



DPC: 24 / 30504710 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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Interested committees:

Title: BS EN IEC 62087-3 Audio, video, and related equipment - Determination of power consumption

Part 3: Television sets

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Submission of Comments

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



100/4235/CD

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SECRETARIAT:

Germany

SECRETARY:

Mr Andreas Schneider

OF INTEREST TO THE FOLLOWING COMMITTEES:

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

Energy Efficiency, Environment

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TITLE:

Audio, video, and related equipment - Determination of power consumption - Part 3: Television sets

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**AUDIO, VIDEO, AND RELATED EQUIPMENT - DETERMINATION OF POWER
CONSUMPTION - PART 3: TELEVISION SETS –**

FOREWORD

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IEC 62087-3 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.

The first edition of IEC 62087-3, together with IEC 62087-1, IEC 62087-2 and IEC 62087-4 to IEC 62087-6 canceled and replaced [IEC 62087:2011 \(third edition\) \[1\]](#) in its entirety.

IEC 62087-3:2015 (first edition) introduced:

- For TVs with an automatic brightness control feature that power may be measured at multiple specific illumination levels;

- A method for determining the ratio of peak luminance expected in the home versus the peak luminance expected in the retail environment.

IEC 62087:2023 (second edition) included the following significant technical changes with respect to the previous edition:

- it introduces measuring procedures for the determination of power consumption in the active mode while viewing static metadata HDR video content;
- all tests for active mode power determination are performed with MDD disabled;
- only progressive video signals are used for testing;
- a dimmable LED reflector lamp is used as a light source for illuminating the ABC sensor to achieve specific illuminance levels;
- a dynamic box and outline video signal is used for determining the ratio of peak luminance.

This third edition cancels and replaces the second edition published in 2023. This edition constitutes a technical revision includes the following significant technical changes with respect to the previous edition:

- a new method for measuring both power and screen-average luminance while playing dynamic video content (e.g. broadcast content) to support effective luminance based energy efficiency metrics is introduced;
- equipment requirements are updated:
 - camera photometer is introduced;
 - smart standby devices (i.e. smart phone and smart speaker) are introduced;
 - luminance and illuminance meter accuracy requirements are increased;
 - power source and power meter reference updated IEC 62301, which includes improved measurement uncertainty specifications;
 - reflective card requirement is removed;
 - Laser/LED projector is introduced for use with the advanced existing method;
- MDD is left in default state during testing
- EUT initial configuration requirements are updated, and options introduced;
- smart standby tests are introduced;
- a new method for determining screen area is used (IEC/CD 62087-1:2024, clause 7);
- definitions are updated
- the document is reorganized
 - to enable use of common test procedures across new and existing methods;
 - to separate tasks into the following buckets;
 - methods;
 - equipment;
 - test clips;
 - ambient conditions;
 - physical setup;

- functional setup;
- test preparation;
- test procedures;
- picture quality measurement procedures are added;
- updates to existing methods are provided, including:
 - an advanced method for performing ABC profiling using a projector is introduced;
 - additional dynamic box and outline video signals are provided to support the advance existing method;
 - network configuration requirements for networked standby tests are simplified;

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

Draft	Report on voting
100/xxxx/CDV	100/xxxx/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.

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.

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.

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.

INTRODUCTION

This document introduces a new method of assessing the energy efficiency of TVs using best practices and tools and in this context refines existing methods as they may continue to be used for some time.

New method

In active mode, the new method (5.2) requires the concurrent collection of screen-average luminance and power data at several light source setting levels while playing broadcast video. The results characterize the TV's power use across a wide range of luminance levels in the tested preset picture settings. This new method offers advantages over existing ones, which measure power while playing broadcast video but screen-center luminance while playing a test pattern. These luminance values correlate poorly with broadcast video screen-average luminance, the light output experienced by a typical viewer in real use. Because non-uniform screens generally have higher luminance in the center than the edges, the screen-centre measurement typically exceeds the screen-average measurement, creating the false perception that non-uniform screens have higher luminance for the same power and are therefore more efficient. Furthermore, test pattern measurements fail to capture the efficiency benefits of local dimming when playing typical broadcast content. The new method addresses both of these gaps by measuring screen-average luminance while playing broadcast video, enabling the effective use of efficiency metrics that are based on both screen area and luminance.

In non-active mode, the new method offers procedures for measuring power when smart wake and other advanced features are activated where applicable.

Existing methods

This document also provides updates to existing methods as a secondary objective as mentioned above. Thus, this document provides both a roadmap to more effective methods for determining active and non-active mode energy efficiency, and important updates to existing ones for use in the near term.

