ENERGY STAR® Program Requirements
Product Specification for Displays

Eligibility Criteria
Final Draft Version 7.0

Following is the ENERGY STAR product specification ("specification") for Displays. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

A) Product Types:

1) Electronic Display (Display): A product with a display screen and associated electronics, often encased in a single housing, that as its primary function produces visual information from (1) a computer, workstation, or server via one or more inputs (e.g., VGA, DVI, HDMI, DisplayPort, IEEE 1394, USB), (2) external storage (e.g., USB flash drive, memory card), or (3) a network connection.
   a) Monitor: An electronic display intended for one person to view in a desk based environment.
   b) Signage Display: An electronic display intended for multiple people to view in non-desk based environments, such as retail or department stores, restaurants, museums, hotels, outdoor venues, airports, conference rooms or classrooms. For the purposes of this specification, a display shall be classified as a signage display if it meets two or more criteria listed below:
      (1) Diagonal screen size is greater than 30 inches;
      (2) Maximum Reported Luminance is greater than 400 candelas per square meter;
      (3) Pixel density is less than or equal to 5,000 pixels per square inch; or
      (4) Ships without a mounting stand.

Note: In Draft 2, EPA proposed distinguishing a signage display using three criteria: screen size, Maximum Reported Luminance, and pixel density. Given a stakeholder comment that there still may be overlap among two or more of these criteria, EPA is proposing a fourth criterion based on the physical configuration of a product to reflect the typical use cases for signage displays. Most signage displays are wall-mounted as opposed to stand-mounted like computer monitors. Therefore, EPA has added the additional criterion "ships without a mounting stand" to further delineate the product types. As such, EPA now proposes a set of four criteria, where a display would have to meet at least two to be classified as a signage display.

B) Operational Modes:

1) On Mode: The mode in which the display has been activated, and is providing the primary function.

2) Sleep Mode: A low-power mode in which the display provides one or more non-primary protective functions or continuous functions.

Note: Sleep Mode may serve the following functions: facilitate the activation of On Mode via remote switch, internal sensor, or timer; provide information or status displays including clocks; support sensor-based functions; or maintain a network presence.

3) Off Mode: The mode where the display is connected to a power source, produces no visual information, and cannot be switched into any other mode with the remote control unit, an internal signal, or an external signal.

Note: The display may only exit this mode by direct user actuation of an integrated power switch or control. Some products may not have an Off Mode.

C) Visual Characteristics:

1) Ambient Light Conditions: The combination of light illuminances in the environment surrounding a display, such as a living room or an office.

2) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness of a Display as a function of Ambient Light Conditions.

Note: ABC functionality must be enabled to control the brightness of a Display.

3) Color Gamut: Color gamut area shall be reported as a percentage of the CIE LUV 1976 *u*' *v*' color space and calculated per Section 5.18 Gamut Area of the Information Display Measurements Standard Version 1.03.

Note: Any gamut support in non-visible/invisible color areas is not to be counted. The gamut's size must be expressed as a percentage of area of the visible CIE LUV color space only.

4) Luminance: The photometric measure of the luminous intensity per unit area of light travelling in a given direction, expressed in candelas per square meter (cd/m^2).

a) Maximum Reported Luminance: The maximum luminance the display may attain at an On Mode preset setting, and as specified by the manufacturer, for example, in the user manual.

b) Maximum Measured Luminance: The maximum measured luminance the display may attain by manually configuring its controls, such as brightness and contrast.

c) As-shipped Luminance: The luminance of the display at the factory default preset setting the manufacturer selects for normal home or applicable market use.

5) Native Vertical Resolution**:** The number of physical lines along the vertical axis of the Display within the visible area of the Display.

Note: A display with a screen resolution of 1920 x 1080 (horizontal x vertical) would have a Native Vertical Resolution of 1080).

6) Screen Area: The visible area of the display that produces images.

