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The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture of ENERGY STAR qualified set-top boxes (STBs). The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on STBs and specifying the testing criteria for STBs. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA’s request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR marks and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR STB model within six months of activating the STB portion of the agreement. When the manufacturing Partner qualifies the product, it must meet the specification in effect at that time;
- for all qualified STBs, clearly display the ENERGY STAR label:
  - on product packaging;
  - in product literature (e.g., user manuals, spec sheets); and
  - on the Partner’s Web site where information about ENERGY STAR qualified models is displayed. If additional information about the ENERGY STAR program(s) or other products is provided by the Partner on its Web site, Partner must comply with the ENERGY STAR Web Linking Policy, which can be found at www.energystar.gov/partners;
- for all qualified STBs sold at retail or directly to the consumer, provide clear and consistent labeling of ENERGY STAR qualified STBs. Clearly display the ENERGY STAR mark via electronic notification or via physical labeling, as follows:
  - electronic notification:
    - the ENERGY STAR mark must appear in cyan, black, or white, as described in the ENERGY STAR Identity Guidelines, which can be found at www.energystar.gov/marks;
    - the ENERGY STAR mark must be at least 10% of the screen by area, may not be smaller than 76 pixels x 78 pixels, and must be legible;
• the ENERGY STAR mark must appear on average at least once per day for a duration of not less than five seconds.

• physical labeling via a permanent or temporary label on the product, as described in the ENERGY STAR Identity Guidelines, which can be found at www.energystar.gov/marks;

• for all qualified STBs sold to Service Providers that are ENERGY STAR partners, the manufacturing Partner may provide labeling. If labeling is provided, then it must meet the requirements above for electronic notification or physical labeling. The STB may only bear the ENERGY STAR certification mark if the Service Provider to whom the box is sold has joined as an ENERGY STAR partner. Appropriate labeling of STBs provided to subscribers is the responsibility of the Service Provider. Partner must clearly communicate the requirements for configuration and installation that are necessary for the STB to maintain ENERGY STAR qualification and receive labeling;

• for all qualified STBs sold to Service Providers that are not ENERGY STAR partners, STBs must NOT bear the ENERGY STAR mark, although the manufacturing Partner is welcome to explain that the box meets ENERGY STAR levels and may point the Service Provider to the ENERGY STAR qualified product list for verification;

Note: Some manufacturers have requested that they be permitted to use the ENERGY STAR mark on ALL boxes that meet ENERGY STAR requirements regardless of the partner status of the service provider customer. EPA welcomes feedback from stakeholders on this proposal. Specifically, it would be useful to understand the situations in which energy consumption of boxes could NOT change despite service provider actions, and how manufacturers propose reporting such claims to EPA.

• explain the conditions under which the model is able to earn the ENERGY STAR in product guide and specification sheets for each qualified product. For STBs sold at retail, include information on how using the product in conjunction with a Service Provider subscription can impact the product’s energy use, and what steps the consumer must take to assure that the product still meets ENERGY STAR criteria. In addition, these materials shall notify Service Providers that they must complete an ENERGY STAR Partnership Agreement before labeling any STB, or claiming to provide ENERGY STAR qualified STBs in advertising or promotions;

• provide to EPA, on an annual basis, an updated list of ENERGY STAR qualified STB models. Once the Partner submits its first list of ENERGY STAR qualified STB models, the Partner will be listed on the ENERGY STAR Web site. Partner must provide annual updates in order to remain on the list of participating product manufacturers;

• provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified STBs shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., type, presence of additional functions, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;

• notify EPA of a change in the designated responsible party or contacts for STBs within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:
• provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message;

• consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program;

• purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials’ contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes;

• feature the ENERGY STAR mark(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;

• ensure the power management feature is enabled on all ENERGY STAR qualified displays and computers in use in company facilities, particularly upon installation and after service is performed;

• provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified product models;

• provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, communicate, and/or promote Partner’s activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user’s manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products: and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;

• provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message;

• join EPA’s SmartWay Transport Partnership to improve the environmental performance of the company’s shipping operations. SmartWay Transport works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway;

• join EPA’s Climate Leaders Partnership to inventory and reduce greenhouse gas emissions. Through participation, companies create a credible record of their accomplishments and receive EPA recognition as corporate environmental leaders. For more information on Climate Leaders, visit www.epa.gov/climateleaders;

• join EPA’s Green Power partnership. EPA’s Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities; visit www.epa.gov/gmpower.
Below is the Version 3.0 product specification for ENERGY STAR qualified set-top boxes. A product must meet all of the identified criteria if it is to earn the ENERGY STAR.

1. Definitions

A) **Base Type**: For purposes of this specification, base type is the primary means of access to video content for a STB. All base types may be configured in a simple STB with only one stand-alone tuner or as part of a complex STB with additional functionality (e.g., DVR, DVD playback/recording).

1) **Cable STB**: A STB whose principal function is to receive television signals from a broadband, hybrid fiber/coaxial, or community cable distribution system with conditional access (CA) and deliver them to a consumer display, thin-client/remote STB, and/or recording device.

2) **Satellite STB**: A STB whose principal function is to receive television signals from satellites and deliver them to a consumer display, thin-client/remote STB, and/or recording device.

3) **Cable / Satellite Digital Transport Adapter (DTA)**: A minimally-configured STB with no “Additional Functionalities” whose principal function is to receive television signals from (1) a broadband, hybrid fiber/coaxial, or community cable distribution system or (2) a satellite distribution system, and deliver them to a consumer display and/or recording device.

