ENERGY STAR® Program Requirements for Audio/Video

Version 2.0

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ENERGY STAR® Program Requirements for Audio/Video

Version 2.0 Partner Commitments

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified Audio/Video (AV) products. 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 Audio/Video products and specifying the testing criteria for AV products. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR marks and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR Audio/Video product within six months of activating a Partnership agreement. When Partner qualifies a product, it must meet the specification in effect at that time;
- provide clear and consistent labeling of ENERGY STAR qualified AV products. Partner must use the ENERGY STAR mark in all of the following ways:
    - Via permanent or temporary label on the product. All temporary labeling must be affixed to the top/front of product with an adhesive or cling-type application. Partner must comply with guidance for certification marks provided in the ENERGY STAR Identity Guidelines, which can be found at www.energystar.gov/marks;
    - Either in product literature (e.g., user manuals, specification sheets, etc.) or in a separate box insert that provides educational language about the product's ENERGY STAR settings; and
    - On product packaging/boxes for products sold at retail;
    - If additional information about the ENERGY STAR program(s) or other products is provided by the Partner on its Web site, Partner must comply with the ENERGY STAR Web Linking Policy, which can be found at www.energystar.gov/partners;
- work with Value Added Resellers (VARs) of Partner's products to help ensure that AV products remain in compliance with ENERGY STAR requirements. Any party within the distribution channel of an ENERGY STAR qualified AV product that alters the power profile of a product after its date of manufacture through hardware or software modifications must ensure that the product continues to meet the ENERGY STAR requirements before delivering this product to the end customer. If the product no longer meets the requirements, it may not bear the ENERGY STAR mark;
- if a VAR makes any modifications to an AV product that was previously qualified under this Version 2.0 specification, re-brands the product, and promotes it as ENERGY STAR, it must become an ENERGY STAR Partner and follow the requirements outlined in this Version 2.0 specification;
- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying AV products. Once the Partner submits its first list of ENERGY STAR qualified products, 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 AV products 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 AV products 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 mark 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 of which the Partner would like EPA to be aware. For example, activities may include: (1) increase the availability of ENERGY STAR labeled products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;

- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message;
- join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. SmartWay Transport works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway;
- join EPA's Climate Leaders Partnership to inventory and reduce greenhouse gas emissions. Through participation, companies create a credible record of their accomplishments and receive EPA recognition as corporate environmental leaders. For more information on Climate Leaders, visit www.epa.gov/climateleaders;
- join EPA's Green Power partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities; visit www.epa.gov/grnpower.

ENERGY STAR® Program Requirements for Audio/Video

Version 2.0 Eligibility Criteria

Below is the Version 2.0 product specification for ENERGY STAR qualified audio/video products. A product must meet all of the identified criteria if it is to earn the ENERGY STAR.

1. Definitions

A. Product Classifications:

1) AV Product: For purposes of this specification, all mains-connected products that offer audio amplification and/or optical disc drive functions and do not meet the definition of a Dedicated Audio DSP Device shall be classified as AV Products and subject to the requirements specified in this document.

2) Dedicated Audio DSP Device: A device may be classified as a "Dedicated Audio DSP Device" if it meets all of the following criteria:

i) provides audio digital signal processing as its primary function;

ii) provides support for one or more networking / control protocols; and,

iii) does not provide audio amplification.

3) Consumer AV Product *(Applicable to Tier 1 Version 2.0 Only):*[1] Consumer AV Products are intended for sale to individual consumers and include the following: cassette decks, CD players/changers, CD recorders/burners, clock radios, DVD & Blu-ray Disc products, equalizers, laserdisc players, mini- and midi-systems, minidisc players, powered speakers, rack systems, stereo amplifiers/pre-amplifiers, stereo receivers, table radios, and tuners.

B. APD (Auto Power Down): The capability to automatically switch a device from On mode to Sleep mode after a predetermined period of time (APD timing) has elapsed. APD timing begins when the following criteria have been met: (1) the device has ceased performance of all primary functions, or (2) the last user input has been received (e.g., remote control signal, volume adjustment).

C. Loss of Signal (LOS):

1) For audio signals, LOS is defined as:

i) Analog inputs: 1 dB or more above the measured noise floor for 60 seconds.

ii) HDMI: Receive <Inactive Source> or <Standby> signal over the CEC channel, or [Power Status] of an upstream device goes to "Standby" or "In Transition to Standby" over the CEC channel.

iii) Other Digital Inputs (e.g., Ethernet): No audio information in the data stream.

iv) Detectable cable disconnects.

2) For video signals, LOS is defined as:

i) Analog Inputs: Loss of either the horizontal or vertical sync signal.

[1] Note: The definition for Consumer AV Product is included here strictly for purposes of maintaining continuity of requirements for products that were eligible for qualification under the Version 1.0 ENERGY STAR Audio/DVD specification under the new Tier 1 Version 2.0 ENERGY STAR Audio/Video specification. This definition will be phased out when Tier 2 Version 2.0 requirements take effect.

ii) HDMI: Receive <Inactive Source> or <Standby> signal over the Consumer Electronics Control (CEC) channel, or [Power Status] of an upstream device goes to "Standby" or "In Transition to Standby" over the CEC channel; or detection of a disabled TMDS link, a TMDS clock line signal below 22.5 MHz for more than one second, or a TMDS link operating outside of the valid frequency range.

iii) DVI: Detection of a disabled TMDS link, a TMDS clock line signal below 22.5 MHz for more than one second, or a TMDS link operating outside of the valid frequency range.

iv) Other Digital Inputs (e.g., Ethernet): No video information in the data stream.

v) Detectable cable disconnects.

