ENERGY STAR® Program Requirements for Televisions

Partner Commitments
DRAFT 2

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified televisions (TVs). 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 TVs. 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 name and mark 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 labeled TV model within six months of activating the TV portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;

- provide clear and consistent labeling of ENERGY STAR qualified TVs. The ENERGY STAR label 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. In addition, ENERGY STAR qualified TVs must be labeled according to one of the following three options: 1) permanent label on the top/front of the TV; 2) temporary label on the top/front of the TV; or, 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.

- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying TV models. Once the Partner submits its first list of ENERGY STAR labeled TV, the Partner will be listed as an ENERGY STAR Partner. 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 TVs 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., capacity, size, speed, 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. 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;

- notify EPA of a change in the designated responsible party or contacts for TVs 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:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;

- 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;

- ensure the power management feature is enabled on all ENERGY STAR qualified monitors 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;

- 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;

- 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.

ENERGY STAR® Program Requirements for Televisions

Eligibility Criteria (Version 3.0)
DRAFT 2

Below is the product specification for ENERGY STAR qualified TVs (Version 3.0). A product must meet all of the identified criteria to be labeled as ENERGY STAR by its manufacturer.

1) **Definitions**: Below is a brief description of TVs and other terms as relevant to ENERGY STAR.

   A. Television (TV): A commercially available electronic product designed primarily for the display and reception of audiovisual signals from terrestrial, cable, satellite, Internet Protocol TV (IPTV), or other transmission of analog and/or digital signals, consisting of a tuner/receiver and a display encased in a single housing. The product usually relies upon a cathode-ray tube (CRT), liquid crystal display (LCD), plasma display, or other display device.

   B. Television Monitor: An electronic product intended to display a video signal from an external tuner or other video source such as a VCR or DVD player on a CRT, LCD, plasma display, or other display device. For purposes of this agreement, this definition includes analog and digital television monitors. Television monitors with computer capability (e.g., computer input port) may qualify as ENERGY STAR under this specification as long as they (i) are marketed and sold to consumers as television monitors (i.e., focusing on television/video as the primary function) and (ii) incorporate Display Power Management Signaling (a standard from the VESA consortium for managing the supply of power of video monitors for computers through the graphics card) so that users may benefit from power management, allowing the product to automatically enter a low power mode after a certain period of inactivity, when it is being driven by a computer.

> **Note**: The above definition for a TV Monitor is broadly consistent with the definition in the ENERGY STAR Version 2.2 specification, and identical to what was proposed by the Consumer Electronics Association in their comments on the Draft 1 Version 3.0 TV products specification, with the addition of Display Power Management Signaling for those products that are also sold with computer input ports, e.g., VGA. EPA has made this addition to ensure that consumers who purchase TV monitors and then elect to use them with computers may still benefit from the additional power consumption savings achieved through power management.

   C. Rear-Projection TV: A type of TV in which the display device is a projector that focuses images onto a screen located within the housing of the TV.

   D. Direct-View TV: A type of TV whose display device emits light either directly from the screen surface or transmits light from a source mounted directly behind the screen. Examples include CRT, LCD, and plasma display technologies.

   E. TV Combination Unit: A system in which the TV and an additional device(s) (e.g., DVD player, HDD, VCR, etc.) are combined into a single unit and which meets all of the following criteria: the additional device(s) is included in the television casing; it is not possible to measure the power requirements of the two (or more) components separately without removal of the television casing; and the system is connected to the wall outlet through a single power cable.

> **Note**: The above definition for a TV Combination Unit is consistent with the definition for each type of Combination Unit (e.g., TV/DVD Combination Unit, etc) provided in the Draft 1 Version 3.0 TV products specification. EPA has combined the TV Combination Unit definitions in this Draft 2 specification to allow manufacturers flexibility in qualifying other types of TV Combination Units in the future, which are not currently available on the market, but would meet the definition provided above.

   F. Component Television Unit: A television system composed of two or more separate components (e.g., display device and tuner) marketed and sold as a television under one model or system

designation. The system may have more than one power cord. For purposes of meeting ENERGY STAR criteria, the total power for the system is considered.

G. Analog: For purposes of this agreement, analog units have an NTSC, PAL, or SECAM tuner and may have analog video inputs (e.g., composite video, component video, S-video, RGB).

H. Digital: For purposes of this agreement, digital units include 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 should be considered digital units.

