methods of measurement are applicable only for equipment which can be connected to the mains.

The measuring conditions in this standard represent the normal use of the equipment and may differ from specific conditions, as specified, for example, in safety standards.

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 62087-5:2015

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

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

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 following terms and definitions apply.

3.1.1 additional functions

functions that are not required for the basic operation of the equipment

3.1.2 buffering

temporary storage of video and audio streams in some form of memory in order to perform time shifting functions

3.1.3 cable TV STB

STB whose principal function is to receive and decode television signals from a broadband, hybrid fiber/coaxial, community cable distribution system and deliver them to a display and/or recording device

3.1.4**conditional access module**

plug-in module that enables conditional access

3.1.5**data over the cable service interface specification****DOCSIS**

international suite of standards that define interface requirements for cable modems involved in high-speed data and video/audio content distribution over cable television systems

3.1.6**internet protocol TV STB**

STB whose principal function is to receive and decode television/video signals encapsulated in IP packets and to deliver them to a display and/or recording device

3.1.7**multi-room STB**

STB that is capable of providing 2 or more independent video and audio streams either direct to display devices or to thin clients/remote

3.1.8**satellite TV STB**

STB whose principal function is to receive and decode television signals from satellites and deliver them to a display and/or recording device

3.1.9**set top box****STB**

equipment for the reception of television and related services (e.g. radio) from terrestrial, cable, satellite, or broadband networks which are decoded and delivered to a display and/or recording device

3.1.10**special functions**

functions that are related to, but not required for, the basic operation of the device

3.1.11**television set****TV**

equipment for the reception and display of television broadcast and similar services for terrestrial, cable, satellite and broadband network transmission of analogue and/or digital signals

Note 1 to entry: A television set may include additional functions that are not required for its basic operation.

3.1.12**terrestrial TV STB**

STB whose principal function is to receive and decode television signals over the air (OTA) and deliver them to a display and/or recording device

3.1.13**thin-client STB****remote STB**

STB that is designed to interface between a multi-room capable STB and a TV (or other output device) that has no ability to interface with the service provider directly and relies solely on a multi-room box STB for content

Note 1 to entry: Any STB that meets the definition of cable TV, satellite TV, Internet protocol TV or terrestrial TV STB is not a thin-client/remote STB.

3.1.14**time shifting**

capability of a device to allow playback type functions with real time broadcast

Note 1 to entry: Such functions may include fast forward, review (rewind), pause and slow motion.

3.1.15**video recording equipment**

equipment for the recording and reproduction of video and audio signals on a recording medium

EXAMPLES Video cassette recorder (VCR) and digital versatile disc (DVD) player or recorder.

Note 1 to entry: Equipment with only playback function is included as well.

3.2 Abbreviations

'	Prime
AC	Alternating Current
BD	Blu-ray Disc ^{TM2}
DC	Direct Current
DVD	Digital Versatile Disc
IP	Internet Protocol
HD	High Definition (720 p or better)
HDD	Hard Disk Drive
LNB	Low Noise Block converter
MPEG	Moving Picture Experts Group
OTA	Signals Over the Air
RF	Radio Frequency
SD	Standard Definition
STB	Set Top Box
UUT	Unit Under Test
VCR	Video Cassette Recorder

4 Specification of operating modes and functions**4.1 General**

Table 1 contains the operating modes and functions for set top boxes.

4.2 Auto power down function

An auto power down feature may be implemented on a STB to power down into a Partial On mode after a predetermined time. Such a feature should be referred to as auto power down.

² Blu-ray DiscTM 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.

Table 1 – Operating modes and functions

Power	Mode	Sub-mode	Function(s)	Description
0 W	Disconnected	Disconnected	Disconnect	The equipment is disconnected from all external power sources.
≥0 W	Off	Off	Off	The equipment is connected to an external power source and provides no functions that depend on a power source. The equipment cannot be switched into any other mode with the remote control unit, or an external or internal signal. Note that some power may be consumed if an EMC filter or other components exist on the source side of the power switch.
>0 W	Partial On	Standby-passive	<ul style="list-style-type: none"> – Wake on – remote control – internal signal 	The equipment is connected to an external power source and does not provide its primary functions. The equipment can be switched into another mode with the remote control unit or an internal signal, but not with an external signal.
		Standby-active, low	<ul style="list-style-type: none"> – Wake on – remote control – internal signal – external signal 	The equipment is connected to an external power source and does not provide its primary functions. The equipment can be switched into another mode with the remote control unit, an internal signal, or an external signal.
		Standby-active, high	<ul style="list-style-type: none"> – Wake on – remote control – internal signal – external signal – Data communications 	The equipment is connected to an external power source and does not provide its primary functions. The equipment can be switched into another mode with the remote control unit, an internal signal, or an external signal. Additionally, the equipment is exchanging/ receiving data with/from an external source.
	On	On-play	Playing a programme from an HDD, solid state memory, or other media	The equipment is connected to a power source and plays the tape. The optical disc inside the equipment.
		On-broadcast	Pictures and sound from a broadcast	The equipment is performing the function of providing a viewer with video and audio from a broadcast.
		On-record	Recording a programme from a broadcast	The equipment is connected to a power source and records a signal from an external or internal source.
		On-multifunction	Recording Playing back	The equipment is performing multifunction “On-play” and/or “On-record” simultaneously.