4) **Internet Protocol (IP) STB**: A STB whose principal function is to receive television/video signals encapsulated in IP packets and deliver them to a consumer display, thin-client/remote STB, and/or recording device.

5) **Terrestrial STB**: A STB whose principal function is to receive television signals over the air (OTA) or via community cable distribution system without conditional access (CA) and deliver them to a consumer display, thin-client/remote STB, and/or recording device.

6) **Thin-client / Remote STB**: A STB that is designed to interface between a Multi-room 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 STB for access to content. Any STB that meets the definition of a cable, satellite, IP, or terrestrial STB is not a thin-client/remote STB.

**Note**: The STB Base Type definitions have been modified in this draft as follows:

- The “STB Type” and “STB Base Functionality” definitions from the Version 2.0 specification have been merged into a single “STB Base Type” definition for simplicity.
- The Cable, IP, Satellite, and Terrestrial STB base type definitions now explicitly include content delivery to Thin-client/Remote STBs, in order to accommodate new Multi-room system architectures.
- The Cable & Terrestrial STB base type definition now explicitly include reference to Conditional Access. Cable STBs without CA are to be considered Terrestrial STBs.
- The Cable / Satellite DTA base type has been added as a means of differentiating Transport Adaptors from more full-featured STBs. Cable/Satellite DTAs are similar in function to Terrestrial DTAs that are eligible for qualification under the ENERGY STAR DTA specification, and will be subject to similar energy efficiency targets under the Version 3.0 STB specification.
Note: EPA is considering further modifications to the IP Base Type definitions to differentiate IP STBs that are distributed under traditional Service Provider lease agreements from those that are sold directly to the consumer or through retail channels. Supplementary data collection is in progress to validate the assumption that there is a significant variation in energy performance between these subcategories of IP STB. Stakeholders are asked to submit comments on the differences across types of IP STBs that may affect energy efficiency.

B) Additional Functionality:

1) **Additional Tuners**: One or more tuners (exclusive of the base type tuner) that receive television signals or other A/V content and deliver them to a consumer display, thin-client/remote STB, or recording device. An additional tuner may receive content from a physically separate A/V input or in a concurrent stream from the primary input. Out-of-band tuners built in compliance with ANSI/SCTE 55-1 2002 and ANSI/SCTE 55-2 2002 or similar specifications are not considered additional tuners under this specification.

2) **Additional Tuners – Terrestrial / IP**: An additional tuner of Terrestrial or IP type. A device with two tuners (one base type tuner plus one additional tuner) has the ability to simultaneously tune two separate streams of video for delivery on separate outputs (outputs being either physical outputs, picture-in-picture, or recording mechanisms).

3) **Advanced Video Processing**: Advanced methods for video encoding, transcoding and decoding (e.g., H.264/MPEG 4, SMPTE 421M).

4) **CableCARD**: A plug-in conditional access module that complies with ANSI/SCTE 28. A CableCARD is inserted into a digital cable-ready device to enable the decryption of premium content and services and provide other network control functions. Also known as a “Card” or a “Point of Deployment” (POD) module.

5) **Data Over Cable Service Interface Specification (DOCSIS)**: An 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.

6) **Digital Video Recorder (DVR)**: A function that allows video content to be stored locally on a hard disk drive or other non-volatile storage media in the STB. For purposes of this specification, the DVR functionality must be integral to the STB (e.g., does not apply to use of a connected personal computer DVR, or to server-based DVR capabilities made available through Service Provider Video On Demand (VOD) services).

7) **High Definition (HD) Resolution**: Video output with resolutions greater than 480i/p.

8) **Home Network Interface**: An interface (e.g., WiFi, MOCA) that allows a STB to interface with external devices through a network.

9) **Multi-room STB**: A Cable, Satellite, IP or Terrestrial STB that is capable of distributing simultaneous, independent streams of video content to multiple displays or thin-client/remote STBs within a single family dwelling. For the purposes of this specification, a connected display must have a resolution of no less than 480i. Products that provide gateway services in multi-subscriber scenarios are not considered multi-room STBs under this specification.

10) **Removable Media Player**: A device whose primary purpose is the decoding of digitized video signals on DVD or Blu-ray Disc optical media.

11) **Removable Media Player / Recorder**: A device whose primary purpose is the production or recording of digitized video/audio signals on DVD or Blu-ray Disc optical media.

C) **Automatic Power Down (APD)**: The capability to automatically switch a device from On mode to Sleep mode after a predetermined period of time (APD timing) has elapsed. APD timing begins when the following criteria have been met:

† CableCARD is a registered trademark of CableLabs®
1) the device has ceased performance of all primary functions, or
2) the last user input has been received (e.g., remote control signal, volume adjustment).

D) **Primary Function:** For purposes of this specification, a primary function is defined as follows:

1) delivery of live or recorded A/V content to a thin-client/remote STB or local/remote recording device is considered a primary function;
2) delivery of live or recorded A/V content to a consumer display within 4 hours of last user interaction/input is considered a primary function;
3) continuous device functions (e.g., clocks, status displays, indicator lamps) are NOT considered primary functions.

**Note:** The definitions for APD and Primary Function have been updated to be more consistent with the definition in the Version 2.0 ENERGY STAR Audio/Video specification. When implemented, the APD function is expected to switch a STB that is delivering content to a display from On mode to Sleep mode after 4 hours without user interaction. The same STB is not expected to APD if there is an active recording in progress, or if the device is engaged in delivery of video content to a thin-client / remote STB.

