



# ENERGY STAR® Program Requirements for Televisions

## Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

### Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for Televisions. A list of eligible products and their corresponding Eligibility Criteria can be found at [www.energystar.gov/specifications](http://www.energystar.gov/specifications).
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for Televisions. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform Televisions testing. A list of EPA-recognized laboratories and certification bodies can be found at [www.energystar.gov/testingandverification](http://www.energystar.gov/testingandverification).
3. **Ensure that any model associated with the ENERGY STAR name or mark** meets the following standards:
  - 3.1. Product material requirements as defined in restriction of hazardous substances (RoHS) regulations, as generally accepted. This includes exemptions in force at the date of product manufacture, where the maximum concentration values tolerated by weight in homogeneous materials are: lead (0.1%), mercury (0.1%), cadmium (0.01%), hexavalent chromium (0.1%), polybrominated biphenyls (PBB) (0.1%), or polybrominated diphenyl ethers (PBDE) (0.1%). Batteries are exempt.
  - 3.2. The generally accepted attributes of a recyclable product at the date of product manufacture: where products shall be designed for ease of disassembly and recyclability where external enclosures, sub-enclosures, chassis and electronic subassemblies are easily removable with commonly available tools, by hand, or by a recycler's automated processes.

#### Notes:

- The explicit intention is to harmonize with EU RoHS.
- For purposes of ENERGY STAR third-party certification, these requirements shall not be reviewed when products are initially qualified nor during subsequent verification testing. Rather, EPA reserves the right to request supporting documentation at any time.

### Using the ENERGY STAR Name and Marks

4. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at [www.energystar.gov/logouse](http://www.energystar.gov/logouse).
5. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
6. Provide clear and consistent labeling of ENERGY STAR qualified Televisions.
  - 6.1. The ENERGY STAR mark must be clearly displayed on product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed.

6.2. ENERGY STAR qualified TVs must also be labeled according to one of the following three options:

6.2.1. Permanent label on the top/front of the TV;

6.2.2. Temporary label on the top/front of the TV; or

6.2.3. Use of an electronic label so that the ENERGY STAR certification mark appears on the TV's menu-screen for pre-set picture settings.

### **Verifying Ongoing Product Qualification**

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7. Participate in third-party verification testing through a Certification Body recognized by EPA for Televisions, providing full cooperation and timely responses, EPA/DOE may also, 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 the government's request.

### **Providing Information to EPA**

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8. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

8.1. Partner must submit the total number of ENERGY STAR qualified Televisions shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).

8.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.

8.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner.

9. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.

10. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at [www.energystar.gov/mesa](http://www.energystar.gov/mesa).

### **Performance for Special Distinction**

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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 website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified Televisions 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 products.
- 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, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.
- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership 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](http://www.epa.gov/smartway).
- 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. For more information on Green Power, visit [www.epa.gov/greenpower](http://www.epa.gov/greenpower).



# ENERGY STAR® Program Requirements Product Specification for Televisions

## Eligibility Criteria Version 6.1 Rev. Oct-2014

Following is the Final Version 6.1 ENERGY STAR Product Specification for Televisions. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

### 1 DEFINITIONS

#### A) Product Types:

- 1) Television (TV): A product designed to be powered primarily by mains power having a diagonal screen size of 15 inches or larger that is manufactured with a TV tuner, and that is capable of displaying dynamic visual information from wired or wireless sources including but not limited to:
  - a) Broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission of analog and/or digital signals;
  - b) Display-specific data connections, such as Video Graphics Array (VGA), Digital Visual Interface (DVI), High-Definition Multimedia Interface (HDMI), DisplayPort;
  - c) Media storage devices such as a USB flash drive, a memory card, or a DVD; or
  - d) Network connections, usually using Internet Protocol, typically carried over Ethernet or WiFi.A TV may contain, but is not limited to, one of the following display technologies: liquid crystal display (LCD)<sup>1</sup>, organic light-emitting diode (OLED), cathode-ray tube (CRT), or plasma display panel (PDP).
- 2) Rear-projection TV: A television product in which the display device is a projector that focuses images onto a screen located inside the TV enclosure.
- 3) Direct-view TV: A television product in which the display device emits light either directly from the screen surface or transmits light from a source mounted directly behind the screen.
- 4) TV Combination Unit: A television product in which the TV and one or more additional devices (e.g., DVD player, Blu-ray Disc player, Hard Disk Drive) are combined into a single enclosure, and which meets all of the following criteria:
  - a) It is not possible to measure the power of the individual components without removing the product housing; and
  - b) The product connects to a wall outlet via a single power cord.
- 5) Component Television: A television product composed of two or more separate components (e.g., display device and tuner) that is marketed and sold as a television under a single model or system designation. A component television may have more than one power cord.