Note: Screen Area is calculated by multiplying the viewable image width by the viewable image height. For curved screens, measure the width and height along the arc of the display.

D) Additional Functions and Features:

1) Bridge Connection: A physical connection between two hub controllers (i.e., USB, FireWire).

Note: Bridge Connections allow for expansion of ports typically for the purpose of relocating the ports to a more convenient location or increasing the number of available ports.

2) Full Network Connectivity: The ability of the display to maintain network presence while in Sleep Mode. Presence of the display, its network services, and its applications, is maintained even if some components of the display are powered down. The display can elect to change power states based on receipt of network data from remote network devices, but should otherwise stay in Sleep Mode absent a demand for services from a remote network device.

Note: Full Network Connectivity is not limited to a specific set of protocols. Also referred to as "network proxy" functionality and described in the Ecma-393 standard.

3) Occupancy Sensor: A device used to detect human presence in front of or in the area surrounding a display.

Note: An Occupancy Sensor is typically used to switch a Display between On Mode and Sleep Mode.

4) Touch Technology: Enables the user to interact with a product by touching areas on the Display screen.

5) Plug-in Module: A modular plugin device that provides one or more of the following functions without the explicit purpose of providing general computing function:

a) Display images, mirror remote content streamed to it, or otherwise render content on the screen from local or remote sources; or

b) Process touch signals.

Note: Modules providing additional input options are not considered Plug-in Modules for the purposes of this specification.

E) Product Family: A group of product models that (1) are made by the same manufacturer, (2) share the same Screen Area, Resolution, and Maximum Reported Luminance, and (3) are of a common basic screen design. Models within a Product Family may differ from each other according to one or more characteristics or features. For displays, acceptable variations within a Product Family include:

1) External housing;

2) Number and types of interfaces;

3) Number and types of data, network, or peripheral ports; and

4) Processing and memory capability.

F) Representative Model: The product configuration that is tested for ENERGY STAR certification and is intended to be marketed and labeled as ENERGY STAR.

G) Power Source

1) External Power Supply (EPS): An external power supply circuit that is used to convert household electric current into dc current or lower-voltage ac current to operate a consumer product.

2) Standard dc: A method for transmitting dc power defined by a well-known technology standard, enabling plug-and-play interoperability.

Note: Common examples are USB and Power-over-Ethernet. Usually Standard dc includes both power and communications over the same cable, but as with the 380 V dc standard, that is not required.

2 SCOPE

2.1 Included Products

2.1.1 Products that meet the definition of a display as specified herein and are powered directly from ac mains, an External Power Supply, or Standard dc are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.2. Typical products that would be eligible for certification under this specification include:

i. Monitors;

ii. Monitors with keyboard, video, and mouse (KVM) switch functionality;

iii. Signage Displays; and

iv. Signage Displays and Monitors with Plug-in Modules.

2.2 Excluded Products

2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification including Televisions and Computers (Thin Clients, Slates/Tablets, Portable All-in-one Computers). The list of specifications currently in effect can be found at www.energystar.gov/products.

2.2.2 The following products are not eligible for certification under this specification:

i. Products with an integrated television tuner;

ii. Displays with integrated or replaceable batteries designed to support primary operation without ac mains or external dc power, or device mobility (e.g., electronic readers, battery-powered digital picture frames); and

iii. Products that must meet Food and Drug Administration specifications for medical devices that prohibit power management capabilities and/or do not have a power state meeting the definition of Sleep Mode.

3 CERTIFICATION 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 requirements shall be evaluated using directly measured or calculated values without any benefit from 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 requirements.

3.2 General Requirements for Monitors and Signage Displays

3.2.1 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the Level VI 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- and Multiple-voltage EPSs shall include the Level VI or higher marking.

ii. Additional information on the Marking Protocol is available at http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218.