E) **Operational Modes:**

1) **On Mode:** Where the product is connected to a mains power source, has been activated and may be providing one or more primary functions. The common terms “active”, “in-use” and “normal operation” also describe this mode.
2) **Sleep Mode:** Where the product is connected to a mains power source, is not providing a primary function, and offers one or more of the following user oriented or protective functions which may persist for an indefinite time:
   i) to facilitate the activation of other modes (including activation or deactivation of On mode) by remote switch (including remote control), internal sensor, timer;
   ii) continuous function: information or status displays including clocks;
   iii) continuous function: sensor-based functions.

**Note:** The definitions of Operational Modes have been updated to be more consistent with the definitions in the Version 2.0 ENERGY STAR Audio/Video specification and other recent ENERGY STAR specification updates.

F) **Miscellaneous:**

1) **Service Provider:** An entity that provides video (and possibly other) content to subscribers with whom it has an ongoing contractual relationship. For purposes of this specification, a Service Provider distributes STBs covered by this specification to end users under a lease or rental arrangement.
2) **Conditional Access (CA):** The encryption, decryption, and authorization techniques employed to protect content from unauthorized viewing. CableCARD and Downloadable Conditional Access System (DCAS) are examples of conditional access technology.

**Note:** The definitions for Digital Television Adapter and Game Console have been removed from this specification in favor of a reference (see Section 2.2 “Excluded Products”) to definitions that are included in the ENERGY STAR specifications for those products.

3) **Out-of-band Tuner:** A tuner compliant with ANSI/SCTE 55-1 2002 and ANSI/SCTE 55-2 2002 or similar specifications that is used to access data channels outside of the audio/video source signal. Out-of-band tuners may facilitate two-way communication between a STB and Service...
Provider for purposes of enabling system diagnostics or access to Pay-Per-View or other interactive content.

4) **Typical Energy Consumption (TEC):** An estimation of energy consumption (in kWh) over a specific period of time (typically one year) that is intended to represent consumption by an average end-user. TEC is determined by measuring average power consumption in various operational modes and then multiplying by an assumed duty cycle.

5) **Unit Under Test (UUT):** The device being tested.

### 2. Qualifying Products

#### 2.1. Included Products

A product must meet the definition of a STB provided in Section 1 to be eligible for ENERGY STAR qualification under this specification, with the exception of products identified in Section 2.2.

#### 2.2. Excluded Products

Products that are covered under existing ENERGY STAR product specifications are not eligible for qualification under the STB specification. The list of specifications currently in effect can be found at [www.energystar.gov/products](http://www.energystar.gov/products). Products which meet the definition of a Display, Television, Computer, Computer Server, Game Console, Audio/Video Product, or Digital Television Adapter (DTA) per the definitions in ENERGY STAR requirements for those product categories are excluded from qualification under this specification.

### 3. Energy Efficiency Criteria

A product must meet all of the requirements specified below to be eligible for ENERGY STAR qualification under this specification.

#### 3.1. General Qualification Criteria

1) **Products Sold with an External Power Supply:** To qualify for ENERGY STAR, STB products that are sold with an External Power Supply must use either; (1) an EPS that is ENERGY STAR qualified, or (2) an EPS that meets the applicable No-load mode limits, Active mode efficiency levels, and power factor requirements provided in the latest version of the ENERGY STAR Program Requirements for Single Voltage External AC-AC and AC-DC Power Supplies. The EPS specification and qualified product list can be found at [www.energystar.gov/powersupplies](http://www.energystar.gov/powersupplies).

2) **Speculative Recording:** STBs that provide for speculative recording must have a user-accessible menu option to allow the user to disable speculative recording. Manufacturers must also include instructions for disabling speculative recording in product materials.

3) **Auto Power Down (APD):** APD functionality is not a requirement under this specification. However, credit for anticipated energy savings for STBs with APD capability is provided in Section 3.3. In order to use Equation 1B and claim benefits from APD functionality, the following requirements must be met:

   i) If the APD credit is claimed for purposes of ENERGY STAR qualification, the STB must be shipped from the manufacturer with APD enabled by default and APD timing of no more than 4 hours. Default APD settings shall persist unless the user chooses at a later date to: a) manually disable APD, or b) manually modify the APD timing. Partner may choose to restrict users from modifying APD settings.

   ii) The STB may automatically exit Sleep mode in order to download content, scan for system information, retrieve program scheduling information, or perform any other maintenance activity. After this activity has completed, the STB must return to Sleep mode in no more than...
15 minutes. The STB may automatically exit Sleep mode for no more than an average\textsuperscript{2} of two (2) hours in a twenty-four (24) hour period. This requirement is exclusive of activities scheduled by the end user (e.g., scheduled DVR recording of a television program). Video downloads that are not user-requested (e.g., “speculative recording”, or “push”) are to be included in the two hour per day requirement.

### 3.2. TEC Allowance

\textbf{Note:} Based on substantial stakeholder feedback regarding the difficulty of meeting the TEC allowances proposed to take effect on January 1, 2011, EPA performed a detailed EPA analysis of qualified product (QP) data to identify strategic opportunities to ease the ENERGY STAR specification requirements over the next three years. The following changes have been incorporated, as a result of this analysis:

- Version 3.0 includes two tiers of requirements, effective June 1, 2011 and June 1, 2013, respectively.
- Given recent STB technology trends, the Home Network Interface and Advanced Video Processing allowances that were included for Tier 2 in the Version 2.0 specification (10kWh/year and 12 kWh/year, respectively) have been removed from the list of additional functionality allowances for Version 3.0, and added to the base type allowances for Cable STBs in Tier 1 of this specification.
- The Satellite STB base type allowance has been set to be the same as the Cable STB base type allowance based on a review of existing STB data, which showed that basic Satellite STBs would be able to satisfy the new base limit as enumerated in this version.
- The Tier 1 Version 3.0 allowances for DVR and HD output have been increased to 45 kWh/year and 25 kWh/year, respectively, in order to enable more full-featured STBs to qualify for ENERGY STAR.
- The Tier 1 Version 3.0 allowances for CableCARD or DOCSIS are unchanged from those specified in the Version 2.0 specification.
- The base type allowance for Cable / Satellite DTA has been set at 35 kWh/year for Tier 1, such that the best available DTA STBs will be able to qualify for ENERGY STAR under Version 3.0.
- The base type allowance for IP is listed as “TBD” pending the results of supplementary data collection by EPA. Proposed allowances for IP STBs will be made available to stakeholders as soon as possible.

