

## 1 ANNEX E - TEST PROCEDURE

### E.1 Overview

All testing shall be carried out as specified below.

- A. This section defines a manufacturer independent test process to determine the power consumption of a CSTB under various standardised operating conditions, these are designed to emulate average ‘real world’ viewing habits. All testing shall be carried out in controlled repeatable conditions, as specified below. The general conditions of test are described in IEC 62301 (Household electrical appliances – Measurement of standby power). As far as timing is concerned user initiated as well as APD Standby mode measurement should be taken no less than 30 minutes after the device enters such a mode. Except for a smart card or conditional access module there shall be no external loads connected to the EUT, unless these are required for the EUT to function. If other external loads are required these shall not measurably increase the load on the EUT e.g. for satellite the LNB supply shall be via a DC block (i.e. powered independently).
- B. All compliance testing shall be carried out on products representative of production units. To provide results that will give an accurate representation of actual deployed usage the software used in the EUT shall be the same as the software used by the product when deployed by the service provider. Where the same CSTB has been shipped with more than one software version during the course a Reporting Period then a single representative unit may be tested.
- C. The compliance testing shall be carried out on one random sample product.. If the product fails then that model does not comply with this document. If the product passes with a margin of less than 10% then 2 further random samples shall be taken, if both of these pass then the product complies, if any one exceeds the limits then the product does not comply.
- D. Where the energy consumption can be influenced by the end user, then all measurements shall be made using the default (as shipped) settings.
- E. When testing the audio/video content shall be encoded using a qualifying technology (e.g. MPEG2, MPEG 4 with scrambling) and typically an sports or film channel with a high bit rate
- F. Where an allowance for the Return Path is claimed then the EUT must be operated to the highest version of the Return Path technology with which it is compatible.
- G. Where the allowance for Advanced Video Processing (including High Definition) is taken, then at least 1 test stream shall be encoded using a qualifying technology (e.g. MPEG4, H.264 etc. with scrambling)
- H. Where the allowance for Multi-Decode and Display is claimed then at least one additional display device shall be connected to the EUT when performing the test methods set out at Sections E4-E9 of this Annex E and the secondary display device shall render different content than the primary display device being used for the test. The EUT shall provide content to the additional display device for the duration of the test.

- I. Where a product is capable of scheduling a recording in any mode then for all tests a recording shall be scheduled for at least 2 hours after that test will be completed
- J. Where the allowance for Home network / in-Home Networking interface is claimed, then the network interface must be enabled and connected to a standard Client or Host, but it is not necessary for the network to transfer video or audio data.
- K. For Networked Standby the CSTB should be operated in the most basic mode required to produce an output from the specified broadcast stream over a network working to the standard of that broadcast stream.
- L. Where the allowance for networked standby functionality is claimed, then it must be tested on all the Home Network Interfaces for which allowance is claimed. Energy Consumption shall be measured on each individual Network Port as detailed below.
- M. The results of the testing shall be documented, including and model tested, the serial number of the EUT and the software version numbers.

## E.2 IEC 62301 Basic test requirements

The general conditions of test are described in IEC 62301 (Household electrical appliances - Measurement of standby power). The main requirements are summarised in Table 1 - Main requirements of IEC62301 below.

Test Conditions	Value
Ambient temperature	$23 \pm 5$ °C
Air speed close to the unit	$\leq 0.5$ m/s
Supply voltage	230V $\pm$ 1% 50 Hz $\pm$ 1%
Supply voltage waveform	Total harmonic content $\leq$ 2% Crest factor between 1.34 and 1.49
Power measurement accuracy:	
Power level $\geq$ 0.5W	Uncertainty $\leq$ 2% at the 95% confidence level
Power level $\leq$ 0.5W	Uncertainty $\leq$ 0.01 W at the 95% confidence level
Instrument resolution:	
Power $\leq$ 10 W	Resolution $\geq$ 0.01 W
Power $10 \leq$ 100 W	Resolution $\geq$ 0.1 W

Table 1 - Main requirements of IEC62301

Test instruments shall be calibrated annually to traceable national standards to maintain the levels of accuracy above.