<sup>1</sup> Includes LED- and cold-cathode fluorescent lamp (CCFL)-backlit LCD displays.

- 6) Hospitality Television: A television product which includes the following features:
- a) A control port for bi-directional communication (DB-9, RJ11, RJ12, RJ45, coaxial cable, or HDMI-CEC);
  - b) Activated hospitality protocol software (e.g., SmartPort, MPI, MTI, Serial Protocol) to provide direct access to Video-On-Demand (VOD) systems or a digital media player designed for hospitality-specific applications; and
  - c) A power state that meets the definition of Download Acquisition Mode.
- 7) Analog Television: A television product which has an NTSC, PAL, or SECAM tuner, and may have analog video inputs (e.g., composite video, component video, S-video, RGB).
- 8) Digital Television: A television product which has at least one digital tuner or at least one digital video input (e.g., HDMI). Products with an analog tuner and both analog and digital inputs are considered digital products under this specification.
- B) Additional Functions: Functions that are not required for the basic operation of the device. Additional functions include, but are not limited to, a VCR unit, a DVD unit, an HDD unit, a FM-radio unit, a memory card-reader unit, or an ambient lighting unit.
- C) Default Picture Setting (or Home Picture Setting): The picture setting which is recommended by the manufacturer from the initial set up menu or the mode that the television comes shipped in if no setting is recommended.
- D) Brightest Selectable Picture Setting (or Retail Picture Setting): The preset picture setting in which the TV produces the highest luminance within either the home or retail configuration.
- E) Native Vertical Resolution: The physical pixel count for the vertical axis of the television (e.g., a television with a screen resolution of 1920 x 1080 (horizontal x vertical) would have a native vertical resolution of 1080).
- F) Electronic Program Guide (EPG): An interactive on-screen menu of TV program information downloaded from an external source (e.g., program time, date, descriptions).
- G) External Power Supply (EPS): Also referred to as External Power Adapter. A component contained in a separate physical enclosure external to the television casing, designed to convert line voltage ac input from the mains to lower dc voltage(s) in order to provide power to the television. An EPS connects to the television via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.
- H) Point of Deployment (POD) Module: A conditional access module for digital cable signal reception.
- I) Luminance: The 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/m<sup>2</sup>).
- J) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness of a display as a function of ambient light.
- K) Operational Modes:
- 1) On Mode: The power mode in which the product is connected to a mains power source, has been activated, and is providing one or more of its principal functions.

- a) Power Overhang State: A limited-duration power state within On Mode that is intended to facilitate a product's rapid return to full On Mode functionality or provide time for the product to perform functions required for safe shutdown (e.g., operation of cooling fans) after being switched into a low power state by the user.
- 2) Standby-Passive Mode: The mode in which the TV is connected to a power source, produces neither sound nor picture, but can be switched into another mode with the remote control unit or an internal signal.
- 3) Standby-Active, High Mode: The mode in which the TV is connected to a power source, produces neither sound nor picture, but can be switched into another mode with the remote control unit or an internal signal, and with an external signal, and is exchanging/receiving data with/from an external source.
  - a) Download Acquisition Mode (DAM): The power mode in which the product is connected to a mains power source, produces neither sound nor picture, and is actively downloading data. Data downloads may include channel listing information for use by an electronic programming guide, TV setup data, channel map updates, firmware updates, monitoring for emergency messaging/communications or other network communications.
- 4) Standby-Active, Low Mode: The mode in which the TV is connected to a power source, produces neither sound nor picture, but can be switched into another mode with the remote control unit or an internal signal, and with an external signal, and is not exchanging/receiving data with/from an external source.
- 5) Off Mode: The mode where the TV is connected to a power source, produces neither sound nor picture, and cannot be switched into any other mode with the remote control unit, an internal signal, or an external signal.
- L) Screen Area: The viewable screen area of the product, calculated by multiplying the viewable image width by the viewable image height.
- M) Product Family: A group of product models that are: (1) made by the same manufacturer; (2) subject to the same ENERGY STAR qualification criteria; and (3) of a common basic design. Product models within a family differ from each other according to one or more characteristics or features that either (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2) are specified herein as acceptable variations within a product family. For Televisions, acceptable variations within a product family include:
  - 1) Color, and
  - 2) Housing.
- N) Unit Under Test (UUT): The unit currently undergoing testing.
- O) Local Area Network (LAN): Multiple clients interconnected in a geographical area.
- P) Wide Area Network (WAN): Network that is not limited by geographical area, usually interconnecting multiple local networks.
- Q) NOPR Test: U.S. Department of Energy (DOE) Notice of Proposed Rulemaking Energy Conservation Program: Test Procedures for Television Sets published in the Federal Register, 77 FR 2864 on January 19, 2012.