#### 1) Base Functionality Allowance

The STB base functionality energy allowance shall be determined using values from Table 1, and shall satisfy the following requirements:

- **CABLE:** If the STB meets the definition of Cable STB base type, regardless of whether the cable reception is considered the “principal function” by the manufacturer or Service Provider, and/or the STB is capable of receiving cable service after installation of a CableCARD™ or other type of conditional access system, the Base Functionality shall be CABLE.
- **SATELLITE:** If the STB Base Functionality is not CABLE, and the STB meets the base type definition of Satellite STB, regardless of whether the satellite reception is considered the “principal function” by the manufacturer or Service Provider, the Base Functionality shall be SATELLITE.
- **CABLE / SATELLITE DTA:** If the STB meets the definition of Cable / Satellite DTA base type, regardless of whether the IP reception is considered the “principal function” by the manufacturer or Service Provider, the Base Functionality shall be CABLE / SATELLITE DTA.

\textsuperscript{2} Averaged over a time period of one month.
iv) **INTERNET PROTOCOL (IP):** If the STB Base Functionality is not CABLE, SATELLITE, or CABLE / SATELLITE DTA, and the STB meets the base type definition of IP STB, regardless of whether the IP reception is considered the “principal function” by the manufacturer or Service Provider, the Base Functionality shall be IP.

v) **TERRESTRIAL:** If the STB Base Functionality is not CABLE, SATELLITE, CABLE / SATELLITE DTA, or IP, and the STB meets the base type definition of Terrestrial STB, regardless of whether the terrestrial reception is considered the “principal function” by the manufacturer or Service Provider, the Base Functionality shall be TERRESTRIAL.

vi) **THIN-CLIENT / REMOTE:** If the STB Base Functionality is not CABLE, SATELLITE, CABLE / SATELLITE DTA, IP, or TERRESTRIAL, and the STB otherwise meets the base type definition of Thin-Client/Remote, the Base Functionality shall be THIN-CLIENT / REMOTE.

### Table 1: Base Functionality Annual Energy Allowance

<table>
<thead>
<tr>
<th>Base Functionality</th>
<th>Tier 1 Annual Energy Allowance (kWh/year)</th>
<th>Tier 2 Annual Energy Allowance (kWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABLE</td>
<td>72</td>
<td>TBD</td>
</tr>
<tr>
<td>SATELLITE</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>INTERNET PROTOCOL (IP)</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>TERRESTRIAL</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>THIN-CLIENT / REMOTE</td>
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<td></td>
</tr>
<tr>
<td>CABLE / SATELLITE DTA</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

Note: In recognition of the continuing evolution of STB products, EPA is proposing two tiers of energy efficiency levels in this Version 3.0 specification. Over more than 15 years, and across a wide range of product categories in the ENERGY STAR suite, ENERGY STAR has successfully rewarded products that (1) deliver a robust, high-quality experience when in use, (2) supply power only to those components engaged in delivery of the user experience, while forcing other components to sleep, (3) shift all components to a very low power state when not in use, and (4) wake quickly and seamlessly when engaged by users. Products with these capabilities satisfy consumer expectations for both a high-quality user experience and energy savings. EPA wishes to continue to promote best-in-class energy efficiency in STBs, and is working to develop more stringent Tier 2 Version 3.0 levels that reflect this goal. To develop these levels, EPA is considering expected changes in the STB market over the next few years, especially with respect to the widespread implementation of multi-room STBs and other novel system architectures. EPA will share these proposed Tier 2 levels with stakeholders as soon as possible.

2) **Additional Functionality Allowances:** The STB additional functionality allowances shall be determined using values from Table 2, and shall satisfy the following requirements:

   i) Additional functionality allowances shall not be applied to STBs with CABLE / SATELLITE DTA base functionality.

   ii) The **HIGH DEFINITION (HD)** allowance shall not be applied to STBs with TERRESTRIAL base functionality.

   iii) The **ADDITIONAL TUNERS** allowance shall be applied only once per STB, regardless of the number of tuners installed in the device, as applicable.
iv) The ADDITIONAL TUNERS - TERRESTRIAL / IP allowance shall be applied only once per STB, regardless of the number of tuners installed in the device, as applicable.

v) The MULTI-ROOM allowance shall be applied only once per STB, regardless of the number of rooms served by the device, as applicable.

vi) The CABLECARD allowance shall be applied once per each CableCARD installed in the STB, as applicable.

vii) The DOCSIS allowance shall only be applied to STBs that are installed in a Service Provider network with DOCSIS capability.

Note: The preceding list of requirements has been compiled from the footnotes to Table 2 in the Version 2.0 specification. The previous notes for Home Network Interface and Advanced Video Processing have been deleted, as they are no longer applicable to this specification.

