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INTERNATIONAL ELECTROTECHNICAL COMMISSION

METHODS OF MEASUREMENT FOR THE POWER CONSUMPTION OF AUDIO, VIDEO AND RELATED EQUIPMENT

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 62087 has been prepared by IEC technical committee100: Audio, video and multimedia systems and equipment.

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

CDV	Report on voting
100/250/CDV	100/449/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

METHODS OF MEASUREMENT FOR THE POWER CONSUMPTION OF AUDIO, VIDEO AND RELATED EQUIPMENT

1 Scope

This International Standard specifies methods of measurement for the power consumption of TV receivers, VCRs, Set Top Boxes (STBs), audio equipment and multi-function equipment for consumer use.

Moreover the different modes of operation which are relevant for the power consumption are defined.

The methods of measurement are only applicable 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, for example as specified in safety standards.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 50049-1, *Domestic and Similar Electronic Equipment Interconnection Requirements: Peritelevision Connector*

IEC 61938:1996, *Audio, video and audiovisual systems – Interconnections and matching values – Preferred matching values of analogue signals*

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

3 Terms, definitions and abbreviations

3.1 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1.1
television receiver (TV)
appliance for the reception of television broadcast and similar services for terrestrial, cable and satellite transmission of analogue or digital signals

3.1.2
video recording equipment
appliance for recording and reproducing of video and audio signals on a recording medium, for example a magnetic tape in a cassette ,a Video Cassette Recorder (VCR) or a disc, for example a Digital Versatile Disc (DVD) player or recorder

NOTE Appliances with only playback function are included as well.

3.1.3
Set Top Box (STB)
appliance which performs a function which is not (yet) included in the main receiver such as the reception of digital signals or of satellite signals

3.1.4
radio receiver
appliance for the reception of sound broadcast and similar services for terrestrial, cable and satellite transmissions of analogue or digital signals

3.1.5
audio equipment
stand-alone equipment or a system of separable or non-separable components for one or more audio functions

3.1.6
multi-function equipment
combination of equipment with two or more functions in one unit

3.2 Abbreviations

a.c./d.c.	alternating/direct current
CRT	Cathode Ray Tube
DVD	Digital Versatile Disc
IF	Intermediate Frequency
LNB	Low Noise Broadband unit
MPEG-2	Motion Picture Experts Group 2
PS	Power Supply unit
RF	Radio Frequency
STB	Set Top Box
SW	SWitch unit
TV	TeleVision receiver
VCR	Video Cassette Recorder

4 Specification of operating modes

Mode	TV	Video recording equipment (e.g. VCR)	STB	Audio equipment
Disconnected	The appliance is disconnected from all external power sources	The appliance is disconnected from all external power sources	The appliance is disconnected from all external power sources	The appliance is disconnected from all external power sources
Off	The appliance is connected to a power source, produces neither sound nor vision and cannot be switched into any other mode with the remote control unit, an external or internal signal	The appliance is connected to a power source, does not perform any mechanical function (e.g. playing, recording) and cannot be switched into any other mode with the remote control unit, an external or internal signal	The appliance is connected to a power source, fulfils no function and cannot be switched into any other mode with the remote control unit, an external or internal signal	The appliance is connected to a power source, does neither produce sound nor performs any mechanical function (e.g. playing, recording) and cannot be switched into any other mode with the remote control unit, an external or internal signal
Standby-passive	The appliance is connected to a power source, produces neither sound nor vision but can be switched into another mode with the remote control unit or an internal signal	The appliance is connected to a power source, does not perform any mechanical function (e.g. playing, recording), does not produce video or audio output signals but can be switched into another mode with the remote control unit or an internal signal	The appliance is connected to a power source, does not fulfil the main function but can be switched into another mode with the remote control unit or an internal signal	The appliance is connected to a power source, produces neither sound nor performs any mechanical function (e.g. playing, recording) but can be switched into another mode with the remote control unit or an internal signal
Standby-active, low	and can additionally be switched into another mode with an external signal	and can additionally be switched into another mode with an external signal	and can additionally be switched into another mode with an external signal	and can additionally be switched into another mode with an external signal
Standby-active, high	and is exchanging/ receiving data with/from an external source	and is exchanging/ receiving data with/from an external source	and is exchanging/ receiving data with/from an external source	and is exchanging/ receiving data with/from an external source
On (play)	The appliance is connected to a power source and produces sound and vision	The appliance is connected to a power source and plays the tape or disc inside the appliance	The appliance is connected to a power source and fulfils its main function	The appliance is connected to a power source and is performing one or more of the following modes: produce sound, wake-up signal, or play a tape or disc
On (record)	Not applicable	The appliance is connected to a power source and records a signal from an external or internal source	Not applicable	The appliance is connected to a power source and records a signal from an external or internal source