3.2.2 Power Management:

i. Products shall offer at least one power management feature that is enabled by default, and that can be used to automatically transition from On Mode to Sleep Mode either by a connected host device or internally (e.g., support for VESA Display Power Management Signaling (DPMS), enabled by default).

ii. Products that generate content for display from one or more internal sources shall have a sensor or timer enabled by default to automatically engage Sleep or Off Mode.

iii. For products that have an internal default delay time after which the product transitions from On Mode to Sleep Mode or Off Mode, the delay time shall be reported.

iv. Monitors shall automatically enter Sleep Mode or Off Mode within 5 minutes of being disconnected from a host computer.

3.2.3 Signage Displays shall have a true power factor in On Mode of 0.7 or greater per Part G of Section 5.2 in the ENERGY STAR Test Method.

3.3 Energy Requirements for Computer Monitors

3.3.1 The Total Energy Consumption (TEC) in kWh shall be calculated per Equation 1 based on measured values.

Equation 1: Total Energy Consumption Calculation

$$E_{TEC} = 8.76 \times (0.35 \times P_{ON} + 0.65 \times P_{SLEEP})$$

Where:

- *E_{TEC} is the Total Energy Consumption calculation in kWh;*
- *P_{ON} is Measured On Mode Power in watts*
- *P_{SLEEP} is Measured Sleep Mode Power in watts; and*
- *The result shall be rounded to the nearest tenth of a kWh for reporting.*

3.3.2 The Maximum TEC (E_{TEC_MAX}) in kWh for Monitors shall be calculated per Equation 2.

Equation 2: Calculation of Monitor Maximum TEC (E_{TEC_MAX}) in kWh

$$E_{TEC\_MAX} = 6.13 \times r + 89 \times tanh(0.0016 \times [A - 59] + 0.085) + 9$$

Where:

- *E_{TEC_MAX} is the Maximum TEC requirement in kWh;*
- *r is the screen resolution in megapixels;*
- *A is the Screen Area in in^2; and*
- *tanh is the hyperbolic tangent function.*

Note: In this Final Draft, EPA has retained a Total Energy Consumption approach that recognizes the current top performing 20 percent (241 out of 1179 models) of products in the market. EPA seeks to ensure that ENERGY STAR remains a market differentiator for efficiency in monitors when the specification takes effect in 2016.

3.3.3 For all Monitors, Calculated TEC (E_{TEC}) in kWh shall be less than or equal the calculation of Maximum TEC (E_{TEC_MAX}) with the applicable allowances and adjustments (applied at most once) per Equation 3.

Equation 3: Total Energy Consumption Requirement for Monitors

$$E_{TEC} \leq (E_{TEC\_MAX} + E_{EP} + E_{ABC} + E_N + E_{OS}) \times eff_{AC\_DC}$$

Where:

- *E_{TEC} is TEC in kWh calculated per Equation 1;*
- *E_{TEC_MAX} is the Maximum TEC requirement in kWh calculated per Equation 2;*
- *E_{EP} is the enhanced performance display allowance in kWh per Section 3.3.4;*
- *E_{ABC} is the Automatic Brightness Control allowance in kWh per Equation 5;*
- *E_N is the Full Network Connectivity allowance in kWh per Table 2;*
- *E_{OS} is the Occupancy Sensor allowance in kWh per Table 3; and*
- *eff_{AC_DC} is the standard adjustment for ac-dc power conversion losses that occur at the device powering the Display, and is 1.0 for Ac-powered Displays and 0.85 for displays with Standard dc.*

3.3.4 For Monitors meeting the enhanced performance display (EPD) requirements below, only one of the following Table 1 allowances shall be used in Equation 3:

i. Contrast ratio of at least 60:1 measured at a horizontal viewing angle of at least 85° from the perpendicular on a flat screen and at least 83° from the perpendicular on a curved screen, with or without a screen cover glass;

ii. A native resolution greater than or equal to 2.3 megapixels (MP); and

iii. Color Gamut greater than or equal to 32.9% of CIE LUV.