- R) Final Rule Test: U.S. Department of Energy (DOE) Final Rule Energy Conservation Program: Test Procedures for Television Sets incorporated into the Code of Federal Regulation, 10 CFR § 430.23(h) and Appendix H to Subpart B 10 CFR § 430, on November 25, 2013.

## 2 SCOPE

### 2.1 Included Products

- 2.1.1 Products that are: (1) marketed to the consumer as a television (e.g., television is the primary function); (2) capable of being powered from either a wall outlet or a battery unit that is sold with an external power supply; and (3) meet one of the following product type definitions, are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.2:
- i. Televisions
  - ii. Television Combination Units
  - iii. Component Televisions
  - iv. Hospitality Televisions
  - v. Products with a computer input port (e.g., VGA) that are marketed and sold primarily as televisions.
  - vi. Dual-function televisions / computer monitors that are marketed and sold as dual-function televisions / computer monitors.

### 2.2 Excluded Products

- 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for qualification under this specification. The list of specifications currently in effect can be found at [www.energystar.gov/specifications](http://www.energystar.gov/specifications).
- 2.2.2 Products that satisfy one or more of the following conditions are not eligible for ENERGY STAR qualification under this specification:
- i. Products with a computer input port (e.g., VGA) that are marketed and sold primarily as computer monitors,
  - ii. Products that do not have a power state meeting the definition of Standby-Passive Mode (e.g., Public Alert CEA-2009-A certified models which offer 24/7/365 active public alert features), with the exception of Hospitality Televisions that meet the requirements specified in Section 3.8.

## 3 QUALIFICATION CRITERIA

### 3.1 Significant Digits and Rounding

- 3.1.1 All calculations shall be carried out with directly measured (unrounded) values.
- 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from further rounding.
- 3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

## 3.2 General Requirements

- 3.2.1 External Power Supply (EPS): Single- and Multiple-voltage EPSs shall meet the Level V or higher performance requirements under the International Efficiency Marking Protocol when tested according to the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430.
- i. Single-voltage EPSs shall include the Level V or higher marking.
  - ii. Multiple-voltage EPSs meeting Level VI or higher shall include the Level VI or higher marking.
  - iii. Additional information on the Marking Protocol is available at <http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218>
- 3.2.2 User Information: The product shall ship with consumer informational materials located in either (1) the hard copy or electronic user manual, or (2) a package or box insert. These materials shall include:
- i. Information about the ENERGY STAR program,
  - ii. Information on the energy consumption implications of changes to default as-shipped television configuration and settings, and
  - iii. Notification that enabling certain optional features and functionalities (e.g., instant-on), may increase energy consumption beyond the limits required for ENERGY STAR qualification, as applicable.
- 3.2.3 Forced Menu: Any product that includes a forced menu upon initial start-up shall:
- i. Provide users with a choice of “home” picture setting or “retail” picture setting. Partners may use alternative terminology if approved by EPA.
  - ii. Upon selection of “retail” picture setting at initial start-up, either (1) display a second prompt requiring the user to confirm the choice of “retail” picture setting, or (2) display information on the start-up menu that the “home” picture setting is the setting in which the product qualifies for ENERGY STAR. If option (2) is selected, additional detail about ENERGY STAR qualification and energy consumption expectations shall be included in printed product literature and on the product information page on the Partner’s website.
- 3.2.4 Pre-set Picture Setting Menu: Any product where consumers have the option of selecting different picture settings from a preset menu at any time shall:
- i. Display information that the Default Picture Setting (the Default Picture Setting in “home” mode for TVs with a forced menu) reflects the settings under which the product qualifies for the ENERGY STAR. For example, such information may be indicated by including the ENERGY STAR mark in the name or description of that picture setting or in the form of a message displayed each time any setting other than the default picture setting is selected.
- 3.2.5 Component Televisions: For component television products, the total power of all components shall be considered for evaluation against any power requirement in this specification.