I. Vertical Resolution: The physical pixel count for the vertical axis of the television. For example a television with a screen resolution of ~~1024 x 768~~ would have a vertical resolution of ~~768~~.

J. Electronic Program Guide (EPG): An interactive, onscreen menu of TV program information (e.g., time, date, description of TV programs, etc.) downloaded from an external source.

K. External Power Supply: A component contained in a separate physical enclosure external to the television casing and designed to convert line voltage ac input from the mains to lower dc voltage(s) for the purpose of powering the television. An external power supply must connect to the television via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.

L. Point of Deployment (POD) Module: A conditional access module for digital cable signal reception.

M. Standby Level: The lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For purposes of this specification, Standby Mode is defined as the time when the product is connected to a power source, produces neither sound nor picture, neither transmits nor receives program information and/or data (excluding data transmitted to change the unit's condition from Standby Mode to On Mode), and is waiting to be switched to On Mode by a direct or indirect signal from the consumer, e.g., with the remote control. A TV which does not have a mode meeting this description cannot qualify for ENERGY STAR.

Note: The above definition for Standby Level has been modified to more closely follow the definition provided in IEC 62301, Ed 1.0: Household Electrical Appliances – Measurement of Standby Power, with some TV-specific clarifications, per stakeholder request. Additionally, the definition for Off Mode has been removed, per stakeholder request.

N. Download Acquisition Mode (DAM): The product is connected to a power source, produces neither sound nor a picture, and is downloading ~~channel listing~~ information ~~according to a defined schedule for use by the electronic programming guide, monitoring for emergency messaging/communications and/or otherwise communicating with a connected device through a network protocol.~~ The power requirement in this mode is typically greater than the power requirement in Standby Mode and less than that in On Mode. ~~TVs without EPG functionality may not have a distinct Download Acquisition Mode.~~

O. On Mode/Active Power: The product is connected to a power source and produces sound and a picture. The power requirement in this mode is typically greater than the power requirement in Standby and Download Acquisition Modes.

~~P. Disconnect: The product is disconnected from all external power sources.~~

2) **Qualifying Products**: Any TV, TV Combination Unit, Television Monitor, or Component Television Unit ~~that is marketed to the consumer as such (i.e., focusing on television as the primary function),~~ which meets the respective product type definition in Section 1, and is capable of being powered from either a wall outlet or a battery unit that is sold with an external power supply is eligible to earn the ENERGY STAR. This specification does not cover ~~products~~ with computer capability (e.g., a computer input port,

such as VGA) that are marketed and sold as 1) computer monitors or 2) dual function televisions and computer monitors~~; only those products with computer capability that are marketed and sold as television monitors~~.

3) **Energy-Efficiency Criteria**: Only those products listed in Section 2 that meet the following criteria may qualify as ENERGY STAR. The effective date for these Version 3.0 requirements are provided in Section 6 of this specification. To qualify TVs, TV Combination Units, Television Monitors, or Component Television Units as ENERGY STAR, they must be tested according to the protocol outlined in Section 4, Test Methodology.

EPA will make On Mode, DAM, and Standby Mode data available on the ENERGY STAR Web site for interested consumers. Additionally, EPA will also provide consumers with an estimate of each ENERGY STAR qualified TV's annual energy consumption through publication of a kWh/year number. This annual power consumption estimate will be based on a daily usage pattern of 5 hours in On Mode, 3 hours in DAM (if manufacturer reports that DAM exists for their model), and 16 hours in Standby Mode. TV models without a DAM will have an annual power consumption estimate based on a daily usage pattern of 5 hours in On Mode and 19 hours in Standby Mode.

A. On Mode/Active Power

1. To qualify as ENERGY STAR, all TVs, TV Combination Units, Television Monitors, and Component Television Units must not exceed the maximum On Mode power consumption found from the equations in Table 1, based on the unit's vertical resolution and visible screen area, expressed in watts and rounded to the nearest whole number. In the following equations, A is the viewable screen area of the product, found by multiplying the display width by the display height. Equations are provided in standard units (inches^2) as well as in the metric equivalent (cm^2). Under this metric, maximum allowed power consumption for TV products of various screen sizes is provided below in Table 2.

