

# EPA Proposed Performance Requirements for Game Consoles

## Final Draft

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The following are proposed performance and testing requirements for Game Consoles. Manufacturers that demonstrate that their product meets these criteria will be recognized by EPA.

### 1 DEFINITIONS

- A) Game Console: A standalone computer-like device whose primary use is to play video games. Game Consoles use a hardware architecture based in part on typical computer components (e.g., processors, system memory, video architecture, optical and/or hard drives, etc.). The primary input for Game Consoles are special hand held controllers rather than the mouse and keyboard used by more conventional computer types. Game Consoles are also equipped with audio visual outputs for use with televisions as the primary display, rather than (or in addition to) an external or integrated display. These devices do not typically use a conventional personal computer (PC) operating system, but often perform a variety of multimedia functions such as: DVD/ Compact Disc (CD) playback, digital picture viewing, and digital music playback. Handheld gaming devices, typically battery powered and intended for use with an integral display as the primary display, are not included in this test plan.
- B) Product Category: A second-order classification or sub-type within a product type that is based on product features and installed components. Product categories are used in this specification to determine qualification and test requirements.
- C) Operational Modes:
- 1) Standby Mode: The mode where the console is plugged into a power source but is not providing any primary or secondary function and has no saved hardware state. The console has no active network link although may be capable of charging devices in this mode. Not all consoles may have this mode.
  - 2) Active Mode: The mode in which the Game Console is interactively manipulated by the user in response to prior or concurrent user input. Additional functions available in Active Mode are:
    - a) Navigation Menu Function:
      - (1) Navigation Menu (aka Home Menu, System Menu, Cross Media Bar, or Dashboard): The Home Menu includes the screen(s) initially displayed for user navigation to selected game features for the selected game.
    - b) Game Functions:
      - (1) Game Play: A game is actively being played and the console is receiving user input.
      - (2) Game Play Pause: A game otherwise being played is paused after receiving user input.
    - c) Streaming Media Functions:

- (1) *Video Stream Play*: The Game Console is playing a video stream through a network connection.
  - (2) *Video Stream Pause*: The video player is paused during active streaming of the video.
- d) *System Maintenance and Download*: Applies to times when the console is actively engaged in system maintenance or download functionality after waking or in response to user input. System maintenance and download are defined below:
- (1) System Maintenance: Game Console operating system patching, game updates, or other updates delivered and installed.
  - (2) Download: Files actively downloaded onto a local storage media for concurrent or future use.

D) Components:

- 1) External Power Supply (EPS): Also referred to as External Power Adapter. A component contained in a separate physical enclosure external to the Game Console casing, designed to convert line voltage ac input from the mains to lower dc voltage(s) in order to provide power to the Game Console. An external power supply shall connect to the computer via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.
- 2) Internal Power Supply (IPS): A component internal to the Game Console casing and designed to convert ac voltage from the mains to dc voltage(s) for the purpose of powering the Game Console components. For the purposes of this specification, an internal power supply shall be contained within the Game Console casing but be separate from the main board. The power supply shall connect to the mains through a single cable with no intermediate circuitry between the power supply and the mains power. In addition, all power connections from the power supply to the Game Console components shall be internal to the Game Console casing (i.e., no external cables running from the power supply to the Game Console or individual components). Internal dc-to-dc converters used to convert a single dc voltage from an external power supply into multiple voltages for use by the Game Console are not considered internal power supplies.

E) Marketing or Shipment Terminology:

- 1) Model Number: A unique marketing name or identification reference that applies to a specific hardware and software configuration (e.g., operating system, processor type, memory, GPU), and is either pre-defined or selected by a customer.
- 2) Model Name: A marketing name that includes reference to the console model number, product description, or other branding references.
- 3) Product Family: A high-level description referring to a group of console typically sharing one chassis/motherboard combination that often contains hundreds of possible hardware and software configurations.

F) Additional Terms:

- 1) User Input: Activation of a button or active surface of a connected game controller, mouse, keyboard, remote or any other input device. The connected Game Console registers this activation via a wired or wireless connection.
- 2) Motion and Position Sensing Input: Motion and position sensing input is the use of spectrum sensors (reading a variety of spectrum wavelengths), which detect the motion and position of the player for game play, menu navigation and other purposes. Note: Accelerometer based controllers do not meet this definition.
- 3) UUT: An acronym for "unit under test," which in this case refers to the Game Console being tested.