Table 2: Additional Functionalities Annual Energy Allowance

<table>
<thead>
<tr>
<th>Additional Functionality</th>
<th>Tier 1 Annual Energy Allowance (kWh/year)</th>
<th>Tier 2 Annual Energy Allowance (kWh/year)</th>
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<td>ADDITIONAL TUNERS</td>
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</tr>
<tr>
<td>ADDITIONAL TUNERS – TERRESTRIAL / IP</td>
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<td>DIGITAL VIDEO RECORDER (DVR)</td>
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<td>HIGH DEFINITION (HD)</td>
<td>25</td>
<td></td>
</tr>
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<td>REMOVABLE MEDIA PLAYER</td>
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<td>TBD</td>
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<td>REMOVABLE MEDIA PLAYER / RECORDER</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>MULTI-ROOM</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CABLECARD</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>DOCSIS</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Example:

(A) Under Tier 1, the energy allowance for a high-definition, Cable STB with DVR to qualify for ENERGY STAR would be 142 kWh/yr (72 kWh/yr base + 25 kWh/yr for HD + 45 kWh/yr for DVR).

3.3. TEC Assessment

To qualify for ENERGY STAR, the Combined TEC for a product must not exceed the sum of the annual energy allowances for the product’s base functionality and applicable additional functionalities. Note that some simple Cable or Satellite STBs may not qualify for any additional functionality allowances. The Combined TEC is the maximum amount of energy the STB can consume in a given year, as determined by the ENERGY STAR test procedure.

1) Base TEC Assessment: Equations 1A and 1B apply to all products. Base TEC is calculated by multiplying the power consumption in each state by the duty cycle values in the equations below,
where $P_{TV}$, $P_{Sleep}$ and $P_{AutoPD}$ are measured according to the ENERGY STAR test procedure.

Equation 1A shall be used for products that do not offer Auto Power Down, and Equation 1B shall be used for products that do offer Auto Power Down.

i) Equation 1A: Base TEC assessment for a product with no auto power down capability:

\[
\text{kWh}_{\text{Base}} = 0.365 \times \left(14 \times P_{TV} + 10 \times P_{Sleep}\right)
\]

ii) Equation 1B: Base TEC assessment for a product with auto power down capability:

\[
\text{kWh}_{\text{Base}} = 0.365 \times \left(7 \times P_{TV} + 10 \times P_{Sleep} + 7 \times P_{AutoPD}\right)
\]

Examples:

(B) The UUT (Cable STB, HD, DVR, no APD) power measurements are as follows: $P_{TV} = 24.0$ watts and $P_{Sleep} = 18.0$ watts. The Base TEC assessment is then:

\[
\text{kWh}_{\text{Base}} = 0.365 \times (14 \times 24.0 + 10 \times 18.0) = 188 \text{ kWh/yr}
\]

(C) The UUT (Cable STB, HD, DVR, APD) power measurements are as follows: $P_{TV} = 24.0$ watts, $P_{Sleep} = 18.0$ watts and $P_{AutoPD} = 18.0$ watts. The Base TEC assessment is then:

\[
\text{kWh}_{\text{Base}} = 0.365 \times (7 \times 24.0 + 10 \times 18.0 + 7 \times 18.0) = 173 \text{ kWh/yr}
\]

2) Playback and Record TEC Assessment: Equation 2 applies only to products with DVR, Removable Media Playback, or Removable Media Playback with Record capability. Playback and Record TEC is calculated by multiplying the power consumption in each state by the duty cycle values in the equations below, where $P_{TV}$, $P_{Playback}$ and $P_{Record}$ are measured according to the ENERGY STAR test procedure.

i) Equation 2: Payback and Record TEC assessment:

\[
\text{kWh}_{\text{Play}/\text{Record}} = 0.365 \times \sum_{i} (P_{mod-e} - P_{TV}) \times H_{mod-e}
\]

Table 3: Playback and Record TEC Duty Cycle

<table>
<thead>
<tr>
<th>Mode</th>
<th>DVR (hours/day)</th>
<th>Removable Media Playback (hours/day)</th>
<th>Removable Media Playback w/ Record (hours/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours On-Playback ($H_{\text{Playback}}$)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hours On-Record ($H_{\text{Record}}$)</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Example:

(D) The UUT (Cable STB, HD, DVR, no APD) power measurements are as follows: $P_{TV} = 24.0$ watts, $P_{Playback} = 30.0$ watts and $P_{Record} = 32.0$ watts. The Playback/Record TEC assessment is then:

\[
\text{kWh}_{\text{Play}/\text{Record}} = 0.365 \times ((30.0 - 24.0) \times 2 + (32.0 - 24.0) \times 3) = 13.1 \text{ kWh/yr}
\]
3) Combined TEC Assessment: If the STB includes a DVR, Removable Media Playback, or Removable Media Playback with Record capability, add the results of Equation 1 and Equation 2 to determine Combined TEC. If the STB does not include DVR, Removable Media Playback, or Removable Media Playback w/ Record capability, the Combined TEC is equivalent to the result of Equation 1.

i) Equation 3: Combined TEC assessment:

\[ kWh_{\text{Combined}} = kWh_{\text{Base}} + kWh_{\text{Play/Record}} \]

Example:

(E) In the case of a HD STB with a DVR as used above, the Combined TEC would be the sum of Equation 1 and Equation 2 (188.3 + 13.1) for a total of 201.4 kWh/yr for this STB.

3.4. STBs with Multi-room Capability

To qualify for ENERGY STAR, STBs with multi-room capability must be evaluated according to the following process:

1) STBs with multi-room capability must first be tested with only one display output in use (single-output configuration).

2) Compare the calculated TEC for the STB in single-output configuration to the annual energy allowance for the STB, excluding the Multi-room allowance.

3) If the STB meets ENERGY STAR qualification criteria in the single-output configuration without the Multi-room allowance, it may be qualified for ENERGY STAR under any installation configuration (i.e., it can be used for one or more TVs).