Table 1: On Mode Power Level Requirements for TV Products

Vertical Resolution	Tier 1: Effective September 1, 2008		Tier 2: Effective September 1, 2010	
	Maximum On Mode Power Consumption (A expressed in inches^2)	Maximum On Mode Power Consumption (A expressed in cm^2)	Maximum On Mode Power Consumption (A expressed in inches^2)	Maximum On Mode Power Consumption (A expressed in cm^2)
≤ 480 All Screen Areas	P_{Max} = 0.13*A + 25	P_{Max} = 0.02015*A + 25	TBD	TBD
≤ 768 All Screen Areas	P_{Max} = 0.20*A + 40	P_{Max} = 0.03100*A + 40	TBD	TBD
> 768 Screen Area ≤ 650 inch^2 (4,194 cm^2)	P_{Max} = 0.20*A + 40	P_{Max} = 0.03100*A + 40	TBD	TBD
> 768 Screen Area > 650 inch^2 (4,194 cm^2)	P_{Max} = 0.24*A + 14	P_{Max} = 0.03720*A + 14	TBD	TBD

For example, under Tier 1, the maximum power consumption for a TV with 768 pixels of vertical resolution, a width of 36.6 inches and a height of 20.6 inches (that has a screen area of 753.8 square inches) would be: 0.20(753.8) + 40 = 190.76 or 191 watts when rounded to the nearest whole number. Examples of On Mode power requirements for other sample screen sizes are provided below in Table 2.

Table 2: Average Tier 1 On Mode Power Level Requirements for Example TV Screen Sizes

Viewable Diagonal Screen Size (Inches)	Aspect Ratio	Viewable Screen Size in Inches	Screen Area in Inches^2 (cm^2)	Maximum On Mode Power in Watts		
				480 Lines of Vertical Resolution	768 Lines of Vertical Resolution	1080 Lines of Vertical Resolution
20	16:9	17.4 x 9.8	170.5 (1,100)	47	74	74
32	16:9	27.9 x 15.7	437.6 (2,823)	82	128	128
42	16:9	36.6 x 20.6	753.8 (4,863)	123	191	195
50	16:9	43.6 x 24.5	1068.2 (6,892)	164	254	270
60	16:9	52.3 x 29.4	1537.6 (9,920)	225	348	383

Note: Several stakeholders submitted comments to EPA in response to the Draft 1 Version 3.0 TV products specification requesting that separate specification lines be developed for TVs based on TV resolution, and also that more data on larger resolution TVs was needed to address this issue. In response to these comments, EPA collected additional data for large-screen 1080i and 1080p TVs, which stakeholders noted were impacted the greatest in terms of needing additional power due to their high resolution. The current dataset for 1080 models has gone from 24 units to 56 units, and now constitutes a significantly larger proportion of the models in the dataset. EPA conducted a detailed analysis of its expanded dataset, and for this Draft 2 specification has proposed different specification lines based on the vertical resolution of the screen. This approach was developed to address stakeholder comments that apart from screen area, resolution also greatly impacts power demand. When binning products based on resolution, EPA found that relatively smaller full high resolution products (i.e., 1080 products with a screen area of less than or equal to 650 square inches) were treated to a more stringent requirement than that of smaller models with a resolution of 768. Rather than fracture the 1080 specification line to prevent this, EPA proposes that products with screen sizes less than or equal to 650 square inches and with a resolution of 1080 meet the 768 levels for the same size.

Additionally, EPA received comments from multiple stakeholders on the topic of a technology-neutral specification. Several stakeholders were supportive of a technology-neutral approach to the Version 3.0 TV products specification, whereas others felt that separate requirements should be developed for LCD, CRT, Plasma and Rear-Projection units. Irrespective of technology-type, all TVs serve the same fundamental purpose. For this reason, EPA strongly believes that the Version 3.0 TV products specification should be technology-neutral. This approach ensures that when a consumer considers one TV with the ENERGY STAR versus another, they can be confident the TVs are equally efficient and the meaning of the label is consistent across technologies. Further, a technology neutral approach provides flexibility in the future for manufacturers wanting to qualify TVs that utilize screen technologies that are not currently mainstream, such as OLED.

Several stakeholders also asked EPA to consider providing additional power allowances in this Draft 2 specification for certain features such as Wide Color Gamut and motion blur improvement, stating that they are premiere features and require additional power beyond that required by a base TV model. EPA reviewed the information provided by stakeholders on the estimated power draw of these features and conducted research to determine how prevalent they are in the marketplace. Based on information provided by stakeholders, this feature has a minimal effect on power consumption, especially when compared with a TV's overall power budget. Further, based on information from DisplaySearch, EPA found that Wide Color Gamut is projected to be in over 40% of TVs with a screen size of greater than 30" by 2008, when the Version 3.0 TV products specification is proposed to take effect. Given the quick uptake of this feature, EPA does not believe that it should be deemed a 'premiere' feature and warrant an additional power consumption allowance. Motion blur improvement is also expected to be more prevalent in TVs by 2008.