D. Primary Function: A primary function is any discrete, dynamic device function that can be perceived by an end user. The delivery of active audio/video content to an end user is considered a primary function.

1) Continuous device functions (e.g. clocks, status displays, indicator lamps) are not primary functions.

2) Static device functions are not primary functions. Static functions include, but are not limited to:

i) no active audio or video processing or output;

ii) playback paused or stopped;

iii) no optical disc media in disc drive; and,

iv) system waiting in disc menu or other menu for user input.

E. Operational Modes:[2]

1) On Mode: Where the product is connected to a mains power source, has been activated and is providing one or more primary functions. The common terms "active", "in-use" and "normal operation" also describe this mode.

i) Active State: A state within On mode in which a product is performing a primary function.

ii) Idle State: A state within On mode in which a product is not performing a primary function and no content is actively being delivered to the end-user.

2) Sleep Mode: The common term "standby" may also describe this mode, where the product is connected to a mains power source, is not providing a primary function, and offers one or more of the following user oriented or protective functions which may persist for an indefinite time.:

i) to facilitate the activation of other modes (including activation or deactivation of On mode) by remote switch (including remote control), internal sensor, timer;

ii) continuous function: information or status displays including clocks;

iii) continuous function: sensor-based functions.

For purposes of this specification, Sleep 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 Sleep 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).

3) Off Mode: Where the product is connected to a mains power source, is not providing any On mode or Sleep mode functions, and cannot be switched into any other mode except by user actuation of a manual power switch. An indicator that only shows the user that the product is in the off position is included within the classification of an Off mode.

[2] Operational mode definitions are derived from IEC 62301, Ed. 1.0, "Measurement of Household Appliance Standby Power"

4) Standby Mode *(Applicable to Tier 1 Version 2.0 Consumer AV Products Only)*[3]: The mode in which the product is connected to the power source, is possibly producing status information or time readout, is waiting to be switched to the active mode, and produces/records no video or audio signal (either directly audible, or audible as reproduced by headphones, loudspeakers, or other transducers). The product may exit the standby mode through an automatic timer activation, direct activation by the user, or a remote control command from the user. In standby mode, the product is substantially shut down but may continue to perform some functions (e.g., remote control sensing and clock).

F. EPS (External Power Supply): Also referred to as External Power Adapter. A component contained in a separate physical enclosure external to the AV product, designed to convert line voltage AC input from the mains to lower DC voltage(s) in order to provide power to the AV product. An EPS must connect to the AV product via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.

G. HDMI (High-Definition Multimedia Interface): A compact audio/video interface for transmitting uncompressed digital data.

1) CEC (Consumer Electronics Control) Protocol: A single-conductor wire or bus technology that is an optional feature in the HDMI specification. CEC is meant to carry IR/remote and/or control commands between HDMI devices that are interconnected. CEC is not currently required for HDMI compliance.

H. High Definition Resolution: Video output with resolution greater than 480i/p.

I. Multi-component System: A product consisting of several components with separate enclosures that are sold as and intended for use as a single system. A “Home Theater in a Box” is an example of a Multi-component System.

J. Audio Amplifier Type Classifications:

1) Full-spectrum Amplifier: An amplifier capable of full (20 Hz to 20 kHz) audible frequency range output on all channels.

2) Limited-bandwidth Amplifier: An amplifier limited to less than full (20 Hz to 20 kHz) audible frequency range output on one or more channels.

K. Audio Amplifier Size Classifications:

1) Large Amplifier: Where $P_{IN} \geq 100$ W (P_{IN} = Input Power @ 1/8 MUP 1kHz Sine Wave)

2) Medium Amplifier: Where $20 \text{ W} \leq P_{IN} < 100$ W (P_{IN} = Input Power @ 1/8 MUP 1kHz Sine Wave)

3) Small Amplifier: Where $P_{IN} < 20$W (P_{IN} = Input Power @ 1/8 MUP 1kHz Sine Wave)

L. Product Functions:

1) Audio Amplification: A function by which a device increases the amplitude of an audio signal for purposes of sending the signal to a transducer for playback.

2) Audio Signal Processing: A function by which a device modifies an audio signal for a purpose other than amplification.

3) High Resolution Display: A function by which a device converts a video signal into a visual output (e.g., LCD panel, Plasma display panel).

4) Status Display: A function by which a product provides a visual display of less than 480x234 pixel resolution or 5 inches diagonal screen size. A typical status display would be a back-lit alphanumeric clock or channel indicator. Note that single indicator lamps are not included under the definition of status displays and are not provided power allowances under this specification.

[3] Note: The definition of Standby mode is the same as in the Version 1.0 ENERGY STAR Audio/DVD specification. The definition is included here strictly for purposes of maintaining continuity of requirements for “Consumer AV Products” under the Tier 1 Version 2.0 Audio/Video specification. This definition will be phased out when Tier 2 Version 2.0 requirements take effect.