- 4) Auto Power Down (APD): The ability of a Game Console to go into a low power state when left without user input for a predetermined amount of time.
- 5) High Definition Multimedia Interface (HDMI): A type of audio/video connection.
- 6) Digital Visual Interface (DVI): A type of audio/video connection.

## **2 SCOPE**

### **2.1 Included Products**

- 2.1.1 Manufacturers of products that meet the definition of Game Console are eligible for EPA recognition, with the exception of products listed in Section 2.2.

### **2.2 Excluded Products**

- 2.2.1 Manufacturers of the following products are not eligible for EPA recognition specific to these Game Console Performance Requirements:
  - i. Portable Game Consoles.
  - ii. Game consoles incapable of rendering HD video output (video output with a display resolution of 720 lines or greater) via HDMI.

**Note:** EPA received comments regarding the language "brought to market". Comments indicated that a change to exclude products incapable of rendering HD Video Output would be better suited for industry. EPA reviewed and agrees, and has made the necessary changes to 2.2.1.ii.

### **2.3 Ensuring Products Across Production Runs Meet Performance Requirements**

- 2.3.1 This document describes the method by which a single unit may be tested for compliance with the performance requirements. Manufacturers recognized by EPA for meeting these game Console Performance Requirements are responsible for ensuring that products from different production runs meet program requirements.

## **3 PERFORMANCE REQUIREMENTS**

### **3.1 Modal and Power Management Requirements**

#### **3.1.1 Auto Power Down**

- i. During initial setup for the game console, a setup screen that identifies Auto Power Down should not include an option to disable. The setup screen may include a link to a secondary Auto Power Down screen which includes an option to disable.
- ii. From the secondary APD screen, the user shall have the option to either disable Active Game Play mode APD only or disable APD for all modes. Consoles shall present the option of disabling APD for Active Game mode only on initial setup so as to encourage users to leave APD enabled for other modes.
- iii. In limited circumstances, users may be prompted to suspend APD for certain types of games, media content or other applications such that they run without user input and do not trigger APD (e.g. simulation games which run without user input for periods longer than 1 hour). Upon starting such games, media content or other applications, the temporary APD suspension may remain enabled for replay of such game, media content or other applications upon restart of the console. Auto-power down for other titles will not be disabled.
- iv. If a user selects to disable Auto Power Down, a second selection process shall be prompted to confirm this selection.
- v. A Game Console without user input, by default, must auto-power down to a standby mode within the period of user inactivity (i.e., the console receives no user input) specified in the Table 1 below.

**Table 1: Auto-Power Down Requirements by Mode**

Mode	Period of User Inactivity
<b>Active Navigation Menu</b>	1 hour
<b>Active Game Play</b>	1 hour
<b>Active Game Play Pause</b>	1 hour
<b>Active Video Stream Play</b>	4 hours
<b>Active Video Stream Pause</b>	1 hour

- vi. Auto-power down shall be suspended temporarily to allow for the uninterrupted performance of System Maintenance and Downloads and shall not occur during the display of an error message in the event of a system error. After an automatic wake event, the console must auto-power down immediately after performing required System Maintenance and Downloads.
- vii. The Game Consoles must be shipped with these settings enabled by default.

**Note:** EPA, to clarify the option of disabling APD for specific game titles, has updated the language of section 3.1.1.iii.

EPA has updated the language in 3.1.1.iv to reflect the language the following new language: "a second selection process shall be prompted to confirm this selection". EPA removed the earlier language referring to a "pop-up" window, giving manufacturers more flexibility regarding how they notify users

during the process. Stakeholders requested the following language to be added at the end of the new language: "on initial activation of the console". However, this phrase was not included to avoid limiting the notification to this single instance.

EPA has updated the language of 3.1.1.vi to allow for system maintenance and downloads while the console is in a mode other than standby.

EPA deleted in its entirety 3.1.1.vii, which stated "A Game Console in *Game Play* or *Media Play* need not automatically power down." EPA replaced it with new language and the Table 1: Auto-Power Down Requirements by Mode to clarify auto-power down requirements.