EPA has also determined that several non-proprietary technologies currently exist in the marketplace to make TVs more efficient, such as advances in backlighting technologies and films. Therefore, EPA has proposed the concept of yet TBD Tier 2 requirements in this Draft 2 Version 3.0 TV products specification. Approximately six to eight months after Tier 1 takes effect, EPA proposes to reassess the TV products market with input from industry stakeholders, and determine appropriate Tier 2 requirements. The proposed effective date for these Tier 2 requirements is September 1, 2010, two years after the proposed effective date for Tier 1. EPA anticipates that by this date, the new backlighting technologies and other power saving design attributes will be more prevalent in the marketplace.

Finally, stakeholders asked that the dataset on which EPA based its proposed levels mirror market share for technology types. As such, EPA received estimated 2008 TV market share projections from the Consumer Electronics Association (CEA). The breakdown for each technology type in EPA's dataset is within 3.7% (or less) of CEA's estimated percentage of shipments for that technology type for 2008. Based on that, EPA believes that the EPA dataset is a reasonable proxy for the current and near term market.

2. TV Products with Automatic Brightness Control: To account for the power savings achieved through automatic brightness control, where the feature is activated by default when shipped to the end user, On Mode power consumption should be determined as follows: $P_A = 0.75*P_{Max} + 0.25*P_{MIN}$, where P_A is the average On Mode power consumption in watts and rounded to the nearest whole number, taking into consideration that the TV will be in low ambient light level conditions one-quarter of the time; P_{Max} is the average On Mode power consumption in watts and rounded to the nearest whole number, determined by the applicable equation provided in Table 1, above, and tested with a minimum ambient light level of 300 lux entering directly into the sensor; and P_{MIN} is the average On Mode power consumption in watts and rounded to the nearest whole number, determined by the applicable equation provided in Table 1, above, BUT when tested with an ambient light level of 0 lux entering directly into the sensor. (See Section 4.E.2, below, for further information on how to test TVs with Automatic Brightness Control to determine ENERGY STAR qualification.)

Note: A stakeholder requested that manufacturers shipping their TVs with an Automatic Brightness Control should be recognized under this proposed Draft 2 Version 3.0 TV products specification. As such, EPA has included an additional equation under this Draft 2 specification specifically for TV products that are shipped with Automatic Brightness Control enabled at default, recognizing that when the TV is used in a room with lower ambient light levels, the power draw will automatically be reduced. Based on the JEITA standard used in Japan and referenced in the *Draft* IEC 62087, Ed 2.0: Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment, under this Draft 2 specification, a manufacturer must determine the TV's On Mode power consumption by testing both in low level and average level ambient light conditions. EPA has provided a weighted average equation for subsequently calculating the power consumption used to determine ENERGY STAR qualification, based on the TV being used three-quarters of the time in average ambient light conditions and one-quarter of the time in low ambient light conditions. This weighting is based on the JEITA standard for TVs.

3. TV Products Using an External Power Supply: To qualify, the external power supply must be ENERGY STAR qualified or meet the no-load and active mode efficiency levels provided in the ENERGY STAR Program Requirements for Single Voltage Ac-Ac and Ac-Dc External Power Supplies. The ENERGY STAR specification and qualified product list can be found at www.energystar.gov/powersupplies.

B. Download Acquisition Mode (DAM)

1. Tier 1: To qualify as ENERGY STAR, TVs, TV Combination Units, Television Monitors, and Component Television Units must not exceed power consumption of 12 watts in DAM (if manufacturer reports that DAM exists for their model). Further, products may spend no longer than three hours in a 24-hour period in DAM. If the one watt Standby Mode requirement is exceeded for longer than this, the product will not be eligible to earn the ENERGY STAR. Typically, products will enter DAM to download channel listing information according to a defined schedule for use by the EPG or otherwise to communicate with a connected device through a network protocol.