5) IP Video Tuner: A function by which a device can play back streaming digital video content packetized or downloaded over an IP network.

6) Networking / Control Protocol: A function by which a device can connect to a network for transmission and receipt of data. The connection may be wired or wireless (e.g., WiFi, Ethernet, Bluetooth, RS-232, USB).

7) Optical Disc Player / Recorder: A function by which a device can read and/or write data to removable disk media (e.g., CD, DVD, Blu-ray Disc).

M. THD (Total Harmonic Distortion): The ratio of the sum of the powers of all harmonic components to the power of the fundamental frequency of a signal.

N. MUP (Maximum Undistorted Power): A measure of amplifier output power at the point at which the THD of the amplifier is 1% or greater.

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

2. Qualifying Products

2.1. Included Products:

A product must meet the definition of an AV Product or Dedicated Audio DSP Device provided in Section 1.A of this document to be eligible for ENERGY STAR qualification under this specification, with the exception of products identified in Section 2.2.

2.2. Excluded Products:

Products that are covered under existing ENERGY STAR product specifications are not eligible for qualification under the Audio/Video specification. The list of specifications currently in effect can be found at www.energystar.gov/products. For example, displays, monitors, lighting, computers, and game consoles cannot qualify as Audio/Video products, since each is subject to qualification criteria under another ENERGY STAR specification.

The following products are excluded from qualification under this specification.

a) Products which meet the definition of a Display, Television, Set-Top Box (STB), Computer, or Game Console per the definitions in ENERGY STAR requirements for those product categories.

b) Products whose primary video playback capability is via IP Video Tuner and which are sold or provided outside of a dedicated service contract.

c) Primarily battery-powered products (i.e. MP3 players, portable DVD players, portable gaming systems, etc.) Note that primarily battery-powered products may be eligible for qualification as End Use Products under ENERGY STAR. In addition, see the Tier 1 Exception for Portable Video Disc Players below.

Tier 1 Exception for Portable Video Disc Players: Portable DVD and Blu-ray Disc players that were previously eligible for qualification under the Version 1.0 ENERGY STAR Audio/DVD specification will be allowed to qualify under Tier 1 Version 2.0. At the time Tier 2 Version 2.0 requirements take effect, these products will no longer be eligible to qualify as ENERGY STAR.

d) Products for use in automotive applications.

e) Video projectors.

f) Home and building automation & control products.

g) Whole-house and whole-building audio and/or video systems.

h) Videoconferencing systems.

i) Wireless microphone systems.

j) A/B selector switches.

k) Media servers.

3. Energy Efficiency Criteria

Products must meet all of the requirements specified below to be eligible for ENERGY STAR qualification under this specification. A summary of these requirements is in Table 1. Products previously eligible for qualification under the Version 1.0 ENERGY STAR Audio/DVD specification are not subject to new qualification requirements until Tier 2 takes effect.

Table 1: Summary of Energy Efficiency Requirements

<table>
<tr><th rowspan="2">Product</th><th colspan="3">Requirements</th></tr>
<tr><th>Tier 1
November 2009</th><th>Tier 2
July 2010</th><th>Tier 3
March 2012</th></tr>
<tr><td>Consumer AV Products</td><td>▪ Standby mode power consumption limit = 1W</td><td>▪ Sleep mode power consumption limits (base, networking / control)
▪ Auto Power Down requirements
▪ Product function power consumption limits (display, networking / control, optical disc player)
▪ Amplifier efficiency requirements (medium, large)
▪ Idle power limits for all products if option to disable APD</td><td rowspan="2">▪ Sleep mode power consumption limits (base, networking / control)
▪ Auto Power Down requirements
▪ More stringent product function power consumption limits (display, networking / control, optical disc player)
▪ More stringent amplifier efficiency requirements (medium, large)
▪ Idle state power consumption limits for all products if option to disable APD</td></tr>
<tr><td>All Other AV Products</td><td colspan="2">▪ Sleep mode power consumption limits (base + networking / control)
▪ Auto Power Down requirements (for Digital Signal Processors, this is the only requirement)
▪ Product function power consumption limits (display, networking / control, optical disc player)
▪ Amplifier efficiency requirements (medium, large)
▪ Idle state power consumption limits for all products if option to disable APD</td></tr>
</table>

3.1. General Qualification Criteria:

a) Mandatory Auto Power Down (APD): To qualify for ENERGY STAR, all products must offer APD functionality that is enabled by default. APD timing begins after the last user input has been received (e.g., control signal, volume adjustment) or when the product ceases performance of all primary functions. For devices that process audio or video signals from external sources, the presence of a signal on any active AV input may constitute performance of a primary function, and APD timing begins upon loss of audio or video signal (LOS) on any active AV inputs. Manufacturers may offer users the option (via system menu, DIP-switch, or other means) to modify APD timing in 10 minute intervals or to disable APD entirely. Products may also initiate APD immediately upon receipt of authoritative control instruction via an active Networking / Control Protocol.

1) APD Timing ≤ 30 minutes: This timing option is acceptable for use as a default setting. If APD timing is set by default to no more than 30 minutes and APD cannot be disabled or increased to greater than 30 minutes, products do not have to meet Idle state power consumption requirements.