General

This document is built around a common set of measurement procedures, with different options available to accommodate both new and existing methods, allowing users to apply the most appropriate method and selected options based on their specific requirements and contexts. Some options are determined by the applicable method, while others are determined by regional (e.g. power supply voltage and frequency) and product-specific context (e.g. the presence or configuration of certain features in a TV model). At a conceptual level, Table 1 illustrates the relationship between new and existing methods, procedures, their options, and what is measured. Regional context might require a mix of new and existing methods to collect data that helps correlate new and existing methods.

Table 1 – Conceptual active-mode illustration of the building blocks on which this specification is based

	Active mode				Non-active mode
Methods Clause 5	Procedures 13.2	Options 13.2	Power	Luminance	Procedures
New camera-based method 5.2	Broadcast content	Many region and product-specific options	Average	Screen average	Smart standby 13.3.4, smart standby with quick start 13.3.5
Basic existing method 5.3	Broadcast content		Average	Not measured	Standby 13.3.2, network standby 13.3.3
	Test pattern	Screen center			

Users of this document typically follow these steps to apply the appropriate procedures and options:

Identify regional context

Select the applicable test method [Clause 5](#) and procedures based on regional context

Identify the remaining active and non-active mode options based on regional and product context

Document these selections in a detailed active and non-active mode test sequence

Execute the test sequence

Record the results

This structured approach ensures consistency, flexibility, and applicability across various regional and product contexts, and the documentation of the approach allows for easier subsequent verification of test results. It is important that regional context indicates methods, procedures and options to be used.

The IEC 62087 series 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
- Part 7: Computer monitors
- Part 8: Small network equipment

AUDIO, VIDEO, AND RELATED EQUIPMENT - DETERMINATION OF POWER CONSUMPTION - PART 3: TELEVISION SETS –

1 Scope

This part of IEC 62087 specifies the determination of the power, luminance, and related characteristics of television sets. Television sets include, but are not limited to, those with self-emitting, backlit, or projection technologies.

The operating modes and functions, as they specifically apply to television sets, are defined in detail in this part of IEC 62087.

This document is limited to television sets that can be connected to an external power source. Television sets that include a non-removable, main battery are not covered by this document. Television sets can include any number of auxiliary batteries.

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

Users of this document should consider the fact that TV set characteristics like screen luminance, resolution, contrast, color gamut, and viewing angle can have an impact on TV energy consumption. It is recommended that the impact of these features on power consumption be among those considered when establishing TV power limits.

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

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

IEC 62087-2:2023, *Audio, video, and related equipment - Determination of power consumption - Part 2: Signals and media*

IEC 62301, *Household electrical appliances - Measurement of standby power*

IEC 62977-2-1:2021, *Electronic displays - Part 2-1: Measurements of optical characteristics - Fundamental measurements*

3 Terms, definitions, and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 62087-1:2015, IEC 62087-2:2023 and 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 Terms and definitions

3.1.1

light source setting

LSS

TV control that manually adjusts the units light source output level

Note 1 to entry: On LCD TVs this is often called the “backlight” control. On OLED or other emissive displays this is sometimes called the “luminance” control.

Note 2 to entry: The light source setting (e.g. 1 - 100) is not to be confused with light source luminance, which may require destructive testing to measure, or screen luminance, which is dependent on panel transmissivity.

3.1.2

brightest selectable preset picture setting

user selectable preset picture setting that, among the preset picture settings intended for home use, produces the highest luminance

Note 1 to entry: See 12.3.

3.1.3

CAT5e cable

category 5e cable

twisted pair cable used for computer networks

Note 1 to entry: See IEC 61156-5 and IEC 61156-6.

3.1.4

colour rendering index

CRI

measure of the degree to which the psychophysical colour of an object illuminated by the test illuminant conforms to that of the same object illuminated by the reference illuminant, suitable allowance having been made for the state of chromatic adaptation

Note 1 to entry: See also CIE 13, Method of Measuring and Specifying Colour Rendering of Light Sources.

[SOURCE: IEV 845-22-109, modified - Note 2 to entry and Note 3 to entry removed]

3.1.5

conditional access

encryption, decryption, and authorization techniques employed to protect content from unauthorized viewing

3.1.6

conditional access module

plug-in module that enables conditional access

3.1.7

default configuration

manufacturer’s preset configuration for television sets without a forced menu

Note 1 to entry: See 11.5.3.

3.1.8

default picture setting

picture setting for television sets in the normal or default configuration that is highlighted, or if none is highlighted, the picture setting first available for user selection

Note 1 to entry: See 11.5.3. The HDR default picture setting (if different than the default picture setting) is the one that the TV enters when HDR video is played from the starting point of the SDR default picture setting.

3.1.9

dimming line

numerical relationship between average power and screen-average luminance when playing a
broadcast video test clip

Note 1 to entry: Dimming lines are typically represented as the linear or second-order polynomial trendline of a data series where average power is plotted against screen-average luminance at three or more LSS levels.