2. Tier 2: TBD

Note: At the July 19, 2007 ENERGY STAR TV Stakeholder meeting, CEA agreed to work with its members to develop a proposal regarding testing and suggested power consumption requirements for DAM. EPA looks forward to receiving this proposal from CEA, so that it may be integrated into the proposed requirements for the ENERGY STAR Version 3.0 TV products specification. In the interim, EPA received significant stakeholder feedback on the DAM requirements proposed in the Draft 1 specification, specifically focused on the power consumption requirements, the time limit for DAM, the functionality addressed by DAM, and how to test power consumption while in this mode. EPA has integrated this feedback into the Draft 2 specification where appropriate, and anticipates making further modifications once it receives CEA's proposal.

Additionally, at the July 19, 2007 meeting, a stakeholder requested that EPA consider TV products with Public Alert capabilities under this proposed Draft 2 specification, EPA requested information on the potential additional power draw of this feature and the period of time the product is in the elevated power state in the Action Items from the meeting but to date, has not received any additional information. As such, stakeholders are encouraged to provide information specific to the Public Alert feature in their comments on these proposed Draft 2 requirements, otherwise EPA will be unable to address this feature under the Version 3.0 TV products specification.

C. Standby Level: To qualify as ENERGY STAR under both Tier 1 and Tier 2 of this specification, TVs, TV Combination Units, Television Monitors, and Component Television Units must not exceed power consumption of 1 watt in Standby Mode. Additionally, this lowest power consuming Standby Mode must be the default Standby Mode for the TV as shipped to consumers. Measurements are to be taken without a POD module, if present on the product, installed.

Note: Based on stakeholder feedback, EPA has clarified that the POD module, if available, should not be installed when determining power consumption in Standby Mode.

D. User Information Requirement: In order to ensure that consumers are properly informed of the benefits of keeping their TVs in the default modes as shipped, particularly for those models that incorporate additional features and functionality that, if employed, would result in increased energy use beyond that intended by the ENERGY STAR requirements for On, DAM, and Standby Mode, the manufacturer will include with each TV one of the following:
   - Information on ENERGY STAR and the benefits of keeping the TV at its factory default settings that meet ENERGY STAR criteria in either a hard copy or electronic copy of the user manual. Where necessary, manufacturers will also include language advising consumers that enabling certain features and functionality in their TV (e.g., instant-on) will increase its energy consumption, possibly beyond the limits required for ENERGY STAR qualification. This information should be near the front of the user manual; or,
   - A package or box insert on ENERGY STAR and the benefits of keeping the TV in its factory default modes. Where necessary, manufacturers will also include language advising consumers that enabling certain features and functionality in their TV (e.g., instant-on) will increase its energy consumption, possibly beyond the limits required for ENERGY STAR qualification.

Note: Several stakeholders asked if the User Information Requirement proposed in the Draft 1 Version 3.0 specification applied to all modes, or only to Standby Mode. EPA wishes to clarify that the User Information Requirement applies to all three operational modes specified: On Mode, Standby Mode, and DAM.

4) **Test Methodology**: Manufacturers are required to perform tests and self-certify those models that meet the ENERGY STAR guidelines.

   - In performing these tests, partner agrees to use the test procedures outlined in Table 3, below, with the clarifications outlined in Section 4.E.1.
   - The test results must be reported to EPA.

Additional testing and reporting requirements are provided below.

A. Test Conditions:

Supply Voltage:	North America/Taiwan:	115 (± 1%) Volts AC, 60 Hz (± 1%)
	Europe/Australia/New Zealand:	230 (± 1%) Volts AC, 50 Hz (± 1%)
	Japan:	100 (± 1%) Volts AC, 50 Hz (± 1%)/60 Hz (± 1%)
		Note: For products rated for > 1.5 kW maximum power, the voltage range is ± 4%
Total Harmonic Distortion (THD) (Voltage):	< 2% THD (< 5% for products which are rated for > 1.5 kW maximum power)	
Ambient Temperature:	23°C ± 5°C	
Relative Humidity:	10 – 80 %	

(Reference IEC 62301 Ed 1.0: Household Electrical Appliances – Measurement of Standby Power, Sections 4.2, 4.3)

B. Models Capable of Operating at Multiple Voltage/Frequency Combinations: Manufacturers shall test their products based on the market(s) in which the models will be sold and promoted as ENERGY STAR qualified. For products that are sold as ENERGY STAR in multiple international markets and, therefore, rated at multiple input voltages, the manufacturer must test at and report the required power consumption or efficiency values at all relevant voltage/frequency combinations. For example, a manufacturer that is shipping the same model to the United States and Europe must measure, meet the specification, and report test values at both 115 Volts/60 Hz and 230 Volts/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 (e.g., 115 Volts/60 Hz), then it may only be qualified and promoted as ENERGY STAR in those regions that support the tested voltage/frequency combination (e.g., North America and Taiwan).