**Note:** Game consoles are increasingly dedicating themselves to providing non-gaming services such as media play. While EPA has not proposed criteria for Active Gaming in these Performance Requirements, EPA does believe that game consoles should be held to similar standards as devices providing these same services. Devices such as set-top boxes typically use 10-20W in Active Streaming Media. For these reasons, a requirement of 45W for this function in game consoles is appropriate. EPA did, however, receive consistent stakeholder feedback regarding the stringency of proposed media play requirements. As such, EPA has raised the Active Streaming Menu level from 45W to 50W.

EPA has also raised the Active Navigation Menu level from 35W to 40W.

Currently, 49% of U.S. households own a dedicated game console, or 57 million U.S. households. With media being played 2 hours per day, consuming 33 kWh per year would provide double the savings of what is currently proposed by industry, which would amount to over 1.8 million MWh per year and a national savings of \$216.5 million dollars in electricity bill savings. The electricity savings equates to over 1.3 million metric tons of CO<sub>2</sub> emissions prevented, equivalent to the emissions from over 250,000 cars.

## 3.2 Energy Efficiency Requirements

Table 2: Game Console Requirements

Mode	Requirement
Standby	0.5 W
Active Navigation Menu	40.0 W
Active Streaming Media	50.0 W

## 3.3 User Information Requirements

3.3.1 Products shall be shipped with informational materials to notify customers of the following:

- i. A description of power management settings that have been enabled by default,
- ii. A description of the timing settings for various power management features, and
- iii. Instructions for properly waking the product from Auto Power Down.

3.3.2 Products shall be shipped with one or more of the following:

- i. A list of default power management settings.
- ii. A note relating that the manufacturer has been recognized by US EPA for this product's efficiency to include efficiency delivered to users through power management settings, which have been enabled at the factory for the user.

## 4 TESTING

### 4.1 Test Methods

4.1.1 Test methods identified in Table 3 shall be used to determine qualification:

**Table 3: Test Methods for Qualification**

Product Type	Test Method
All	Test Method for Game Consoles, Rev. Jul-2012

# Proposed EPA Game Console Recognition Program

## Draft Final Test Method Rev. Oct-2012

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### 1 OVERVIEW

The following test method shall be used for determining product compliance with requirements in the Proposed EPA Game Console Recognition program.

### 2 APPLICABILITY

The Proposed EPA Game Console Recognition program test requirements are dependent upon the feature set of the product under evaluation. The following guidelines shall be used to determine the applicability of each section of this document:

- Section 6 shall be conducted on all eligible Game Console Products. Testing in Section 6.2 shall only be conducted on Game Consoles that support a Standby Mode in their default configuration.

### 3 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions in the Proposed EPA Game Console Recognition program.

### 4 TEST SETUP

- A) Test Setup and Instrumentation: Test setup and instrumentation for all sections of this method shall be in accordance with the requirements of IEC 62301, Ed. 2.0, "Household Electrical Appliances – Measurement of Standby Power," Section 4, "General Conditions for Measurements," unless otherwise noted in this document. In the event of conflicting requirements, the Proposed EPA Game Console Recognition program Test Method shall take precedence.
- B) Input Power: Products intended to be powered from ac mains shall be connected to a voltage source appropriate for the intended market, as specified in Table 1.

**Table 1: Input Power Requirements**

Market	Voltage	Voltage Tolerance	Maximum Total Harmonic Distortion	Frequency	Frequency Tolerance
North America, Taiwan	115 V ac	+/- 1.0 %	2.0 %	60 Hz	+/- 1.0 %
Europe, Australia, New Zealand	230 V ac	+/- 1.0 %	2.0 %	50 Hz	+/- 1.0 %
Japan	100 V ac	+/- 1.0 %	2.0 %	50 Hz/60 Hz	+/- 1.0 %

- C) Ambient Temperature: Ambient temperature shall remain between 18 °C and 28 °C, inclusive, for the duration of the test.
- D) Relative Humidity: Relative humidity shall remain between 10% and 80%, inclusive, for the duration of the test.
- E) Power Meter: Power meters shall possess the following attributes:
  - 1) Crest Factor:
    - i) An available current crest factor of 3 or more at its rated range value; and
    - ii) Lower bound on the current range of 10 mA or less.
  - 2) Minimum Frequency Response: 3.0 kHz
  - 3) Minimum Resolution:
    - i) 0.01 W for measurement values less than 10 W;
    - ii) 0.1 W for measurement values from 10 W to 100 W; and
    - iii) 1.0 W for measurement values greater than 100 W.
  - 4) Measurement Accuracy:
    - i) Power measurements with a value greater than or equal to 0.5 W shall be made with an uncertainty of less than or equal to 2% at the 95% confidence level.
    - ii) Power measurements with a value 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.