5 Measuring conditions for set top boxes (STBs)

5.1 Overview of a set top box

STBs are devices that perform the task of providing audio, video and related services from various broadcast, narrowcast and broadband platforms. They can exist as stand alone devices or as an integral part of a network. Although originally they were analogue in nature more recently, STBs are typically associated with digital television services.

Recent STBs have included various enhanced functionality such as recording. The measuring method described in this clause only covers STBs that have either HDDs or solid state memory for recording. In the case of solid state memory this method covers the STB whether or not the memory is removable. STBs with removable media, apart from solid state memory, are not covered by this method.

5.2 Input signal

5.2.1 General

In general terms, input signals shall be of the strength and quality for the type of broadcast system on which the STB is intended to be used. Where an STB supports multiple broadcast systems, it shall be tested for each broadcast system in which it operates. Each measured result shall be described in the report. In some circumstances, the dynamic broadcast-content video may be suitable for use as the video and audio test signal content but will need to be multiplexed and modulated as stated in 5.2.2 below.

5.2.2 RF test signal

5.2.2.1 General

For digital terrestrial, satellite and cable TV STBs, the test signal shall be comprised of a multiplexed transport stream modulated with parameters that reflect the typical environment in which the STB will be used. The video and audio components of the transport stream shall be as described in 5.2.2.2 and 5.2.2.3. For analogue terrestrial TV, satellite TV and cable TV STBs, the signal should be typical of the type of signal the STB is designed to receive.

5.2.2.2 Video test signal (standards.iteh.ai)

The STB shall be tested using an appropriate input signal. This input signal should be at the highest resolution that the STB is capable of decoding using the most processing intensive advanced decoding standard of the intended broadcast system(s) that the STB will be used on. A description of the signal used for the test shall be included in the test report. This description shall include at a minimum, resolution, frame rate and bit rate.

If the STB under test is an HD decoder, additional testing may also be conducted with an SD input signal.

Where the STB is operating in a download or recording mode, the input should contain content that simulates material that would typically be downloaded or recorded.

Where an STB has a conditional access system, it should be tested whilst decoding encrypted content.

Where an STB can record other services than the one being watched, the test signal should contain sufficient services to enable this feature to be tested.

5.2.2.3 Audio test signal

The STB shall be tested using an appropriate input signal. The audio test signal should have the maximum data rate (bit/s).

The audio format used during the power measurement shall be described in the report.

5.2.3 Broadband input signal

An input signal that provides the equivalent multiplexed transport stream as an appropriate internet protocol (IP) broadband signal conforming to the defined video and audio test signalling (5.2.2.2 and 5.2.2.3).

5.3 Input terminals

5.3.1 Analogue terrestrial input terminal

In the case that the STB 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 75Ω resistor or at a level to provide a perceptually noise free and error free picture.

NOTE -39 dB(mW) corresponds to 70 dB(μ V).

5.3.2 Cable television input terminal

In the case that the STB 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 a termination of 75Ω 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 or error free for analogue signals.

NOTE -49 dB(mW) corresponds to 60 dB(μ V).

5.3.3 Digital terrestrial input terminal

In the case that the STB 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 a termination of 75Ω 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 and error free picture.

5.3.4 Satellite input terminal

In the case that the STB is being tested with a satellite input signal, the input signal level shall be set at -49 dB(mW) with a termination of 75Ω 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 picture or error free for analogue signals.

5.4 Measurement procedure

5.4.1 General measuring conditions

The general measuring conditions including the type of power meters to be used is as per IEC 62087-1:2015 except where conditions are otherwise specified in this subclause.

5.4.2 Stabilization

The measurements shall be performed after the STB has achieved a stable condition with respect to power consumption. Refer also to IEC 62087-1:2015.

NOTE There are several ways to consider a STB stable. For example, a STB can be considered stable between 15 min and 30 min after entering into each operation mode. In this case, the time used to stabilize the STB shall be recorded in the test report. A STB can be also considered stable when any of the results of the same test repeated are within 2 %.

5.4.3 Environmental conditions

The ambient temperature shall be $23 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$. Refer also to IEC 62087-1:2015.