4) If the STB does not meet ENERGY STAR qualification criteria in Step 2, it must then be tested with two display outputs in use (dual-output configuration).

5) Compare the calculated TEC for the STB in dual-output configuration to the annual energy allowance, including:

i) the Multi-room allowance, and

ii) for STBs that can support a second TV without the need for a thin client, and do so over standard RF cabling with common, unencrypted N/ATSC; 50% (one half) of the THIN-CLIENT/REMOTE base functionality allowance.

6) If the STB meets ENERGY STAR qualification criteria in the dual-output configuration, it must be qualified for ENERGY STAR only as a Multi-room STB. The manufacturer must clearly indicate in product literature that the product qualifies for ENERGY STAR only when providing content to more than one TV.

4. Testing

Partners are required to perform tests and self-certify those Set-top Box products that meet the ENERGY STAR guidelines. A representative sample of STB products shall be tested to ensure that all units meet the ENERGY STAR criteria. Test results must be reported to the EPA using the STB Qualifying Product Information (QPI) Form, as directed. Test results must be included with the product submission. All testing shall be performed per the ENERGY STAR Set-top Box Test Procedure included as Appendix A of this document.

The following method shall be used to determine an appropriate representative sample size for STB qualification:
1) Randomly select a pool of five (5) units of the STB model to be tested. If the units have been refurbished, all must have undergone the same refurbishment or reconfiguration, and must have received the same hardware and software upgrades.

2) Test three (3) units drawn at random from the pool of five according to the ENERGY STAR Set-top Box Test Procedure.
   
   i) If all three tested units meet the applicable ENERGY STAR criteria, and are not within 10% of the allowance in the specification, the STB model meets ENERGY STAR requirements and can be qualified as ENERGY STAR, and no more testing is needed.
   
   ii) If all three tested units meet the applicable ENERGY STAR criteria, but one or more of the units are within 10% of the allowance in the specification, go to Step 3.
   
   iii) If any of the three tested units do not meet the applicable ENERGY STAR criteria, the STB model cannot be qualified as ENERGY STAR.

3) Test the additional two units in the pool. If both units meet the applicable ENERGY STAR criteria, the STB model meets ENERGY STAR requirements and can be qualified as ENERGY STAR, and no more testing is needed. If either of the two units does not meet the applicable ENERGY STAR criteria, the STB model cannot be qualified as ENERGY STAR.

5. User Interface

Although not mandatory, manufacturers are strongly recommended to design products in accordance with the Power Control User Interface Standard — IEEE 1621 (formally known as “Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments”). Compliance with IEEE 1621 will make power controls more consistent and intuitive across all electronic devices. For more information on the standard, see http://eetd.lbl.gov/Controls.

6. Effective Date

Note: Based on stakeholder feedback regarding the need for specification effective dates in June/July versus January, EPA has changed the Tier 1 Version 3.0 effective date to June 1, 2011.

The date that products must meet the requirements specified under the Version 3.0 Set-top Box specification will be defined as the effective date of the agreement. Any previously executed agreement on the subject of ENERGY STAR qualified STB products shall be terminated effective June 1, 2011 for products eligible under the Version 2.0 Program Requirements for Set-top Boxes.

1) Qualifying and Marking Products under the Tier 1 Version 3.0 Specification: All products, including models originally qualified under Version 2.0, with a date of manufacture on or after June 1, 2011, must meet the new (Version 3.0) requirements in order to qualify for ENERGY STAR.

The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.

2) Qualifying and Marking Products under the Tier 2 Version 3.0 Specification: All products, including models originally qualified under Tier 1 Version 3.0, with a date of manufacture on or after June 1, 2013, must meet the Tier 2 requirements in order to qualify for ENERGY STAR.

3) Elimination of Grandfathering: EPA will not allow grandfathering under this Version 2.0 ENERGY STAR specification. ENERGY STAR qualification under previous Versions is not automatically granted for the life of the product model. Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification in effect at the time of manufacture of the product.

7. Future Specification Revisions

EPA reserves the right to revise the specification should technological and/or market changes affect its
usefulness to consumers or industry or its impact on the environment. In keeping with current policy, revisions to the specification will be discussed with stakeholders. In the event of a specification revision, please note that ENERGY STAR qualification is not automatically granted for the life of a product model. To qualify as ENERGY STAR, a product must meet the ENERGY STAR specification in effect on the date of manufacture of the product.
APPENDIX A:
ENERGY STAR Test Procedure for Set-top Boxes

1. Overview
The following protocol shall be followed when measuring the power consumption of STB products for compliance with the Version 3.0 ENERGY STAR Set-top Box Specification. The following workload-based test procedure is centered on the actions of the end-user and is intended to represent the practical output of STBs in typical end-use applications, and is not meant to be representative of every possible STB function and use scenarios.

2. Applicability
Partners must test products in their “as-shipped” configuration. For products that offer a choice of user-configurable options, all options shall be set to their default condition.

3. Definitions
Unless otherwise specified, all terms used in this test procedure are consistent with the definitions contained in the Version 3.0 ENERGY STAR Eligibility Criteria for Set-top Boxes.

4. Test Setup
Test setup and instrumentation shall be in accordance with the requirements of IEC 62301, Ed. 1.0, “Measurement of Household Appliance Standby Power”, Section 4, and CSA C380-08 “Test Procedure for the Measurement of Energy Consumption of Set-top Boxes”, unless otherwise noted in this document. In the event of conflicting requirements, this test procedure shall take precedence. The setup and instrumentation requirements from IEC 62301, Ed. 1.0, Section 4 are applicable to both On and Sleep mode testing for ENERGY STAR.