2) 30 minutes < APD Timing ≤ 2 hours: This timing option is acceptable for use as a default setting. If APD can be disabled, or if APD timing can be increased to no more than 2 hours, products must meet Idle state power consumption requirements.

3) APD Timing > 2 hours: This timing option may only be enabled by the end user and is not acceptable for use as a default setting. If APD can be disabled, or if APD timing can be set to greater than 2 hours, products must meet Idle state power consumption requirements.

Exception to Mandatory APD Requirements: Products that are subject to 3rd party performance standards that prohibit APD, including those used for Mass Notification and Emergency Communications Systems and subject to proposed ANSI/UL 2572, are exempt from ENERGY STAR APD requirements.

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

c) Multi-component Systems: On and Sleep mode power consumption limits for each power-consuming component in a Multi-component System shall be assessed independently. To qualify for ENERGY STAR, each component must meet applicable ENERGY STAR criteria.

d) Networking / Control Protocols: To qualify for ENERGY STAR, AV products that offer one or more Networking / Control Protocol options must meet all applicable ENERGY STAR criteria in all networking and control configurations.

3.2. Modal Qualification Criteria:

a) Standby Mode Power Consumption Requirement for Consumer AV Products: The limit specified in Table 2 is the only requirement applicable to Consumer AV products under Tier 1 of this specification. To qualify for ENERGY STAR, the calculated Standby mode power consumption for a product must not exceed the limit in Table 2.

Table 2: Standby Mode Power Consumption Limit for Tier 1 Consumer AV Products

Product	*Standby Mode Power Consumption Limit (W)*
Consumer AV Products	1.0

b) Sleep Mode Power Consumption Requirements for All Other Products and Tiers: The limits specified in Table 3 are additive. To qualify for ENERGY STAR, the calculated Sleep mode power consumption for a product must not exceed the sum of the limits for each applicable product function listed in Table 3. The Networking / Control Protocol limit in Sleep mode shall be applied only to active, in-use networking / control protocols that provide remote hosts with the capability to transition the device into and out of Sleep mode.[4]

[4] The intent of the networking / control protocol Sleep mode limit is not to provide an additional power allowance for all network / control capabilities offered by a product. Rather, the allowance is intended only for active, in-use protocols that enable products to be connected to a network for remote wake/sleep control. Additional protocols that are available but inactive or disconnected, or do not provide remote wake/sleep capability, do not receive additional Sleep mode power allowances.

Table 3: Sleep Mode Power Consumption Limits

Product Function	*Sleep Mode Power Consumption Limits (W)*			
	Tier 1 Consumer AV Products	*Tier 1 All Other Products*	*Tier 2 All Products*	*Tier 3 All Products*
Base (All Products)	N/A	1.0		
In-use Networking / Control Protocol (Wake / Sleep Capability Only)	N/A	2.0		1.0

c) On Mode Power Consumption Requirements: The limits specified in Table 4 are additive, with the exception of the optical disc player limit. Only one optical disc player limit shall be applied to the On mode power consumption calculation for a product. The Networking / Control Protocol limit in On mode shall be applied only to active, in-use networking / control protocols.[5]

To qualify for ENERGY STAR, power consumption in On mode must not exceed the sum of the limits for each applicable product function listed in Table 4. In the case where multiple On mode tests can be performed on a single product (e.g., both playback and recording tests can be performed on a DVD Player/Recorder), the product must meet the On mode requirements specified in Table 4 for each test that is performed. See the requirements flow chart in Appendix A to determine appropriate test and qualification requirements for a particular product.

Exception to On Mode Power Consumption Requirements: Dedicated Audio DSP Devices that meet the definition in Section 1 are exempt from ENERGY STAR On mode power consumption requirements. In order to qualify for ENERGY STAR, these products must meet the Sleep mode power consumption limits in Table 3, must have APD enabled by default, and must meet all other requirements specified in this document. Furthermore, manufacturers must test and report On mode power consumption for all qualifying DSP products. EPA may consider this On mode power consumption data in future evaluations of ENERGY STAR Audio/Video requirements.

Table 4: On Mode Power Consumption Limits

Product Function	*On Mode Power Consumption Limits (W)*			
	Tier 1 Consumer AV Products	*Tier 1 All Other Products*	*Tier 2 All Products*	*Tier 3 All Products*
High Resolution Display (> 480x234 pixel resolution and 5 inches diagonal screen size)	N/A	*P = 6*(R) + 0.05*(A) + 3* *Where:* *R = Display resolution (x * y) in megapixels* *A = Viewable screen area in square inches*		
In-use Networking / Control Protocol	N/A	2.0		1.0
Standard Definition (SD) Source Optical Disc Player/Recorder	N/A	6.0 (Playback) 16 (Recording)		TBD

[5] The intent of the networking / control protocol On mode limit is not to provide an additional power allowance for all network / control capabilities offered by a product. Rather, the allowance is intended only for active, in-use protocols. Additional protocols that are available but inactive or disconnected do not receive additional On mode power allowances.