3.1.10

forced menu

on-screen menu that requires the user to choose a configuration option when a television set is first setup or after a factory reset

Note 1 to entry: For example, a forced menu can offer the user the option to select either "Normal"/"Home" or "Retail"/"Store" configuration.

Note 2 to entry: See 11.5.

3.1.11

barn doors

adjustable, hinged metal flaps attached to the front of a lighting fixture to shape and control the spread of the light beam by restricting or directing it

3.1.12

local dimming

LD

<backlit television> feature that enhances contrast, enhances dynamic range, and reduces energy consumption by dynamically dimming the backlighting in lower-luminance areas of the displayed image

3.1.13

luminance

photometric measure of the luminous intensity per unit area of light traveling in a given direction, expressed in units of candelas per square meter (cd/m²)

3.1.14

motion-based dynamic dimming

MDD

television feature that adjusts whole-screen luminance in response to the amount of change in screen brightness from frame-to-frame.

3.1.15

normal configuration

setting intended to be chosen for home use from the forced menu

Note 1 to entry: See 11.5.3. This configuration selection is generally named "normal," "home," "standard," or equivalent.

Note 2 to entry: Some EUTs have initial start-up prompts that fall under the definition of forced menu. While the EUT may not prompt the tester to choose between home and retail configurations, the EUT is considered to be in normal configuration as long as it is not in retail configuration.

3.1.16

plug-in module

device that plugs into television sets to provide additional functionality

3.1.17

point of deployment module

conditional access module for digital signal reception

3.1.18

preset picture setting

common set of picture parameters pre-programmed as a single picture setting

Note 1 to entry: Examples of parameters included in preset picture settings are brightness, contrast, colour space, chroma control.

3.1.19

quick-start

function that reduces the television set's resume time from non-active mode to active mode

Note 1 to entry: Resume time is measured in accordance with [13.3.1](#).

Note 2 to entry: Quick-start, sometimes referred to as fast-start, often enables smart standby functions ([13.3.4](#)).

Note 3 to entry: Quick-start can enable additional primary or secondary functions.

3.1.20

retail configuration

forced menu selection impacting the picture setting and perhaps other aspects of a television's performance, intended for use in a retail environment

Note 1 to entry: Retail configuration selection is generally recommended by the manufacturer for presentation in a public space when the television set is offered for sale and might be named "retail", "store", "shop", or equivalent.

3.1.21

retail picture setting

preset picture setting when a television is in retail configuration, intended for use in a retail environment

Note 1 to entry: See [retail configuration](#).

3.1.22

selectable preset picture setting

TV picture setting that is selectable by a user from a set of manufacturer-defined picture settings

Note 1 to entry: Preset picture settings not selectable by the user might include settings only available in an engineering menu or in retail mode.

3.1.23

snoot

a tool used to focus and direct light in photography, allowing for controlled, pinpointed lighting on specific areas of a subject or scene.

3.1.24 special function

function that is related to, but not required for, the primary function of the device

Note 1 to entry: Examples of special functions include, but are not limited to, special sound processing and power-saving functions (e.g. automatic brightness control).

Note 2 to entry: Refer to the definition of television set (TV) for primary function.

3.1.25 television set TV

equipment whose primary function is 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 can include additional functions that are not required for its primary function.

3.2 Abbreviated terms

ABC	automatic brightness control
AV	audio-visual
BD	Blu-ray Disc™ ¹
DVD	digital versatile disc
DHCP	dynamic host configuration protocol
DVI	Digital Visual Interface
EMC	electromagnetic compatibility
EUT	equipment under test
FM	frequency modulation
HDD	hard disk drive
HDMI® ²	High Definition Multimedia Interface
HDR	high dynamic range
HLG	hybrid log-gamma
IP	internet protocol
LAN	local area network
LED	light-emitting diode
LCD	liquid-crystal display
LMD	luminancemeasuring device
LNB	low-noise block

¹ 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. Equivalent products may be used if they can be shown to lead to the same results.

² HDMI® and HDMI® High-Definition Multimedia Interface are registered trademarks of HDMI Licensing Administrator, Inc.. 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.

MDD	motion-based dynamic dimming
NAT	network address translation
OLED	organic light-emitting diode
PC	personal computer
PPS	preset picture setting
PQ	perceptual quantizer
RF	radio frequency
SDR	standard dynamic range
STB	set-top box
SSID	service set identifier
TV	television set
USB ³	Universal Serial Bus
VGA	Video Graphics Array
WAN	wide area network
WCG	wide colour gamut
WLAN	wireless local area network
WOL	wake-on-LAN
WoWLAN	wake on wireless LAN
WPA	Wi-Fi protected access
WPA2	Wi-Fi protected access 2

4 Specification of operating modes and functions

The general operating modes and functions are described in IEC 62087-1:2015.