Note: Since the Draft 2, EPA received new feedback on the difficulty of achieving the contrast ratio of at least 60:1 at a measurement of 85° on a curved screen. Based on the information, EPA proposes curved computer monitor screens have a contrast ratio of at least 60:1 measured at a horizontal viewing angle of at least at 83° to be eligible for the allowances outlined in Table 1 below.

Table 1: Calculation of Energy Allowance for Enhanced Performance Displays

Color Gamut Criteria	**E_{EP} (kWh)** *Where:* ▪ *E_{TEC_MAX} is the Maximum TEC requirement in kWh; and* ▪ *r is screen resolution in megapixels*
Color Gamut support is 32.9% of CIE LUV or greater.	$0.15 \times (E_{TEC_{MAX}} - 6.13 \times r)$
Color Gamut support is 38.4% of CIE LUV or greater.	$0.65 \times (E_{TEC\_MAX} - 6.13 \times r)$

Note: A model supporting greater than 99% of the sRGB color space translates to 32.9% of CIE LUV and a model supporting greater than 99% of Adobe RGB translates to 38.4% of CIE LUV.

Note: In Draft 2, EPA classified EPD models based on color gamut performance using the Version 6.0 dataset. Since data were submitted using varying standards (NTSC, sRGB, Adobe RGB), EPA normalized the data to make it comparable by converting the percentage of the color space of each standard into percentage of the color space of the CIE standard. In this Final Draft, as reflected in the definition of color gamut, EPA maintains that manufacturers report their color gamut in terms of CIE LUV to allow for information to be standardized across models.

In further reviewing color gamut data, EPA found that nearly half of all monitors in the dataset cover the sRGB color gamut, indicating that this level of performance, as an isolated feature, is no longer limited to a small subset of premium models. Holding resolution and area constant, the data indicate that increased color gamut performance typically requires more power. Models supporting 32.9% of CIE LUV (99% or more of defined sRGB colors) indicate a need for additional power over models with a smaller color space. Models covering at least 38.4% of CIELUV (99% of Adobe RGB)—an even higher coverage—appear to require more power still.

EPA continues to propose a tiered allowance for EPDs based on color gamut, as proposed in Draft 2. After reviewing the most recent data, EPA has made a modest adjustment to the allowance for models meeting EPD criteria such that they are eligible for one of the following two allowances based on their color gamut:

1) **A 15% allowance for models meeting proposed EPD criteria with color gamut support greater than 32.9% of CIELUV (aka, 99% of sRGB).** In the Final Draft dataset, EPA identified nearly 40 models not categorized as Enhanced Performance Displays under the Version 6.0 specification that appear to meet the Final Draft color gamut criterion and also likely the contrast ratio criterion. By including these models, EPA expanded the set of models considered to be EPD to 76 which may include relatively more efficient models that did not necessarily need the EPD allowance under Version 6.0. With this set of models, EPA found that a 15% allowance for models with color gamut support greater than 32.9% of CIE LUV recognized a similar percentage of passing models the Draft 2 allowance of 25% applied to a relatively less efficient set of models. After substantial review of products in the marketplace, including those not qualified to the ENERGY STAR, EPA considers that its EPD dataset is reflective of the majority of the EPD market.

Or

2) **A 65% allowance for models meeting the current EPD criteria with color gamut support greater than 38.4% of CIELUV (aka, 99% of sRGB and at least 99% Adobe RGB).** In Draft 2, EPA proposed a 65% allowance for models supporting a color gamut of at least 96% Adobe RGB. Upon final review of its dataset, EPA noted that nearly all of the models that support 96% or greater of Adobe RGB in fact support 99% or greater of Adobe RGB. EPA has therefore revised the CIE LUV criterion to be equivalent to 99% or greater of Adobe RGB.