Product Function	*On Mode Power Consumption Limits (W)*			
	Tier 1 Consumer AV Products	*Tier 1 All Other Products*	*Tier 2 All Products*	*Tier 3 All Products*
SD Source to HD Output "Upconversion" Optical Disc Player/Recorder	N/A	10 (Playback) 16 (Recording)		TBD
High Definition (HD) Source Optical Disc Player/Recorder	N/A	15 (Playback) 25 (Recording)		TBD

EXAMPLE: The Tier 2 On mode power consumption limit for an AV product with an integrated display, HD Blu-ray Disc player, and an active Ethernet network connection would be calculated as follows: (1) A display with 480 x 234 pixel resolution (0.11 MP) and a 7 inch diagonal screen (viewable area of 20.9 square inches), would receive [((6 x 0.11) + (0.05 x 20.9)) + 3] = 4.7 watts; (2) the HD optical disc player would receive 15 watts during playback; and (3) the Ethernet connection would receive 2.0 watts. The On mode power consumption limit during playback of video content from the disc would be 4.7 W + 15 W + 2.0 W = 22 watts when rounded to the nearest watt.

d) On Mode Audio Amplifier Efficiency Requirements: To qualify for ENERGY STAR, all products that offer Audio Amplification must meet or exceed the On mode amplifier efficiency requirements specified in Table 5.

If no AV inputs are available and the optical disc player is used for audio signal input (per test procedure Section 4.3.a), the power consumption from the optical disc player, as measured in Section 6.3 of the test procedure, may be subtracted from the total measured power consumption of the device for all audio amplifier efficiency calculations.

Table 5: On Mode Audio Amplifier Efficiency Requirements

Product Function	*On Mode Audio Amplifier Efficiency*			
	Tier 1 Consumer AV Products	*Tier 1 All Other Products*	*Tier 2 All Products*	*Tier 3 All Products*
Audio Amplification Small Amplifiers (P_{IN} < 20 W)	N/A	No Efficiency Requirement		
Audio Amplification Medium Amplifiers (20 W ≤ P_{IN} < 100 W)	N/A	Efficiency > 55% *Where:* *Efficiency = P_{OUT} / (P_{IN} * 0.80)*		TBD
Audio Amplification Large Amplifiers (P_{IN} ≥ 100 W)	N/A	Efficiency > 55% *Where:* *Efficiency = P_{OUT} / P_{IN}*		TBD

P_{IN} = Input Power @ 1/8 MUP 1kHz Sine Wave
P_{OUT} = Output Power @ 1/8 MUP 1kHz Sine Wave

e) Idle State Power Consumption Requirements: The limits specified in Table 6 are additive. To qualify for ENERGY STAR, power consumption in Idle state must not exceed the sum of the limits for each applicable product function listed in Table 6.

Table 6: Idle State Power Consumption Limits

Product Function	*Idle State Power Consumption Limits (W)*			
	Tier 1 Consumer AV Products	*Tier 1 All Other Products*	*Tier 2 All Products*	*Tier 3 All Products*
Base (All Products)	N/A	5.0		
Audio Amplification	N/A	P = (0.10 * P_{OUT}) or 5 W, whichever is greater *Where:* P_{OUT} *= Output Power @ 1/8 MUP 1kHz Sine Wave*		

4. Testing

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

5. User Interface

Although not mandatory, EPA strongly recommends that manufacturers design products in accordance with IEEE 1621 "Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments." Compliance with IEEE 1621 will make power controls more consistent and intuitive across all electronic devices. For more information on the standard, visit http://eetd.lbl.gov/controls.

6. Effective Date

The date that products must meet the requirements specified under the Version 2.0 Audio/Video specification will be defined as the effective date of the agreement. Any previously executed agreement on the subject of ENERGY STAR qualified Audio/DVD products shall be terminated effective November 16, 2009 for products eligible under the Version 1.0 Program Requirements for Audio/DVD Products.

a) Qualifying and Marking Products Under the Tier 1 Version 2.0 Specification: Effective dates for Tier 1 Version 2.0 ENERGY STAR Program Requirements for Audio/Video are listed in Table 7. Note that the requirements for products originally eligible for qualification under the Version 1.0 ENERGY STAR Audio/DVD specification have been transferred into this specification for the Tier 1 timeframe. Commercial AV products and all other AV products not previously eligible for qualification under Version 1.0 must meet applicable Tier 1 Version 2.0 requirements specified in the main body of this document in order to qualify for ENERGY STAR.

   All products with a date of manufacture on or after the Tier 1 Version 2.0 effective date must meet applicable Tier 1 Version 2.0 requirements in order to qualify for ENERGY STAR (including additional shipments of products originally qualified under Version 1.0). 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 and Marking Products Under the Tier 2 Version 2.0 Specification: Effective dates for Tier 2 Version 2.0 ENERGY STAR Program Requirements for Audio/Video are listed in Table 7. All products with a date of manufacture on or after the Tier 2 Version 2.0 effective date must meet applicable Tier 2 Version 2.0 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.

c) Qualifying and Marking Products Under the Tier 3 Version 2.0 Specification: Effective dates for Tier 3 Version 2.0 ENERGY STAR Program Requirements for Audio/Video are listed in Table 7. All products with a date of manufacture on or after the Tier 3 Version 2.0 effective date must meet applicable Tier 3 Version 2.0 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.

Table 7: Version 2.0 Specification Effective Dates

Audio/Video Product	*Tier 1 Version 2.0 Effective Date*	*Tier 2 Version 2.0 Effective Date*	*Tier 3 Version 2.0 Effective Date*
All Products	November 16, 2009	July 30, 2010	March 30, 2012

d) Elimination of Grandfathering: EPA will not allow grandfathering under this Version 2.0 ENERGY STAR specification. ENERGY STAR qualification under Version 1.0 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 specification in effect on the date of manufacture of the product.