4.1. Test Conditions

<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>North America</th>
<th>Europe / Australia / New Zealand</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Note: For products rated for greater than 1.5 kW, voltage tolerance is ± 4%)</td>
<td>115 (± 1%) Vac, 60 Hz (± 1%)</td>
<td>230 (± 1%) Vac, 50 Hz (± 1%)</td>
<td>220 (± 1%) Vac, 50 Hz (± 1%)</td>
<td>100 (± 1%) Vac, 50 Hz (± 1%) 100 (± 1%) Vac, 60 Hz (± 1%)</td>
</tr>
<tr>
<td>Total Harmonic Distortion (Voltage)</td>
<td>&lt; 2% THD (&lt; 5% THD for products which are rated for &gt; 1.5 kW maximum power)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>23°C ± 5°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>10% min 80% max</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Models Capable of Operating at Multiple Voltage/Frequency Combinations: Manufacturers shall test their products for qualification in every market in which they will be sold and promoted as ENERGY STAR. For
products that are sold as ENERGY STAR in several markets and rated for multiple input voltages, the
manufacturer must test and report the required power consumption or efficiency values at all relevant
definitions (e.g., a manufacturer that ships the same model to the United States and
Europe must measure, meet the specification, and report test values at both 115 Vac / 60 Hz and 230 Vac
/ 50 Hz in order to qualify the model as ENERGY STAR in both markets). If a model qualifies as ENERGY
STAR at only one voltage/frequency combination, then it may only be qualified and promoted as ENERGY
STAR in regions that support the qualified voltage/frequency combination.

4.2. Calibration
All test equipment shall be annually calibrated by a laboratory accredited to ISO/IEC 17025:2005 by an
ILAC recognized accreditation body.

4.3. Power Measurement Location
All power measurements shall be taken at a point between the AC mains power source and the UUT.

4.4. Source Signals
a) Reference Channels:
   [A] Network television channel, standard definition (SD) format, 480i minimum resolution.
   [B] Live or recorded sports channel;
   (a) If the STB is HD capable, this channel shall be in HD format, minimum 720p
   resolution.
   (b) If the STB is not HD capable, this channel shall be in SD format, minimum 480i
   resolution.
   [C] 24-hour news channel, standard definition (SD) format, 480i minimum resolution.

b) Headend System Interaction:
   (1) All STBs with POD/CableCARD-encrypted content must decrypt by POD/CableCARD.
   (2) All Cable STBs must interact with Conditional Access (CA) system data via DOCSIS Set-
   top Gateway (DSG) or SCTE-55.
   (3) All Telecom QAM/IP STBs must interact with CA system data via SCTE-55 and/or via an
   applicable LAN technology (e.g., MoCA).
   (4) All IP STBs must interact with CA system data via applicable LAN technology (e.g. IEEE-
   802.3, MoCA).
   (5) All Satellite STBs must interact with CA system via LNB and POTS modem.
   (6) All Terrestrial STBs must interact with an ATSC signal from a live source.

4.5. UUT Configuration and Control
a) UUT Control: The UUT shall be controlled with the factory-supplied remote control (I/R or RF) to
the extent possible. For units that do not ship with a remote control, or for functions that cannot
be exercised with the supplied remote control, control interfaces on the face or body of the UUT
may be used.

b) Tuning: For purposes of this specification, tuning to a broadcast video source is defined as one
tuner acquiring an encrypted digital video service, where the video service is rendered on all
analog audio/video outputs (e.g., RF modulated, S-Video, composite, and component) and on
all S/PDIF audio outputs, as applicable.

c) Satellite Low Noise Block (LNB): Incremental power required to operate LNB(s), if drawn from
the STB, may be subtracted from all power measurements. It is preferable that all LNB power
drawn be supplied separately. Otherwise, the amount subtracted must be clearly noted on the Qualified Product Information (QPI) form.

d) Secondary Device Functions: The following UUT secondary functions shall be disabled for testing, as applicable:

(1) WiFi, unless video streaming over WiFi is the primary means of content delivery.

(2) Voice Over IP (VOIP)

(3) Data Services that are made available to the end-user (e.g., broadband services)

e) Conditional Access: If the UUT uses POD or CableCARD for conditional access system control, then insert the applicable card into the UUT prior to applying power.

f) Battery Powered Devices: If the UUT contains rechargeable batteries, or can be integrated with another device that contains rechargeable batteries, all batteries shall be in a fully charged state for the duration of testing.

g) A/V Interconnections: If the UUT offers several audio and video interconnection options, select and configure the system with one of the following interconnections, in order of preference: HDMI, component, S-video, and composite.

4.6. UUT Initialization

Prior to the start of testing, the UUT shall be initialized as follows:

1) Set up the UUT per the instructions in the supplied operating manual.

2) Connect the UUT to a display device via an A/V Interconnection as specified above (e.g., HDMI).

3) Connect the UUT to the power source.

4) Power on the UUT with the remote control and perform initial system configuration, as applicable. Ensure that UUT features and functions are in their as-shipped configuration.

5) Connect the UUT to the signal source. The input signal shall comply with the requirements in Section 4.3, above.

6) Let the UUT sit for at least 15 minutes, or until the unit has completed initialization and is ready for use.

7) Measure and record the AC mains input voltage and frequency.

8) Measure and record the test room ambient temperature.

5. Test Procedures

5.1. Watching Live TV ($P_{TV}$)

1) Verify that the UUT is turned on and tuned to a live television channel. If the UUT base type is IP, and the UUT does not have the capability to play back live, streaming video content (i.e., the UUT is a "download-only" device), this portion of the test procedure must be performed while the video content is simultaneously being played back and downloaded.