## E.3 Test Method for Standby ( $P_{\text{Standby}}$ , user initiated)

- A. The EUT shall be put into its “On” mode.
- B. After 5 minutes in this mode, the standby or off button on the remote control shall be pressed.
- C. The EUT shall then be left for a maximum of 30 minutes for any housekeeping activities to complete.
- D. At the end of the 30 minutes or completion housekeeping activities (whichever is shorter) the average energy shall be measured for a period of 5 minutes. Based on this 5 minute measurement the standby part of the TEC shall be calculated.

- E. If the EUT has an automatic passive/network standby cycle where automatic wake up from a low power mode is used periodically to receive network updates then the test cycle duration shall be amended to 1 complete passive/network cycle (e.g. 30 minutes passive standby and 5 minutes network standby, test cycle 35 minutes total) the standby part of the TEC shall be calculated based on 1 complete cycle.
- F. If the EUT is fitted with a front panel switch which initiates a different level of energy saving, then the test shall be repeated using the front panel switch to initiate the standby mode, with the test cycle as sections 3.1-5. If the results are different then the higher value shall be used.
- G. If the EUT is fitted with a manual switch on a rear face then that switch shall be disregarded.
- H. Based on this measurement the User initiated Standby part of the TEC shall be calculated.

#### **E.4 Test Method for Auto Power Down ( $P_{APD}$ , EUT initiated )**

- A. The EUT shall be connected to, and displaying a Standard Definition stream
- B. The EUT shall be left until the auto power down takes place.
- C. The EUT shall then be left for a maximum of 30 minutes or for any housekeeping activities (whichever is shorter) to complete. At the end of the 30 minutes or housekeeping activities the average energy shall be measured in accordance with section E3 above
- D. Based on this measurement the APD part of the TEC shall be calculated.

#### **E.5 Test method “On” mode of Standard Definition non-PVR**

- A. The EUT shall be connected to, and displaying a standard definition stream.
- B. The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- C. The average energy shall then be measured over a period of 5 minutes.
- D. Based on this 5 minute measurement the “On” mode part of the TEC shall be calculated.

#### **E.6 Test method for “On” mode of HD, Full HD, UHD and 3D-TV non-PVR**

##### **E.6.1 Tier1**

- A. The EUT shall be connected to, and displaying a stream of the highest resolution it is able to support.
- B. The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- C. The average energy shall then be measured for a period of 5 minutes
- D. The EUT shall then be re-tuned to a standard definition channel and the average energy measured for a further 5 minutes.
- E. Based on these 2 measurements totalling 10 minutes, the “On” mode part of the TEC shall be calculated.

##### **E.6.2 Tier2**

- A. The EUT shall be connected to, and displaying a stream of the highest resolution it is able to support and 3DTV if applicable.
- B. The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- C. The average energy shall then be measured for a period of 5 minutes.

- D. The EUT shall then be re-tuned to a 2D high definition channel at the highest supported resolution and the average consumption measured for a further 5 minutes.
- E. Based on these 2 measurements totalling 10 minutes, the “On” mode part of the TEC shall be calculated.

**E.7 Test method for “On” mode of Standard Definition PVR**

- A. The EUT shall be connected to a Standard Definition stream.
- B. The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- C. The EUT shall then be set to view 1 SD channel whilst a second channel is recorded.
- D. The average energy shall then be measured for a period of 5 minutes.
- E. For the purposes of this test where there is more than 1 tuner the viewed channel shall be different to the recorded channels.
- F. Based on this 5 minute measurement the “On” mode part of the TEC shall be calculated.