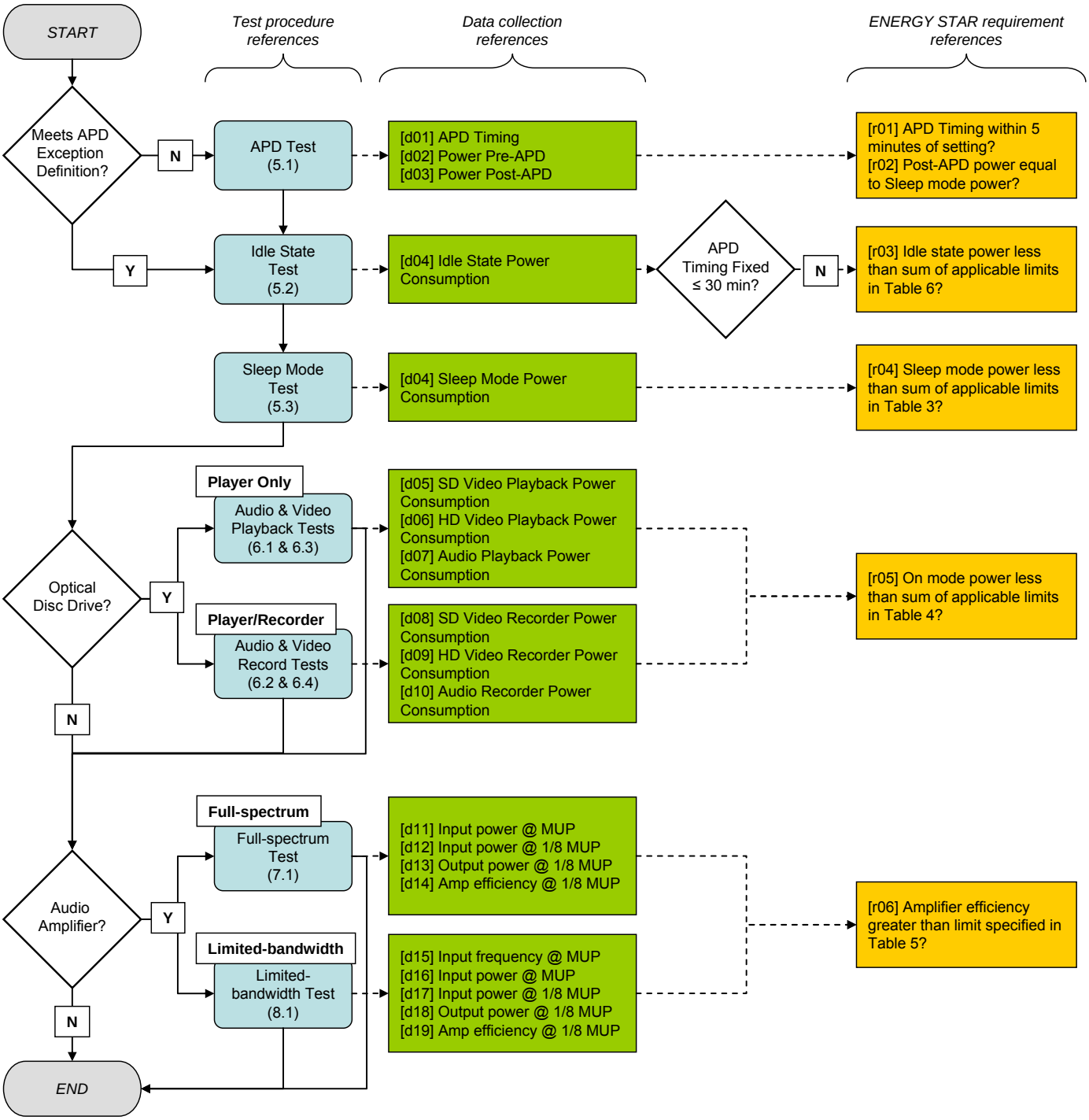
7. Future Specification Revisions

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

APPENDIX A:
Audio/Video Version 2.0 Requirements Flow Chart

(Not Applicable to Tier 1 Consumer AV Products)

Note: This flow chart is a visual aid only and is not intended for use in place of the ENERGY STAR Program Requirements primary specification document. In the event of a discrepancy between this flow chart and the primary document, the requirements specified in the primary document shall prevail.



APPENDIX B:
ENERGY STAR Test Procedure for Audio/Video Products

1. Overview

The following protocol shall be followed when measuring power consumption levels of audio/video products for compliance with the levels provided in the ENERGY STAR Version 2.0 Audio/Video Specification.

2. Applicability

Partners must test products in their "as-shipped" configuration. For products that offer a choice of user-configurable options, all options shall be set to their default condition. EPA has prepared the following guidelines for testing of Audio/Video products:

a) Power mode tests described in Section 5 shall be performed on every product;

b) Optical media player tests (Section 6) shall be performed on any product capable of playback or recording of audio and/or video stored on optical media (e.g., CD, SACD, DVD, Blu-ray Disc);

c) Full-spectrum audio amplifier tests (Section 7) shall be performed on any product that offers one- or two-channel audio amplification; and

d) Limited-bandwidth audio amplifier tests (Section 8) shall be performed on any product that offers surround sound multi-channel audio amplification. Products that offer surround sound processing shall be tested in the default surround sound mode.