## 5 TEST CONDUCT

- A) As Shipped Condition: Game Consoles shall be tested with configuration and settings in their default, "as shipped" condition, unless otherwise specified in this document. During initial system setup, if prompted for user input for configuration options, the default settings shall be chosen when applicable. If prompted, the system firmware shall be updated.
- B) TV/Display Requirements: Game Consoles shall be tested while connected to a TV or display that supports the highest resolution supported by the UUT. Furthermore, the UUT shall be connected to the TV/display using the preferred connection type. The list below ranks connection types from most preferred to least preferred (e.g., if the UUT supports both HDMI and Component Video outputs, HDMI shall be used for testing).
  - 1) HDMI
  - 2) DVI
  - 3) Other Digital Interface
  - 4) Analog Component
  - 5) Analog Composite
  - 6) Other Analog Interface
- C) Network Connection: Game Console energy consumption shall be measured with network connectivity according to the instructions below. Only one network connection shall be active during testing.
  - 1) For UUTs with wireless capability (e.g., IEEE 802.11), a live connection to a wireless router or network access point, which supports the highest and lowest data speeds of the client radio, shall be maintained for the duration of testing.

- 2) For UUTs without wireless capability but with Ethernet support, a connection to an active network switch (the switch does not need to be connected to a live network), which supports the highest and lowest data speeds supported by the UUT, shall be maintained for the duration of testing.
- D) Streaming Media: Sections 6.4 and 6.5 require the use of streaming media. Any streaming service widely available to consumers may be utilized so long as it provides content at the highest resolution available among streaming services. Video titles shall contain motion/action typical of a modern, live-action movie. The streaming media shall be viewed in the highest resolution available from the streaming service. This resolution shall be maintained for the duration of testing.

**Note:** Based on stakeholder feedback, sections 5.D), 6.4A), and 6.5.A) of this test method no longer contain the reference to a specific streaming media provider.

- E) Game Title: To test game play APD, a game title must be loaded into the UUT. Any game title may be selected for this test, except for legacy game titles.

**Note:** Based on stakeholder feedback, legacy games designed for older systems may not support APD functionality and cannot be used to test game play APD

## 6 TEST PROCEDURES FOR ALL PRODUCTS

### 6.1 UUT Preparation

- A) Record the UUT's manufacturer, model name, operating system name and version, processor type and speed, total and available physical memory, etc. in the test report template provided.
- B) Connect an approved meter capable of measuring true power to an ac line voltage source set to the appropriate voltage/frequency combination for the test.
- C) Plug the UUT into the measurement power outlet on the meter. No power strips or uninterruptible power supplies shall be connected between the meter and the UUT. For a valid test, the meter shall remain in place until all power data are recorded.
- D) Connect the UUT to a suitable TV/display using the preferred connection type in accordance with the instructions given in Section 5.B).
- E) Turn on the UUT and wait until the operating system has fully loaded.
- F) Configure the UUT to peripherals connections (e.g., infrared, Bluetooth), as shipped. Ensure the following provisions are also met:
  - 1) All accessories shipped with the console that are required for operation must be connected for the entirety of the test.

**Note:** DOE included the term, "Motion and Position Sensing Input" in section 6.1F)1) of the Draft 3 Test Method to provide an example of an accessory that is not required for operation. Stakeholders commented that the language used in the definition for this example was too specific. DOE believes requirements in section 6.1F)1) are clear, and has therefore removed the example.

- 2) If the controller has wireless capabilities, configure and utilize the wireless connection to the console during testing. Otherwise, plug the controller into the UUT.
- 3) Only one standard controller shall be used unless otherwise required for the UUT to operate properly.
- 4) For wireless controllers and peripherals requiring integral batteries, ensure the batteries are fully charged prior to testing.