With a 15% allowance for EPDs with at least 32.9% of CIELUV, 33% of models identified as meeting the EPD criteria qualify, whereas none of the higher color-gamut models do. With the addition of a 65% allowance for models with at least 38.4% of CIELUV (99% or greater Adobe RGB), 4 out of 16 models, or 25% in the $\geq$38.4% CIELUV category, meet the proposed criteria.

Finally, EPA removed the additional E_{TEC_MAX}resolution allowance of 6.13×*r* from the EPD allowance because including it resulted in a multiplier effect on the resolution allowance, such that Ultra HD (UHD) EPD models would qualify at much higher rates than non-UHD EPD models. Removing this portion of the EPD allowance will ensure that the resolution allowance is applied only once against the On Mode power requirements.

3.3.5 For monitors with Automatic Brightness Control (ABC) enabled by default, an energy allowance (E_{ABC}), as calculated per Equation 5, shall be added to E_{TEC_MAX} in Equation 3, if the On Mode power reduction (R_{ABC}), as calculated per Equation 4, is greater than or equal to 20%.

Equation 4: Calculation of On Mode Reduction with ABC Enabled by Default

$$R_{ABC} = 100\% \times \left(\frac{P_{300} - P_{12}}{P_{300}}\right)$$

Where:

- *R_{ABC} is the On Mode percent power reduction due to ABC;*
- *P_{300} is the On Mode power in watts, as measured at an ambient light level of 300 lux in Section 6.4 of the Test Method; and*
- *P_{12} is the On Mode power in watts, as measured at an ambient light level of 12 lux in Section 6.4 of the Test Method.*

Equation 5: Monitors ABC Energy Allowance (E_{ABC}) for Monitors

$$E_{ABC} = 0.05 \times E_{TEC\_MAX}$$

Where:

- *E_{ABC} is the energy allowance for Automatic Brightness Control in kWh; and*
- *E_{TEC_MAX} is the Maximum TEC in kWh, per Equation 2.*

3.3.6 Products with Full Network Connectivity confirmed in Section 6.7 of the ENERGY STAR Test Method shall apply the allowance specified in Table 2.

Table 2: Full Network Connectivity Energy Allowance (E_N) for Monitors

E_N (kWh)
2.9

3.3.7 Products tested with an Occupancy Sensor active shall apply the allowance specified in Table 3.

Table 3: Additional Functions Energy Allowance (E_{OS}) for Monitors

Type	Allowance (kWh)
Occupancy Sensor E_{OS}	1.7

3.4 On Mode Requirements for Signage Displays

3.4.1 The Maximum On Mode Power (P_{ON_MAX}) in watts shall be calculated per Equation 6.

Equation 6: Calculation of Maximum On Mode Power (P_{ON_MAX}) in Watts for Signage Displays

$$P_{ON\_MAX} = (4.0 \times 10^{-5} \times \ell \times A) + 119 \times tanh(0.0008 \times (A - 200.0) + 0.11) + 6$$

Where:

- *P_{ON_MAX} is the Maximum on Mode Power, in watts;*
- *A is the Screen Area in square inches;*
- *ℓ is the Maximum Measured Luminance of the display in candelas per square meter, as measured in Section 6.2 of the test method;*
- *tanh is the hyperbolic tangent function; and*
- *The result shall be rounded to the nearest tenth of a watt for reporting.*

Note: Since the release of Draft 2, EPA identified very bright (2,500 cd/m^2) signage displays in the smaller signage sizes (under 50 inches) that operate very efficiently. Therefore, in the Final Draft, EPA has adjusted the luminance allowance from 7.5×10^{-5} to 4.0×10^{-5} to allocate a greater proportion of power to area in Equation 6. Despite, the shift in the weight of the allowances, this Final Draft Maximum On Mode Power for Signage Displays continues to capture approximately 25 percent of signage products in EPA's dataset. Measured On Mode Power (P_{ON}) in watts shall be less than or equal to the calculation of Maximum On Mode Power (P_{ON_MAX}) with the applicable allowances and adjustments per Equation 7.