5 Test methods

5.1 General

This clause lists three primary test methods, which are applicable per regional requirements and are based on test procedures that are harmonized between the methods to the extent possible.

There are two levels of abstraction above step-by-step test instructions (i.e. the test sequence). The test method is the highest level of abstraction; it defines the basic approach and what is measured (e.g. Measuring screen-average luminance and power while playing broadcast video). Test methods are specified in this document.

The next level of abstraction consists of test sequence requirements, which are determined by regional and product context. For example, these includes details about when to test with ABC enabled vs. disabled based on product context and which preset picture settings and video

³ USB Implementers Forum, Inc. takes the position that the terms "USB" and "Universal Serial Bus" are generic terms. 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.

content formats to test per regional context. Examples of test sequence instructions are provided in this document; however, they are to be determined regionally.

Finally, step-by-step test instructions are determined by the test lab for each EUT based on test method requirements, regional test sequence requirements and context and product context.

For all the methods listed below supplemental tests may be added including picture quality tests [13.2.6](#).

Each method description below highlights applicable equipment and configuration requirements that distinguish the method. [Clause 6](#) provides a complete list of test equipment.

Retest of specific test steps in a test sequence is permitted in any order. This is necessary at times to efficiently repair or verify test data without having to repeat the entire sequence in order.

5.2 New camera-based method

Test equipment and configuration requirements are listed below. For brevity, only requirements that differentiate this method are listed.

Test equipment:

- A camera photometer is used to measure screen-average luminance.
- A smart speaker and smart phone or tablet are used to perform smart standby tests.

Test clips: Only broadcast video clips are required [Clause 7](#). Test patterns are not used.

EUT and network functional setup:

- As for all methods documented in this specification, the EUT is set to default normal configuration except where the user is prompted to activate more functionality during initial setup per [11.5.3](#).
- Unlike the existing methods documented herein, in the new method the EUT shall be connected to LAN and WAN with smart wake features enabled for both active and non-active mode testing [11.13.3](#), [13.3.4.2](#).

Test procedure requirements are listed below:

Power and screen-average luminance shall be measured [13.2.4](#) playing broadcast video at three or more LSS levels to characterize power as a function of luminance (i.e. dimming line) using one of options below:

- ABC disabled: test at minimum, default, and maximum LSS levels. Add the midpoint between maximum and minimum if default LSS = maximum.
- ABC enabled: test at four lux levels per [9.6](#).

At least one combination of content format and preset picture setting shall be tested – e.g. SDR default PPS). SDR and at least one HDR content format should be tested.

Smart wake [13.3.4](#) and smart standby with quick start [13.3.5](#) tests shall be conducted.

NOTE An informative example of new method test sequence requirements can be found in [A.1](#).

5.3 Basic existing test-pattern-based method

This clause summarizes basic existing (BE) method test equipment, configuration and measurement procedure requirements.

Highlighted test equipment and configuration requirements are listed below:

Test equipment:

- A camera photometer or spot photometer (contact or non-contact) may be used to measure screen-centre luminance.
- Smart speaker and smart phone or tablet are not required to perform smart standby tests.

Test clips:

- Broadcast and L20 and L40 test pattern video clips are required [Clause 7](#).

EUT and network functional setup:

- As for all methods documented in this specification, the EUT is set to default normal configuration except where the user is prompted to activate more functionality during initial setup per [11.5.3](#).
- Unlike the new method documented herein, the EUT shall be disconnected from the network during active mode and standby sub-mode [11.13.1](#) testing and shall be connected to LAN but not WAN for network-standby, passive sub-mode testing [13.3.3](#)

Test procedure requirements are listed below:

Screen-centre luminance and optionally power shall be measured while playing a test pattern [13.2.5](#). Repeat with different options per requirements stated below and regional requirements if applicable. This procedure is often repeated multiple times with different options to satisfy regional requirements pertaining to minimum luminance, luminance ratio or ABC qualification.

Options

1. LMD: Spot photometer or camera used as spot photometer.
2. Test pattern (L20 or L40 shall be selected per [12.2.1](#)) based on screen area.
3. Content format and preset picture setting (at least one combination shall be tested– e.g. SDR default PPS).
4. ABC disabled or enabled (one or both shall be tested).
 - ABC disabled: test at default LSS level.
 - ABC enabled: test at four lux levels.

Power shall be measured while playing broadcast video [13.2.4](#). Repeat with different options per requirements state below and regional requirements if applicable.

Options

1. Content format and preset picture setting (at least one combination shall be tested– e.g. SDR default PPS).