Under these guidelines, a typical Home Theater in a Box system with an integrated DVD player/recorder and audio amplifiers would be subject to the power mode tests in Section 5, several of the optical disc player tests in Section 6, and the full-spectrum audio amplifier tests in Section 8. In contrast, a stand-alone rack-mount audio amplifier would likely only be subject to the power mode tests in Section 5 and the full-spectrum audio amplifier tests in Section 7. See the requirements flow chart in Appendix A to determine appropriate test and qualification requirements for a particular product.

Note that Partners who wish to qualify Consumer AV products to Tier 1 requirements need only perform the Standby mode tests in Section 5.4 of this test procedure. After the Tier 2 Version 2.0 specification becomes effective, all products must be tested to all applicable tests found in this Appendix B document.

3. Definitions

Unless otherwise specified, all terms used in this test procedure are consistent with the definitions contained in the Version 2.0 ENERGY STAR Eligibility Criteria for Audio/Video Products.

4. Test Setup

Test setup and instrumentation shall be in accordance with the requirements of IEC 62301, Ed. 1.0, "Measurement of Household Appliance Standby Power", Section 4, "General Conditions for Measurements", unless otherwise noted in this document. In the event of conflicting requirements, this test procedure shall take precedence. The setup and instrumentation requirements from IEC 62301, Ed. 1.0, Section 4 are applicable to both On and Sleep mode testing for ENERGY STAR.

4.1. Calibration

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

4.2. Power Measurement Test Conditions

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

b) Component-level Measurement: For multi-component systems (e.g., a home theater system may include a receiver, powered subwoofer, and wireless speakers); all components shall be connected together in a typical end-use configuration. Components may be tested simultaneously, but each power-consuming device must be metered separately – power consumption must be measured at each plug connection to mains power.

4.3. Source Signals

a) Signal Input Location: If the UUT does not have accessible signal input terminals, test signal input may be through the device antenna, optical disc player, or other accessible means typical of customer use.

b) Audio Sources: A 1 kHz sine wave input signal shall be used as the audio source for all amplifier tests in Sections 7 and 8. For stereo testing, sine wave signals shall be in-phase, with identical frequency.

c) Video Sources: SD and HD video broadcast loop content from IEC-62087 shall be used as the video source for optical disc player tests in Section 6.

d) Option to Test with Only HD Video Sources: The video test procedures in Section 6 are to be performed with both SD and HD video sources for devices capable of processing both SD and HD content. The reported power consumption for the UUT is the average of the power consumption measurements from the SD and HD video source tests. This average is intended to reward devices that can scale back power consumption when processing SD video signals.

If the UUT is found to have negligible differences in power consumption when processing SD versus HD sources, the manufacturer may choose to perform and report results from only HD tests, in order to expedite testing.

4.4. UUT Configuration and Control

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

b) Output Volume: The UUT output volume shall be set to minimum for the duration of all tests except as noted in the audio amplifier test procedures in Sections 7 and 8.

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

d) Speaker Outputs: If the UUT includes speaker outputs, connect a resistive load across each pair of output terminals equivalent to the nominal rated load impedance or lowest impedance of the rated impedance range (e.g., 6 ohm if rated 6-8 ohm). The same resistive load must be used for all amplifier tests. For self-powered or internal speakers with no accessible output terminals, output power must be measured across the speaker input leads, using the attached speaker as a resistive load.

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

f) Networking / Control Protocols: If the UUT offers several networking / control protocol options, the most energy-consumptive protocol must be active and in-use through all phases of the test procedure.

4.5. UUT Initialization

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

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

2) Connect the UUT to the power source.
3) Power on the UUT and perform initial system configuration, as applicable.
   a) Ensure that all audio tone controls are set to mid-level.
   b) Ensure that UUT components (display brightness, etc.) are in their as-shipped configuration.
4) Connect the UUT to the signal source. The input signal shall comply with the requirements in Section 4.3, above.
5) Let the UUT sit for at least 15 minutes, or until the unit has completed initialization and is ready for use.
6) Measure and record the AC mains input voltage and frequency.
7) Measure and record the test room ambient temperature.

5. Test Procedures for All Products

The following tests shall be performed on all products.[6]

5.1. Auto Power Down (APD) Function

1) Configure the UUT in a typical On mode operational state, with APD timing set to the default value, or 30 minutes.
2) Stop the UUT from performing any primary functions and turn off any input signal applied to the active AV input.
3) Measure and record the average power consumption before APD over a 2-minute period.
4) Allow the UUT to automatically power-down. Record the time elapsed before the APD event. Verify that the elapsed time is within 5 minutes of the default APD timing value.
5) Verify that the device is in the expected APD low-power state.
6) Measure and record the average power consumption after APD over a 2-minute period.

5.2. Idle State

1) Configure the UUT in a typical Sleep or Off mode operational state.
2) Press the Power button to bring the unit into an On mode operational state, such that no active content is playing.
3) Wait at least 60 seconds to allow the UUT to achieve stability.
4) Measure and record the average power consumption over a 2-minute period.