EPA also received feedback that very large models (>70 inches) intended for indoor operation were challenged to meet the proposed Draft 2 signage display criteria compared to their smaller counterparts (40–70 inches). EPA developed its proposal based on trends in efficiency seen in large TVs over the past three years. According to stakeholder feedback in Draft 2, signage displays intended for indoor use are manufactured to be very similar to TVs. As such, EPA estimates that efficiency trends should easily translate to signage displays. However, EPA will watch the energy use of displays larger than 70 inches that are intended for indoor use and is able to amend this specification in the future, if warranted. The Agency encourages manufacturers with an interest in very large models to share performance data with EPA to inform this ongoing analysis.

Equation 7: On Mode Power Requirement for Signage Displays

$$P_{ON} \leq P_{ON\_MAX} + P_{ABC}$$

Where:

- *P_{ON} is On Mode Power in watts, as measured in Section 6.3 or 6.4 of the Test Method;*
- *P_{ON_MAX} is the Maximum On Mode Power in watts, per Equation 7; and*
- *P_{ABC} is the On Mode power allowance for ABC in watts, per Equation 8.*

3.4.2 For Signage Displays with ABC enabled by default, a power allowance (P_{ABC}), as calculated per Equation 8, shall be added to P_{ON_MAX}, as calculated per Equation 7, if the On Mode power reduction (R_{ABC}), as calculated per Equation 4, is greater than or equal to 20 percent.

Equation 8: Calculation of On Mode Power Allowance for Signage Displays with ABC Enabled by Default

$$P_{ABC} = 0.05 \times P_{ON\_MAX}$$

Where:

- *P_{ABC} is the Measured On Mode Power allowance for ABC in watts; and*
- *P_{ON_MAX} is the Maximum On Mode Power requirement in watts.*

3.5 Sleep Mode Requirements for Signage Displays

3.5.1 Measured Sleep Mode Power (P_{SLEEP}) in watts shall be less than or equal the sum of the Maximum Sleep Mode Power Requirement (P_{ON_MAX}) and any allowances (applied at most once) per Equation 9.

Equation 9: Sleep Mode Power Requirement for Signage Displays

$$P_{SLEEP} \leq P_{SLEEP_{MAX}} + P_N + P_{OS} + P_T$$

Where:

- *P_{SLEEP} is Measured Sleep Mode Power in watts;*
- *P_{SLEEP_MAX} is the Maximum Sleep Mode Power requirement in watts per Table 4;*
- *P_N is the Full Network Connectivity allowance in watts per Table 5;*
- *P_{OS} is the Occupancy Sensor allowance in watts per Table 6; and*
- *P_T is the Touch allowance in watts per Table 6.*

Table 4: Maximum Sleep Mode Power Requirement (P_{SLEEP_MAX}) for Signage Displays

P_{SLEEP_MAX} (watts)
0.5

3.5.2 Products with Full Network Connectivity confirmed in Section 6.7 of the ENERGY STAR Test Method and with the capability to transition from On Mode to Sleep Mode via a signal over an Internet Protocol connection shall apply the allowance specified in Table 5.

Table 5: Full Network Connectivity Allowance for Signage Displays

P_N (watts)
3.0

Note: Based on information from multiple stakeholders, EPA understands that signage displays and televisions are built with the same, or similar, network connection circuitry. As such, EPA proposes a 3 watt allowance for signage displays to harmonize with the power allowance for network connectivity in a television's Standby-active, Low mode under the Televisions Version 7.0 specification. EPA expects that signage displays, similarly to televisions, will continue to reduce their power consumption in network-connected low-power states. As such, EPA anticipates reducing this allowance in future revisions to the specification.

At this time, EPA proposes to retain the Draft 2 TEC allowance for full network connectivity for computer monitors, which in contrast to signage displays or televisions, have demonstrated lower-power network connectivity.