NOTE The definitions give essential but not exhaustive descriptions of each mode.

Not all equipment can be switched in each mode.

VCRs and STBs normally provide RF feed-through in standby and active modes; sometimes this feed-through is maintained in the off-mode.

The terms "internal" and "external" as used in this table refer to the appliance as it is delivered to the user.

5 General method of measurement

5.1 General measuring conditions

5.1.1 Power supply

Measurements shall be carried out at the rated voltage and the rated frequency of the power supply.

The fluctuation of the power supply voltage during the tests shall not exceed ±2 %. The frequency fluctuation and the harmonic components of the power supply shall not exceed ±2 % and 5 % respectively.

5.1.2 Environmental conditions

Ambient temperature 15 °C to 35 °C, preferably 20 °C

5.1.3 Adjustment of controls

The controls not specifically mentioned in this standard shall be in the position adjusted by the manufacturer.

5.1.4 Input signals

For equipment for which the input signals are not explicitly described in this standard, the nominal signals as specified by the manufacturer shall be applied during the test. The input signal used shall be described in the report.

5.2 General measurement procedure

Measure the power consumption of the appliance 15 min after it has been switched into the relevant operating mode.

The measurement should be carried out directly by means of a wattmeter or by means of a watthour meter by dividing the reading by the measuring time.

If the power consumption in a certain operating mode has more than one stable level, the measuring time shall be sufficiently long to measure the correct average value.

Some appliances switch, after a time delay, from a standby mode to a mode with a lower (or zero) power consumption. The power consumption before and after the switching shall be determined.

For equipment with less functionality than described, for example playback tape equipment, only the relevant parts of the measuring conditions have to be considered

The results shall be given in watts, with a number of relevant digits in accordance with the accuracy of the measurement.

NOTE 1 It should be ascertained that the wattmeter or the watthour meter is suitable to measure the power consumption of power supplies working in a burst mode with a low duty cycle and the low power consumption levels in the standby modes.

NOTE 2 If in the measuring conditions, the standby mode is mentioned without further specification, the standby modes as defined in clause 4 are referred to.

6 Measuring conditions for television receivers

6.1 Input signal

RF or baseband

If an RF input is available, this shall be used.

6.2 RF input signal

At a level to provide a sufficiently noise-free or error-free picture

6.3 Baseband input signal level

According to EN 50049-1

6.4 Video test signal

Three vertical bar signal (see 3.2.1.3 of IEC 60107-1:1997)

6.5 Audio test signal(s)

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.

6.6 Loading of terminals

The loudspeaker terminals should be terminated with the minimum impedance as specified by the manufacturer.

6.7 On mode

Contrast and brightness are adjusted to obtain the luminance values as specified in 3.6.2 of IEC 60107-1:1997.

If the levels cannot be adjusted to the stated values, the actual values shall be mentioned in the report.

If for non-CRT types of displays this setting is not practicable, a setting defined by the manufacturer shall be used. The actual setting shall be listed in the measuring report.

Volume control adjusted to obtain 50 mW at the loudspeaker terminals. In case of TVs with surround sound facility, only the front speaker terminals shall be loaded.

Television receivers with wide screen display shall be measured in the wide screen mode.

6.8 Standby mode

Only those conditions apply which are relevant for the standby mode.

6.9 Off mode

Only those conditions apply which are relevant for the off mode.

7 Measuring conditions for video recording equipment

7.1 Input signal

RF or baseband

If an RF input is available, this shall be used.