## 3.3 On Mode Requirements

- 3.3.1 For products with Automatic Brightness Control (ABC) enabled by default and whose performance is validated using one of the test methods outlined in Section 4.3 (i.e. NOPR Test or Final Rule Test), On Mode power with ABC ( $P_{ON\_ABC}$ ), as calculated per NOPR Test Equation 1 shall be less than or equal to the Maximum On Mode Power Requirement ( $P_{ON\_MAX}$ ), as calculated per Equation 22.

### **NOPR Test Equation 1: Calculation of Maximum On Mode Power for Products with ABC Enabled by Default**

$$P_{ON\_ABC} = (0.55 \times P_{300}) + (0.45 \times P_0)$$

Where:

- $P_{ON\_ABC}$  is the calculated On Mode power with ABC enabled by default,
- $P_{300}$  is the measured On Mode power with ABC enabled when tested at 300 lux per Section 5.5 of the NOPR,
- $P_0$  is the measured On Mode power with ABC enabled when tested per Section 5.5 of the NOPR, but with 0 lux entering the sensor.

### **Final Rule Test Equation 1: Calculation of Maximum On Mode Power for Products with ABC Enabled by Default**

$$P_{ON\_ABC} = (0.25 \times P_{100}) + (0.25 \times P_{35}) + (0.25 \times P_{12}) + (0.25 \times P_3)$$

Where:

- $P_{ON\_ABC}$  is the calculated On Mode power with ABC enabled by default,
- $P_{100}$ ,  $P_{35}$ ,  $P_{12}$ , and  $P_3$  are the measured On Mode power values with ABC enabled when tested at 100, 35, 12, and 3 lux per the Final Rule respectively.

- 3.3.2 For products that do not offer ABC, products that do not offer ABC enabled by default, or products with ABC enabled by default and whose ABC sensor does not meet the validation criteria set forth in Section 4.3, On Mode power with ABC disabled ( $P_{ON}$ ), as measured per the ENERGY STAR test method shall be less than or equal to the Maximum On Mode Power Requirement ( $P_{ON\_MAX}$ ), as calculated per Equation 2.

### **Equation 2: Calculation of Maximum On Mode Power Requirement**

$$P_{ON\_MAX} = 100 \times \tanh(0.00085 \times (A - 140) + 0.052) + 14.1$$

Where:

- $P_{ON\_MAX}$  is the maximum allowable On Mode Power consumption in W,
- $A$  is the viewable screen area of the product in square inches
- $\tanh$  is the hyperbolic tangent function

- 3.3.3 Measured Power Overhang State power shall be less than or equal to the Maximum On Mode Power Requirement ( $P_{ON\_MAX}$ ), as calculated per Equation 2.

## **3.4 Standby-Passive Mode Requirements**

- 3.4.1 Measured Standby-Passive Mode power ( $P_{STANDBY-PASSIVE}$ ) shall be less than or equal to 1.0 W.
- 3.4.2 For products that offer more than one Standby-Passive Mode, the Standby-Passive Mode with the lowest power consumption shall be enabled by default.

## **3.5 Standby-Active, Low Mode Requirements**

- 3.5.1 For products that offer network connectivity, Standby-Active, Low Mode with network connectivity enabled shall be measured and reported.

## **3.6 Luminance Requirements**

- 3.6.1 NOPR Test: Measured peak luminance in the Home Picture Setting ( $L_{HOME}$ ) shall be greater than or equal to 65% of measured peak luminance in the Retail Picture Setting ( $L_{RETAIL}$ ).
- 3.6.2 Final Rule Test: Measured peak luminance in the Default Picture Setting ( $L_{DEFAULT}$ ) shall be greater than or equal to 65% of measured peak luminance in the Brightest Selectable Picture Setting ( $L_{DEFAULT\_RETAIL}$  or  $L_{BRIGHTEST}$ ).

### 3.7 Download Acquisition Mode (DAM) Requirements

- 3.7.1 A product may automatically exit Standby-Passive Mode and enter Download Acquisition Mode according to a predefined schedule, in order to:
- i. Download channel listing information for use by an electronic programming guide,
  - ii. Monitor for emergency messaging/communications, or
  - iii. Communicate via a network protocol.
- 3.7.2 Measured DAM energy consumption for all DAM states ( $E_{DAM}$ ) shall be less than or equal to 40 watt-hours per day (0.04 kWh/day).