5.3. Sleep Mode

1) Configure the UUT in a typical On mode operational state.
2) Press the Power button to bring the unit into a Sleep mode low-power operational state.
3) Measure and record the average power consumption over a 2-minute period.

5.4. Standby Mode

**** ONLY APPLICABLE TO TIER 1 CONSUMER AV PRODUCTS ****

1) Power on all test equipment and properly adjust operation range.
2) Connect the test equipment and unit under test.

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[6] NOTE: The APD test (5.1) is not required for products that are not required to offer an APD function per the exception noted in Section 3.1.a.

3) Check for normal operation of the test unit and leave all customer adjustment to factory default settings.

4) Bring the test unit into Standby mode either by using the remote control device or by using the ON/OFF switch on the test unit cabinet.

5) Set the power meter current range. The full-scale value selected multiplied by the crest factor rating (I_{peak}/I_{rms}) of the meter must be greater than the peak current reading from the oscilloscope.

6) After the unit under test reaches operating temperature and the readings on the power meter stabilize (approximately 90 minutes), take the true power reading in watts from the power meter.

7) Record the test conditions and test data. The measurement time shall be sufficiently long to measure the correct average value to within a +10% - 0% error. If the device has different standby modes that can be manually selected, the measurement shall be taken with the device in the most energy consumptive mode. If the modes are cycled through automatically, the measurement time shall be long enough to obtain a true average that includes all modes.

6. Test Procedures for Optical Disc Players

The following tests shall be performed on any product capable of playback or recording of audio and/or video on optical disc media (e.g., CD, DVD, and Blu-ray Disc).

6.1. Video Playback Test

1) Insert / install the removable media and begin playback of IEC-62087 SD video content.

2) Measure and record the average power consumption over a 2-minute period.

3) If the UUT is capable of playing HD content, repeat the test with IEC-62087 HD video content and record the average power consumption from each test.

6.2. Video Recording Test

1) Insert / install the removable media and begin recording of IEC-62087 SD video content.

2) Measure and record the average power consumption over a 2-minute period.

3) If the UUT is capable of recording HD content, repeat the test with IEC-62087 HD video content and record the average power consumption from each test.

6.3. Audio Playback Test

1) Insert / install the optical disc media and begin playback of a 1 kHz sine wave signal per Section 4.3.b.

2) Measure and record the average power consumption over a 2-minute period.

6.4. Audio Recording Test

1) Insert / install the optical disc media and begin recording of a 1 kHz sine wave signal per Section 4.3.b.

2) Measure and record the average power consumption over a 2-minute period.

7. Test Procedures for Full-spectrum Audio Amplifiers

The following tests shall be performed on any product that contains one or more full-spectrum audio power amplifiers.

7.1. Active State Test

1) Connect the UUT to the output of the signal generator. For devices with multiple independent audio amplifiers, all amplifiers shall be connected and tested simultaneously.

2) Generate a 1 kHz sine wave input signal per Section 4.3.b. For devices that accept only digital input signals, generate an appropriate representation of a 1 kHz sine wave.

3) Monitor each channel, one at a time, with a distortion analyzer and power meter.
4) Set the volume of the UUT to 100% and adjust the amplitude of the input signal until the THD of any single channel is 1% or greater. This shall be considered the maximum undistorted power (MUP)[7] of the channel, and this channel shall be considered the reference channel for testing.
5) Measure and record the mains input power.
6) Reduce the sine wave input signal amplitude until the output power of the reference channel is at 1/8th MUP.
7) Measure and record the mains input power.
8) With the reference channel at 1/8th MUP, measure and record the output power for all channels, averaged over a 2-minute period. Record the sum of all the output power measurements.

8. Test Procedures for Limited-bandwidth Audio Amplifiers

The following tests shall be performed on any product that contains a limited-bandwidth audio power amplifier, including surround sound amplifiers.

8.1. Active State Test

1) Connect the UUT to the output of the signal generator.
2) Generate a 1 kHz sine wave input signal per Section 4.3.b. For devices that accept only digital input signals, generate an appropriate representation of a 1 kHz sine wave. If 1 kHz is outside the range of any bandwidth-limited channel in the UUT, sweep the input signal frequency between the upper and lower -3 dB response points of the channel. Record the input signal frequency when the UUT input power is at its maximum.
3) Using the input signal frequency determined for each channel in 8.1.2, monitor each channel, one at a time, with a distortion analyzer and power meter.
4) Set the volume of the UUT to 100% and adjust the amplitude of the input signal until the THD of the output is 1% or greater. Record the output power measured on each channel at 1% THD. This shall be considered the maximum undistorted power (MUP) of the selected channel.
5) Measure and record the mains input power.
6) Determine which channel created the highest power draw in 8.1.3. This channel shall be considered the reference channel for testing.
7) Reduce the sine wave input signal amplitude until the output power of the reference channel is at 1/8th MUP.
8) Measure and record the mains input power.
9) With the reference channel at 1/8th MUP, measure and record the output power for all channels, averaged over a 2-minute period. Record the sum of all the output power measurements.

[7] If the UUT performs signal processing such that the amplifier output does not clip at 1% THD, maximum undistorted power shall be obtained by monitoring input signal amplitude and output power simultaneously to identify the point at which input signal amplitude is increased and output power remains constant.