C. Approved Meter: Approved meters will include the following attributes[1]:

- An available current crest factor of 3 or more at its rated range value; and
- Lower bound on the current range of 10mA or less.

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested:

- Frequency response of at least 3 kHz; and
- Calibration with a standard that is traceable to the U.S. National Institute of Standards and Technology (NIST).

It is also desirable for measurement instruments to be able to average power accurately over any user selected time interval (this is usually done with an internal math's calculation dividing accumulated energy by time within the meter, which is the most accurate approach). As an alternative, the measurement instrument would have to be capable of integrating energy over any user selected time interval with an energy resolution of less than or equal to 0.1 mWh and

[1] Characteristics of approved meters taken from IEC 62301 Ed 1.0: Household Electrical Appliances – Measurement of Standby Power

integrating time displayed with a resolution of 1 second or less.

D. Accuracy: Measurements of power of 0.5 W or greater shall be made with an uncertainty of less than or equal to 2% at the 95% confidence level. Measurements of power of less than 0.5 W shall be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level.

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

Note: Several minor modifications have been made to Sections C and D, above, to improve clarity for stakeholders. Additionally, EPA received a comment from a stakeholder that the power measurement instrument resolution requirements and frequency response rate suggestions be removed. EPA believes it is important to retain these requirements to ensure the accuracy of the power meter being used to measure the power consumption of products under the Version 3.0 TV products specification.

E. Test Procedures:

Table 2: Test Procedures for Measuring Operational Modes

Specification Requirement	Test Protocol	Source
Standby Mode	IEC 62301, Ed 1.0: Household Electrical Appliances – Measurement of Standby Power	www.iec.ch
On Mode	*Draft* IEC 62087, Ed 2.0: Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment, Section 11, "Measuring conditions of television sets for On (average) mode."[2]	www.iec.ch

1. Guidance on Implementation of IEC 62301: Below, EPA provides specific guidance on using IEC 62301 for measuring TV Standby Mode power. For purposes of determining ENERGY STAR qualification of a product, the below clarifications apply:

   a. All standby measurements shall be conducted and reported to EPA first at factory default conditions. Measurements are to be taken with the POD module, if available, not installed.

   b. Manufacturers must make additional measurements as necessary, in addition to the standby power consumption of the product at factory default settings, to report the highest observed power consumption of the product in Standby Mode.

   c. For TVs that have a Download Acquisition Mode, the manufacturer must measure and report the power consumption of the device while in this mode. All applicable DAM functionality must be active while measuring power in DAM (e.g. the TV must be downloading program guide updates over a live or simulated TV signal, monitoring for emergency messaging/communications, and/or otherwise communicating with a connected device through a network protocol). While testing in DAM, the TV should produce neither images nor sound.

2. Guidance on Implementation of IEC 62087: Below, EPA provides guidance on using IEC 62087 for measuring TV On Mode power. For purposes of determining ENERGY STAR qualification of a product, the below exceptions and clarifications apply.

[2] IEC 62087, Ed 2.0 is still in draft form and under IEC committee review, as of the writing of this Draft 2 Version 3.0 specification. While significant changes to the relevant portions of the IEC document are not envisioned by its authors, EPA will review the final version, when available, to ensure that no material changes have been made to the applicable sections of the document.

a. Accuracy of Input Signal Levels: *Section 11.3.9, "Accuracy of input signal levels"* reminds testers that video inputs used for testing should be within +/- 2% of reference white and black levels. *Section B.2 of Annex B, "Considerations for On (average) mode television set power measurements"* describes the importance of input signal accuracy in further detail. EPA would like to emphasize the importance of using accurate/calibrated video inputs during On Mode testing. Testers are encouraged to use digital video signals such as HDMI wherever possible. When using analog inputs, manufacturers are urged to use DVD player equipment with highly accurate analog outputs that are within +/- 2% of reference signal levels.

b. Use of Static Signals for Testing: Manufacturers should ignore *section 11.4, "On mode (average) testing with static video signals"* for the purposes of ENERGY STAR testing. EPA intends TVs to be measured using the dynamic video test signals referred to in *section 11.5, "On mode (average) testing with dynamic broadcast-content video signal."*

c. True Power Factor: Due to increased awareness of the importance of power quality on the part of EPA and electric utilities, manufacturers shall indicate the true power factor of their sets during On Mode measurement.