### 3.8 Hospitality Television Requirements

- 3.8.1 Hospitality Television TEC ( $TEC_{HOSP}$ ), as calculated per Equation 3, shall be less than or equal to the Maximum Hospitality Television TEC Requirement ( $TEC_{HOSP\_MAX}$ ), as calculated per Equation 4.

#### Equation 3: Calculation of TEC for Hospitality Televisions ( $TEC_{HOSP}$ )

$$TEC_{HOSP} = (P_{ON} \times 5) + (P_{STANDBY-PASSIVE} \times 19) + E_{DAM}$$

Where:

- $TEC_{HOSP}$  is the calculated Hospitality Television TEC;
- $P_{ON}$  is the measured On Mode power;
- $P_{STANDBY-PASSIVE}$  is the measured Standby-Passive Mode power; and
- $E_{DAM}$  is the measured DAM energy over a 24 hour period.

#### Equation 4: Calculation of Maximum TEC Requirement for Hospitality Televisions ( $TEC_{HOSP\_MAX}$ )

$$TEC_{HOSP\_MAX} = 500 \times \tanh(0.00085 \times (A - 140) + 0.052) + 129.5$$

Where:

- $TEC_{HOSP\_MAX}$  is the maximum allowable TEC for Hospitality Televisions;
- $A$  is the viewable screen area of the product in square inches
- $\tanh$  is the hyperbolic tangent function

- 3.8.2 For Hospitality Televisions that feature an always-on DAM, measured DAM power ( $P_{DAM}$ ) shall be less than or equal to 1.0 W when tested per the Standby-Passive Mode test procedure.

**Note:** Products intended for sale in the US market are subject to minimum toxicity and recyclability requirements. Please see ENERGY STAR Program Requirements for Televisions: Partner Commitments for details.

## 4 TESTING

### 4.1 On Mode, Standby-Passive Mode, Luminance, and DAM Testing

4.1.1 When testing On Mode, Standby-Passive Mode, Luminance, and DAM for Television products, the test methods identified in Table 1 shall be used to determine ENERGY STAR qualification.

**Table 1: Test Method for ENERGY STAR Qualification**

Product Type	Test Method
Ac Mains-powered Televisions	<b>EITHER</b> The Notice of Proposed Rulemaking (NOPR) Test Procedures for Television Sets published in the Federal Register, 77 FR 2864 <b>OR</b> the Final Rule Test Procedures for Television Sets incorporated in Appendix H to Subpart B of 10 CFR § 430 and 10 CFR § 429.25
Battery-powered Televisions	ENERGY STAR Test Method for Televisions, Rev. Aug-2010

Note: Hospitality TVs with Download Acquisition Mode (DAM) electing to use the Final Rule test procedure must also use Section 5.3 Guidance for Implementation of CEA: Procedure for DAM Testing in the ENERGY STAR Test Method for Televisions, Rev. Aug-2010 to test DAM.

Note: Per the Final Rule Test Procedures for Television Sets, after April 23, 2014 representations with respect to the energy use or efficiency of television sets must be made in accordance with tests conducted pursuant to Appendix H to Subpart B of 10 CFR § 430 and 10 CFR § 429.25.

### 4.2 Standby-Active, Low Mode Testing

#### 4.2.1 NOPR Test:

- i. UUT (Unit Under Test) Configuration and Control
  - a) Network Connection Capabilities:
    - i) Verify the UUT has network connection capabilities:
      - i. Network connections should be listed in the user manual. If no connections are specified in the user manual, verify that the TV does not have network capabilities by checking for the absence of physical connections or the absence of network settings in the menu.
      - ii. If the UUT has the capabilities to be connected to a network but was not shipped with a required piece of hardware (e.g. wireless adapter), that connection type shall not be tested.
  - b) Peripherals and Network Connections:

- ii) UUT connections shall be set up as follows:
  - i. If a physical network connection is present, network connectivity is listed in the TV menu, or listed in the user manual; the UUT network capabilities shall be activated and the UUT shall be connected to a Local Area Network (LAN) prior to being placed into standby mode.
  - ii. The LAN shall allow devices to ping other devices on the network but will not allow access to a wide area network (WAN).

Note: Limiting the connection to a LAN ensures that the UUT is in Standby-Active, Low Mode, where it is connected to a network but does not receive external data. The LAN, including wireless Radio Frequency (RF), shall support the highest and lowest data speeds of the UUT's network function.