**E.8 Test method for “On” mode of High Definition, Full High Definition, UHD and 3D-TV PVR**

- A. The EUT shall be connected to, and displaying a stream of the highest resolution it is able to support
- B. The EUT shall then be left for a maximum of 30 minutes or until the EUT has stabilised.
- C. The EUT shall then be set to view 1 channel at the highest resolution supported, whilst a second HD channel is recorded at a minimum resolution of 720P. For products with more than 2 tuners the EUT shall be set to view 1 channel at the highest supported resolution and shall record n-1 channels (where n= the total number of tuners available) at a minimum resolution of 720P. For example with a 5 tuner EUT one channel shall be displayed and 4 channels recorded
- D. For the purposes of this test where there is more than 1 tuner, each channel shall display or record different content.
- E. The average energy shall then be measured for a period of 5 minutes
- F. Based on this 5 minute measurement the “On” mode part of the TEC shall be calculated.

### **E.9 Test Method for Networked standby ( $P_{\text{Networked standby}}$ , EUT initiated )**

- A. To determine the Network Standby consumption the EUT shall be connected to each qualifying network in turn.
- B. A qualifying Network port is a Local Area network port, wired or wireless, that is intended to handle audio and video streams and, if the EUT is in a standby mode the port can be used to remotely reactivate the EUT into an 'on' mode.
- C. Where multiple ports of the same technology are used, only 1 of port of each technology shall be tested.
- D. The energy consumed by the EUT with each Network port shall be recorded.
- E. The network standby consumption TEC shall be the average consumption of all network ports. E.g. if an EUT has Wi-Fi, Ethernet and MoCA network ports then the Network standby consumption shall be the consumption of all 3 port types divided by 3.
- F. Each LAN port type shall be tested in turn with any other possible Network ports disabled. It shall be indicated in the test report which Network ports were disabled during testing.
- G. Networked standby (EUT initiated) is expected to take place from Idle mode,
- H. If the EUT is capable of scheduling a recording then a recording shall be scheduled 2 hours in the future plus the Networked Standby timeout.
- I. The EUT shall be left until it switches into the Networked standby mode.
- J. When in the Network standby mode the average energy shall be measured for a period of 5 minutes.
- K. If an EUT has more than one network port type, steps F to J shall be repeated for each network port type and the average network standby figure calculated in accordance with E.9 E
- L. If the EUT has an automatic passive/network standby cycle where automatic wake up from a low power mode is used periodically to receive network updates then the test cycle duration shall be amended to 1 complete passive/network cycle (e.g. 30 minutes passive standby and 5 minutes network standby, test cycle 35 minutes total) the standby part of the TEC shall be calculated based on 1 complete cycle.
- M. Based on this measurement the Network Standby part of the TEC shall be calculated for this networked standby mode.

### **E.10 Test Method for Networked on mode ( $P_{\text{Networked}}$ , user initiated )**

- A. If Networked standby is expected to take place from an "On" mode then the EUT shall be set in that "On" mode, i.e. delivering a stream through the network port under test
- B. A qualifying Network port is a Local Area network port, wired or wireless, that is intended to handle audio and video streams and, if the EUT is in a standby mode the port can be used to remotely reactivate the EUT into an 'on' mode.
- C. Where multiple ports of the same technology are used, only 1 of port of each technology shall be tested.
- D. The energy consumed by the EUT with each Network port shall be recorded.
- E. The network standby consumption TEC shall be the average consumption of all network ports. E.g. if an EUT has Wi-Fi, Ethernet and MoCA network ports then

the Network standby consumption shall be the consumption of all 3 port types divided by 3.

- F. Each LAN port type shall be tested in turn with any other Network ports disabled.
- G. If the EUT is capable of scheduling a recording then a recording shall be scheduled 2 hours in the future.
- H. The EUT shall be put into Networked standby by a command over a qualifying network.
- I. The EUT shall then be left for a maximum of 30 minutes for any housekeeping activities to complete.
- J. At the end of the 30 minutes or completion housekeeping activities (whichever is shorter) the average energy shall be measured for a period of 5 minutes. Based on this 5 minute measurement the Network standby part of the TEC shall be calculated.
- K. If the EUT has an automatic passive/network standby cycle where automatic wake up from a low power mode is used periodically to receive network updates then the test cycle duration shall be amended to 1 complete passive/network cycle (e.g. 30 minutes passive standby and 5 minutes network standby, test cycle 35 minutes total) the standby part of the TEC shall be calculated based on 1 complete cycle.