d. Testing at Factory Default Settings: In measuring the On Mode power consumption of TVs, EPA is interested in capturing first and foremost the power consumption of products *as they are shipped from the factory*. Any sections of IEC 62087 that instruct the tester to modify factory default settings should be ignored when conducting initial On Mode measurements on a given product. These include *sections 11.3.4, "Special functions" and 11.3.5, "Power saving functions."* Picture level adjustments that need to be made prior to testing On Mode power consumption should be made per *section 11.3.6, "Picture level adjustments,"* if applicable.

e. Testing of TVs with Automatic Brightness Control: If an automatic brightness control exists and is enabled by default, the TV should initially be tested in a room with a minimum ambient light level of 300 lux entering the sensor, as described in *section 11.3.5, "Power saving functions."* A second measurement should subsequently be taken with the TV tested in a room with an ambient light level of 0 lux entering the sensor, as described in the first part of Section 3.1.1 of Annex B.

Note: The guidance provided in this Draft 2 Version 3.0 TV products specification on implementation of *Draft* IEC 62087 is similar to the guidance provided in the Draft 1 specification. However, per stakeholder request, EPA has clarified that if applicable, manufacturers should make picture level adjustments as specified in section 11.3.6 prior to testing On Mode power consumption. For products shipped with a forced menu where the customer must select upon initial start up the mode in which the product will operate, IEC 11.3.6 states that these models be tested in standard mode. To further consistent messaging to consumers about how to set their TVs for home use, EPA proposes that the forced menu option provide two choices: home vs retail. If retail is selected, the TV will prompt the user each time they turn on the product to confirm they wish to keep the product in this setting. If home is selected upon initial set-up, the user will not be prompted when next turning on the set. Information relaying that the product qualifies for ENERGY STAR in the home setting and that this is the setting in which power savings will be achieved will be included with the product in its packaging and posted on product listing on the partner's website, where information about the model is listed. EPA has also provided guidance on how to test TVs with Automatic Brightness Control enabled as the default, so that their power consumption can be determined per the equation provided in Section 3.A.2 of this Draft 2 specification. Additionally, per stakeholder request, testing to determine ENERGY STAR qualification will only need to be conducted using the dynamic broadcast-content video signal referenced in IEC 62087. Therefore, EPA has removed reference to the Internet content video signal in this Draft 2 specification.

As of the writing of this Draft 2 Version 3.0 specification, IEC 62087, Ed 2.0 is still in draft form and under IEC committee review. While significant changes to the relevant portions of the IEC document are not envisioned by its authors, EPA will continue to work closely with the IEC and monitor progress on the finalization of this test procedure. EPA will review the final version, when available, and if significant

changes are made to the applicable sections of the document, EPA will engage in discussions with ENERGY STAR TV stakeholders prior to incorporating into the Version 3.0 ENERGY STAR TV products specification.

5) **Effective Date**: The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. Any previously executed agreement on the subject of ENERGY STAR qualified TVs shall be terminated effective August 31, 2008.

   A. Qualifying Products Under Tier 1 of the Version 3.0 Specification: Tier 1 of this Version 3.0 specification will commence on **September 1, 2008**. All products, including models originally qualified under Version 2.2, with a **date of manufacture** on or after **September 1, 2008** 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.

   B. Qualifying Products Under Tier 2 of the Version 3.0 Specification: The second phase of this specification, Tier 2, will commence on **September 1, 2010**. All products, including models originally qualified under Tier 1, with a **date of manufacture** on or after **September 1, 2010**, must meet the Tier 2 requirements in order to qualify for ENERGY STAR.

Note: Several stakeholders asked for a delayed effective date for the Version 3.0 TV products specification, until July 2009. EPA anticipates finalizing the Version 3.0 ENERGY STAR TV products specification by December 2007. The proposed Tier 1 effective date of September 1, 2008, would allow industry the typical nine months transition time prior to the new specification taking effect. Additionally, EPA has included a proposed effective date for TBD Tier 2 requirements under this Draft 2 Version 3.0 TV products specification.

   C. Elimination of Grandfathering: EPA will not allow grandfathering under this Version 3.0 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

6) **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 model must meet the ENERGY STAR specification in effect on the model's date of manufacture.