3.5.3 Products tested with an Occupancy Sensor or Touch Technology active in Sleep Mode shall apply the allowances specified in Table 6.

Table 6: Additional Functions Sleep Mode Power Allowance for Signage Displays

Type	Screen Size (in)	Allowance (watts)
Occupancy Sensor P_{OS}	All	0.3
Touch Functionality P_T ***(applicable only to signage displays where screen size is greater than 30 inches)***	≤ 30	0.0
	> 30	1.5

Note: Previously, EPA proposed removing touch functionality allowances given lack of data in the EPA dataset indicating that touch functionality was either commonly employed or that it required additional power in Sleep Mode. Since the release of Draft 2, EPA has received new feedback that touch functionality used in larger displays requires more power than typically seen in monitors, and that this touch technology is enabled in Sleep Mode to allow products to wake from sleep in response to a touch and perform the requested work. Given this use case and the opportunity to encourage models to spend more time in Sleep Mode while not in use and to be woken up effectively by users, EPA is proposing a 1.5 W allowance in Sleep Mode for signage displays. EPA proposes this allowance based on new feedback and data received

3.6 Off Mode Requirements for all Displays

3.6.1 A product need not have an Off Mode to be eligible for certification. For products that do offer Off Mode, measured Off Mode power (P_{OFF}) shall be less than or equal to the Maximum Off Mode Power Requirement (P_{OFF_MAX}) in Table 7.

Table 7: Maximum Off Mode Power Requirement (P_{OFF_MAX})

P_{OFF_MAX} (watts)
0.5

3.7 Luminance Reporting Requirements

3.7.1 Maximum Reported and Maximum Measured Luminance shall be reported for all products; As-Shipped Luminance shall be reported for all products except those with ABC enabled by default.

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

4 TEST REQUIREMENTS

4.1 Test Methods

4.1.1 Test methods identified in Table 8 shall be used to determine certification for ENERGY STAR.

Table 8: Test Methods for ENERGY STAR Certification

Product Type	Test Method
All Product Types and Screen Sizes	Final Draft ENERGY STAR Test Method for Determining Display Energy – Rev. Jul-2015
Enhanced Performance Monitors	International Committee for Display Metrology (ICDM) Information Display Measurements Standard – Version 1.03
Displays Claiming Full Network Connectivity	CEA-2037-A, Determination of Television Set Power Consumption

4.2 Number of Units Required for Testing

4.2.1 One unit of a Representative Model, as defined in Section 1, shall be selected for testing.

4.2.2 For certification of a Product Family, the product configuration that represents the worst-case power consumption for each product category within the Product Family shall be considered the Representative Model.

4.3 International Market Qualification

4.3.1 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 Manufacturers are encouraged to design products in accordance with the user interface standard, IEEE P1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see http://energy.lbl.gov/controls/.

Note: EPA is reviewing the above User Interface requirements under this specification revision. In order to better track these data, EPA is proposing that EPA-recognized certification bodies report to EPA whether or not products they certify comply with the standard. The reporting requirement would be in the form of a "Yes/No."

6 EFFECTIVE DATE

6.1.1 Effective Date: The Version 6.0 ENERGY STAR Display specification shall take effect on **April 30, 2016**. 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 (e.g., month and year) on which a unit is considered to be completely assembled.

Note: EPA intends to finalize Version 7.0 in August 2015, where the specification would take effect on April 30, 2016.

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 ENERGY STAR certification is not automatically granted for the life of a model

7 CONSIDERATIONS FOR FUTURE REVISIONS

7.1.1 On Mode DC Power Limit: EPA is in interested in considering a separate On Mode Power Maximum requirement for Standard dc products that does not necessitate an ac-dc conversion calculation. EPA anticipates these products will become more popular on the market with the latest USB standard and looks forward to receiving additional direct dc-tested data for these products.