7.2 RF input signal

At a level to provide a sufficiently noise-free or error-free picture at play-back

7.3 Baseband input signal level

According to EN 50049-1.

7.4 On mode

Record or playback mode with tape or disc specified by the manufacturer at standard speed.

7.5 Standby mode

Only those conditions apply which are relevant for the standby mode.

7.6 Off mode

Only those conditions apply which are relevant for the off mode.

8 STB

8.1 Measuring conditions for STB for digital cable transmissions or digital terrestrial broadcast transmissions

8.1.1 Input signal

RF.

8.1.2 RF input signal

At a level within the operating range of the receiver.

8.1.3 Video test signal

8.1.4 Three vertical bar signal (see 6.4) Audio test signal(s)

1 kHz sine-wave signals.

8.1.5 On mode

Decoding one program with the video and audio test signals as described within the MPEG-2 transport stream or as received from a broadcast transmission.

8.1.6 Standby mode

Only those conditions apply which are relevant for the standby mode.

8.1.7 Off mode

Only those conditions apply which are relevant for the off mode.

8.2 STB for analogue and digital satellite broadcast

8.2.1 General

Satellite receivers may contain a dish positioner in order to receive signals from satellites at different orbital positions. However dish positioners are generally used for a very short period of time and are not considered to contribute significantly to the power consumption of satellite receivers. So here only the power consumption of the receiver itself and the connected low noise block converter(s) (LNBs) are considered.

8.2.2 Measuring conditions

8.2.2.1 Peripheral equipment

Tested with manufacturer supplied LNB at its highest consumption selection or if an LNB is not supplied then an LNB equivalent load of 150 mA is connected for the measurement.

8.2.2.2 Input signal

IF.

8.2.2.3 IF input signal

At a level within the operating range of the receiver.

8.2.2.4 Video test signal

8.2.2.5 Three vertical bar signal (see 6.4) Audio test signal(s)

1 kHz sine-wave signals.

8.2.2.6 On mode (analogue STB)

Video and audio test signals as described.

8.2.2.7 On mode (digital STB)

Decoding one program with the described video and audio test signals within the MPEG-2 transport stream or as received from a broadcast transmission.

8.2.2.8 Standby mode

Only those conditions apply which are relevant for the standby mode.

8.2.2.9 Off mode

Only those conditions apply which are relevant for the off mode.

9 Audio equipment

9.1 General

Considered are audio products which are connected to the mains.

Figure 1a – Separate components

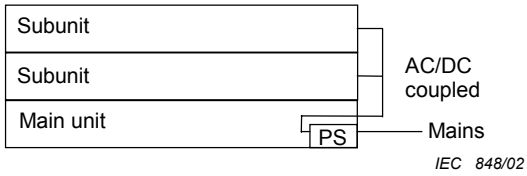

Figure 1b – Systems (non separable components)

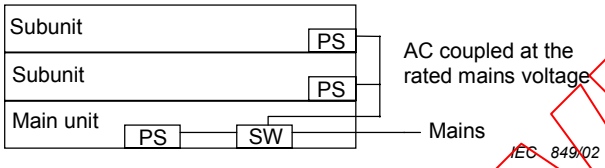

Figure 1c – Systems (separable components)

PS Power supply
SW Switch unit, operated by the standby control unit

Figure 1 – Possible configurations of audio equipment

9.2 Measuring conditions

9.2.1 Input signal

RF or baseband.

If a radio receiver is part of the equipment, the RF input shall be used.

9.2.2 RF input signal

At a level to provide a sufficiently noise free audio signal.

9.2.3 Auxiliary input signal

According to IEC 61938.

9.2.4 Reproduction of tape or disc

Pre-recorded signal.

9.2.5 Audio test 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 shall be used.

9.2.6 Loading of terminals

All loudspeaker terminals should be terminated with the minimum impedance as specified by the manufacturer.

9.2.7 Output level

The volume control shall be adjusted to obtain 50 mW at the loudspeaker terminals. In the case of equipment with surround sound facility, only the front speaker terminals shall be loaded.