2) If the UUT offers DVR functionality, this portion of the test procedure must be performed with the primary video stream paused for 5%, in fast forward for 10% and in rewind for 10% of the total test time, while raw video input is simultaneously being buffered. This requirement does not increase the total overall test times.

3) Tune to Reference Channel A.

4) Measure and record the average power consumption over a 5-minute period.

5) Tune to Reference Channel B (if the UUT is HD capable, Reference Channel B should be in HD format).
622  6) Measure and record the average power consumption over a 10-minute period.
623  7) Tune to Reference Channel C. If the UUT has one or more Additional Tuners, set a second tuner
to Reference Channel A and render it simultaneously in a window embedded in the primary
display window (i.e., Picture-in-Picture). The second window shall be as close to 25% of the total
display screen area as possible. If no picture-in-picture capability exists, the second channel shall
be recorded in the background.
628  8) Measure and record the average power consumption over a 5-minute period.
629  9) Record the average power consumption for the full duration of the test period.
630  10) If the UUT offers place-shifting capability, repeat the test with the place-shifting feature turned on.
       Average and record the power consumption from both tests.

5.2. Recording Live TV ($P_{\text{Record}}$)

1) Verify that the UUT is turned on and tuned to a live television channel.

2) If the UUT offers DVR functionality, this portion of the test procedure must be performed with a
   second tuner engaged and recording at all times. It is permissible to create a series of pre-
   programmed back-to-back recording sessions for these tests to avoid menu prompts.

3) Tune to Reference Channel A.

4) Measure and record the average power consumption over a 5-minute period.

5) Tune to Reference Channel B (if the UUT is HD capable, Reference Channel B should be in HD
   format).

6) Measure and record the average power consumption over a 10-minute period.

7) Tune to Reference Channel C.

8) Measure and record the average power consumption over a 5-minute period.

9) Record the average power consumption for the full duration of the test period.

10) Save the recordings for the Playback test.

5.3. Playing Back Recorded TV ($P_{\text{Playback}}$)

1) Verify that the UUT is turned on and tuned to a live television channel. If the UUT base type is IP,
   and the UUT does not have the capability to play back live, streaming video content (i.e., the UUT
   is a “download-only” device), this portion of the test procedure must be performed with video
   playback from disk storage and no simultaneous file download.

2) If the UUT offers DVR functionality, this portion of the test procedure must be performed with the
   primary video stream paused for 5%, in fast forward for 10%, and in rewind for 10% of the total
   test time, while raw video input is simultaneously being buffered. In addition, this portion of the
   test procedure must be performed with a second tuner engaged and recording at all times.

3) Use the remote control to begin playback of the recording of Reference Channel A.

4) Measure and record the average power consumption over the playback period.

5) When playback is complete, delete the recording. If automatically prompted to delete, select the
   affirmative prompt.

6) Use the remote control to begin playback of the recording of Reference Channel B.

7) Measure and record the average power consumption over the playback period.

8) When playback is complete, delete the recording. If automatically prompted to delete, select the
   affirmative prompt.

9) Use the remote control to begin playback of the recording of Reference Channel C.
10) Measure and record the average power consumption over the playback period.
11) When playback is complete, delete the recording. If automatically prompted to delete, select the affirmative prompt.
12) Record the average power consumption for the full duration of the test period.

5.4. **Removable Media Playback Test** ($P_{\text{Playback}}$)

1) Verify that the UUT is turned on and tuned to Reference Channel A.
2) Begin the power consumption measurement.
3) Use the remote control to activate the UUT’s removable media playback function. Note that if this function is automatically activated when the removable media door is actuated, or when a disc is inserted, this step of the test procedure may be omitted.
4) Insert the removable media. Open and close the disc tray, as necessary.
5) Use the remote control to begin playback of removable media video content. Note that if playback begins automatically upon insertion of removable media, this step of the test procedure may be omitted.
6) Play the recording for 20 minutes.
7) Use the remote control to stop playback and eject the removable media.
8) Measure and record the average power consumption for the full duration of the test.
9) If the UUT is capable of playing back HD content, repeat the test with an HD video stream that meets the requirements of Reference Channel B. Average and record the power consumption from both tests.

5.5. **Removable Media Record Test** ($P_{\text{Record}}$)

1) Verify that the UUT is turned on and tuned to Reference Channel A.
2) Begin the power consumption measurement.
3) Use the remote control to activate the UUT’s removable media recording function.
4) Insert the removable media. Open and close the disc tray, as necessary.
5) Use the remote control to begin recording to the removable media.
6) Record the video content for 20 minutes.
7) Use the remote control to stop recording and eject the removable media.
8) Measure and record the average power consumption for the full duration of the test.
9) If the UUT is capable of recording HD content, repeat the test with an HD video stream that meets the requirements of Reference Channel B. Average and record the power consumption from both tests.

5.6. **Sleep Test** ($P_{\text{Sleep}}$)

1) Verify that the UUT is turned on and tuned to Reference Channel A. Ensure that at least the “Watching Live TV” tests have been completed immediately prior to the start of this portion of the test procedure.
2) Use the remote control to place the system into a lower power state.
3) Begin the power consumption measurement.
4) Measure and record the average power consumption over a 20-minute period.
5.7. Auto Power Down ($P_{AutoPD}$)

1) Verify that the UUT is turned on and tuned to Reference Channel A.
2) Allow the UUT to automatically power down.
3) Verify that the UUT is in the expected low power state.
4) Begin the power consumption measurement.
5) Measure and record the average power consumption over a 20-minute period.