- G) If prompted, run the initial system setup (including firmware update, if prompted) and allow all preliminary tasks and other one-time/periodic processes to complete. If prompted for configuration input, default settings should be used.
- H) Ensure no disk (media or game) is in the UUT.
- I) A network connection shall be made in accordance with the instructions given in Section 5.C).
- J) Ensure that the UUT is configured as shipped including, but not limited to, default Wake on LAN (WoL), power management, and software settings. Record the ac voltage and frequency.

## 6.2 Standby Mode (if applicable)

- A) Place the UUT in its Standby Mode.
- B) Five minutes after completing 6.2.A), set the meter to begin accumulating true power values at an interval greater than or equal to one reading per second. Accumulate power values for a minimum of five minutes and record the average (arithmetic mean) value.

**Note:** Based on stakeholder feedback, power values are now measured for a minimum of five minutes, rather than for exactly five minutes. This allows for a more representative average power measurement to be recorded if the UUT demonstrates brief changes in power consumption. DOE has included this correction in sections 6.2.B), 6.3.C), 6.4.B), 6.5.C), 6.5D), and 6.6E) of this test method.

DOE has not specified an upper limit for the length of time that power is measured, and is requesting stakeholder feedback on whether a maximum time limit is needed. If an upper limit on the length of measurement time were included, what would be an appropriate value for this upper limit?

## 6.3 Navigation

- A) Navigate to the game console's home menu.
- B) Cease user input to the UUT for five minutes.
- C) Set the meter to begin accumulating true power values at an interval greater than or equal to one reading per second. Accumulate power values for a minimum of five minutes and record the average (arithmetic mean) value.

## 6.4 Video Stream Play

- A) Enter the UUT's online movie service, and access a test movie with the resolution and content requirements described in Section 5.D).
- B) Five minutes after completing 6.4.A), set the meter to begin accumulating true power values at an interval greater than or equal to one reading per second. Accumulate power values for a minimum of five minutes and record the average (arithmetic mean) value.
- C) If the video rebuffers or loses video quality any time during the testing, repeat 6.4A) and 6.4B) until a test is completed without video rebuffering or loss of video quality.

## 6.5 Video Stream Pause

- A) Enter the UUT's online movie service, and access a test movie with the resolution and content requirements described in Section 5.D).
- B) Five minutes after completing 6.5A), pause the video stream.
- C) Set the meter to begin accumulating true power values at an interval of greater than or equal to 1 reading per second. Accumulate power values for a minimum of five minutes and record the average (arithmetic mean) value as the "Video Stream Pause" power.

- D) 65 minutes after pausing the video stream in 6.5B), set the meter to begin accumulating true power values at an interval greater than or equal to one reading per second. Accumulate power values for a minimum of five minutes and record the average (arithmetic mean) value as the “Video Stream Pause APD” power.

**Note:** Section 5.F) of the Draft 3 Test Method required the tester to verify APD functionality by noting its absence if APD did not occur. Sections 6.5D) and 6.6E) of the Draft Final Test Method now specify that power consumption shall be measured after 65 minutes of user inactivity, and the average power value recorded. The absence of APD no longer needs to be noted during testing.

Based on stakeholder feedback, five minutes has been added to the waiting time before measuring power. Since the APD function may not occur instantaneously after one hour with no user input, this additional time ensures that the APD has sufficient time to complete. This change is reflected in sections 6.5.D) and 6.6.E).

The Video Stream Pause section of the Draft 3 Test Method did not specify that the one hour (now 65 minutes) of waiting for APD shall start from the pausing of the video stream. The language is updated in this test method to clarify that the 65 minutes starts when the video is paused in step 6.5.B), not after the 5+ minutes of power measurement in 6.5.C).

## 6.6 Game Play APD

- A) Load a game title with the requirements described in Section 5.E).
- B) Advance through any title screens, menus, or videos and initiate Game Play.
- C) Play the game for five minutes, advancing through the level, completing objectives, and/or increasing the user's score.
- D) If the game can be paused, pause the game and cease user input. If the game cannot be paused, cease user input.
- E) 65 minutes after ceasing user input, set the meter to begin accumulating true power values at an interval greater than or equal to one reading per second. Accumulate power values for a minimum of five minutes and record the average (arithmetic mean) value.