- iii) If the UUT has multiple network connections (e.g., Wi-Fi, Ethernet, other), the UUT shall be configured and connected to a single network source in accordance with the hierarchy of connections listed below<sup>2</sup>, while maintaining a video signal connection (i.e., connected to a video signal generating device).
  - i. Wi-Fi (Institution of Electrical and Electronics Engineers - IEEE 802.11-2007)<sup>3</sup>
  - ii. Ethernet (IEEE 802.3). If the UUT supports Energy Efficient Ethernet (IEEE 802.3az-2010)<sup>4</sup> then it shall be connected to a device that also supports IEEE 802.3az.
  - iii. Other

- ii. Power Measurement:

- c) Measurement Procedure<sup>5</sup>:

- iv) After the TV is placed into Standby-Active, Low Mode, leave the UUT for a minimum of 30 minutes to allow Standby-Active, Low Mode power to stabilize.
    - v) Measure the average power consumed for a 10 minute period. Record the power for Standby-Active, Low Mode.

#### 4.2.2 Final Rule Test:

- i. Test according to the Final Rule Test Procedures for Television Sets (Appendix H to Subpart B of 10 CFR § 430).

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<sup>2</sup> This order of preference may change in future revisions.

<sup>3</sup> IEEE 802 – Telecommunications and information exchange between systems – Local and metropolitan area networks – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications

<sup>4</sup> Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications - Amendment 5: Media Access Control Parameters, Physical Layers, and Management Parameters for Energy-Efficient Ethernet

<sup>5</sup> Measurement procedure is based on Standby-Passive measurements in Section 8.6.5.8 of IEC 62087-2011

### 4.3 ABC Sensor Validation Testing

- 4.3.1 NOPR Test: the average power measured at 50 lux (P<sub>50</sub>) shall increase by at least 5% relative to the average power measured at 10 lux (P<sub>10</sub>), the average power measured at 100 lux shall increase by at least 5% relative to the average power measured at 50 lux (P<sub>50</sub>), and the average power measured at 300 lux (P<sub>300</sub>) shall be greater than or equal to the average power measured at 100 lux (P<sub>100</sub>), as indicated in Equation 5.

#### Equation 5: ABC Sensor Validation Conditions

$$\frac{P_{50} - P_{10}}{P_{10}} \geq 5\%, \quad \frac{P_{100} - P_{50}}{P_{50}} \geq 5\%, \quad P_{300} \geq P_{100}$$

Where:

- $P_n$  is the Power consumed for On Mode with ABC enabled at  $n$  lux, with a direct light source

- 4.3.2 Final Rule Test: ABC Sensor Validation is not required.

### 4.4 Number of Units Required for Testing

- 4.4.1 For all products, Representative Models shall be selected for testing per the following requirements:
- For qualification of an individual product model, a product configuration equivalent to that which is intended to be marketed and labeled as ENERGY STAR is considered the Representative Model;
  - For qualification of a Product Family, any product configuration within the family may be considered the Representative Model.
- 4.4.2 For products tested per the Final Rule, units shall be selected for testing per the sampling requirements defined in 10 CFR § 429.25, which references 10 CFR § 429.11.

### 4.5 International Market Qualification

- 4.5.1 Products shall be tested for qualification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

## 5 USER INTERFACE

- 5.1.1 Partners are encouraged to design products in accordance with the user interface standard IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see <http://eetd.LBL.gov/Controls>.

## 6 EFFECTIVE DATE

- 6.1.1 Effective Date: The Version 6 ENERGY STAR Televisions specification shall take effect on June 1, 2013. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on its date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

- 6.1.2 Future Specification Revisions: EPA reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.

## **7 CONSIDERATIONS FOR FUTURE REVISIONS**

- 7.1.1 On Mode Power for Products with ABC Disabled: EPA is interested in understanding better the On Mode power consumption of ABC products when the ABC feature is disabled. EPA anticipates exploring this issue in the next specification revision.

## APPENDIX A:

### Sample Calculations

Viewable Diagonal Screen Size (inches)	Aspect Ratio	Viewable Screen Size, w x h (Inches)	Screen Area, A (sq-inches)	P <sub>ON_MAX</sub> (watts)
20	16:9	17.4 x 9.8	170.9	21.9
32	16:9	27.9 x 15.7	437.6	43.7
42	16:9	36.6 x 20.6	753.8	65.9
50	16:9	43.6 x 24.5	1068.2	82.7
60	16:9	52.3 x 29.4	1538.3	98.7