

JEITA Battery Run Time Measurement Method (Ver. 3.0)

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Japan Electronics and Information Technology Industries Association

Revision History

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1. Introduction

“JEITA battery run time measurement method (Ver. 1.0)” (hereinafter “JEITA-BAT1.0”), which was established in 2001, and JEITA-BAT2.0 which was revised in 2014, by Japan Electronics and Information Technology Industries Association (hereinafter “JEITA”), has been adopted by a number of notebook PC manufacturers up to date and it has played a certain role as a guideline for PC users to compare battery run times before purchasing notebook PCs.

In recent years, the diversification of PC usage as well as improvements in CPU performance and energy-saving features have resulted in dramatic fluctuations in battery run time, depending on the particular use case. The test conditions, battery run time indications, and other details of this measurement method are therefore being revised based on technological advances and environmental changes.

When making the revisions, we established a working group within the Data and Industrial Systems Subcommittee of JEITA’s PC and Tablet Project Committee to study the changes. The revised items and their details were defined primarily in accordance with the following concepts:

- This measurement method is for PCs and tablets equipped with a battery.
- It can be used to compare a variety of computing devices regardless of their installed devices and OS version.
- It requires that users can perform the measurement themselves without the use of specialized test programs or equipment.
- As with JEITA-BAT 2.0, this version of the measurement method allows users to compare the battery run time in a standardized manner and makes it easier to understand how battery run time changes with usage conditions.

2. Names

The official names and their abbreviations are as follows:

Official Japanese Name: JEITA バッテリー動作時間測定法 (Ver. 3.0)

Abbreviated Japanese Name: JEITA 測定法 3.0

Official English Name: JEITA Battery Run Time Measurement Method Ver. 3.0

Abbreviated English Name: JEITA-BAT 3.0

3. Scope of Application

This measurement method is for PCs and tablets equipped with a battery.

4. Measurement Method

4.1. Overview

Under the test conditions listed in section 4.4, calculate the battery run time for the Video Playback described in section 4.2 as well as for the idling described in section 4.3. The result of such a test is battery run time as defined in this measurement method. Fundamentally, battery run time is the measured time between the point when a new, fully charged battery begins operating and the point when the computer enters shutdown or hibernation.

4.2. Video Playback Time

Play the video file specified by this measurement method on repeat in full screen mode and measure the time between the battery beginning operation and the point when the computer enters shutdown or hibernation.

Conditions: Items 1) through 5) of section 4.4 apply.

The specifications of the video file are as follows. (The video file can be downloaded at JEITA's website: https://home.jeita.or.jp/pc_tablet/guideline/battery3.html)

Resolution	3,840 pixels x 2,160 pixels
Video Encoding	H.264/AVC
Video Bitrate	75.5 Mbps
Framerate	60 fps
Audio Encoding	AAC
Audio Bitrate	189 kbps

4.3. Idle Time

Leave the computer on its desktop or home screen while displaying the wallpaper file specified by this measurement method in full screen mode, then measure the time between the battery beginning operation and the point when the computer enters shutdown or hibernation.

Conditions: Items 1) through 4) of section 4.4 apply.

(The wallpaper file can be downloaded at JEITA's website:

https://home.jeita.or.jp/pc_tablet/guideline/battery3.html)

4.4. Measurement Conditions

1) **Volume:**

With headphones connected: 50% volume

Using the computer's speakers: Can be set to minimum volume (but cannot be set to 0% or mute)

2) **Screen Brightness:**

At least 200 cd/m².

If a computer cannot reach a brightness of 200 cd/m², then use its maximum brightness setting. Brightness is determined with the screen displaying white.

White is achieved when all RGB pixel data is set to maximum values.

3) **Wireless LAN:**

Conduct testing while the computer is connected to an access point. There are no rules regarding the communication protocol, whether communication is taking place, the electromagnetic environment, or the distance from the access point.

Also, no particular configuration is required if the computer does not have wireless LAN capabilities.

4) **Other Wireless Communication (Bluetooth, LTE, 5G, etc.):**

Can be turned off.

5) **Video Player Application:**

If a video player is installed, use that application. If no video player is installed, the user may download or purchase one.

There are no rules regarding power-management settings, the handling of other programs and background applications running during measurement, or the percentage of battery remaining when the test computer enters shutdown or hibernation. However, the user must be able to easily configure such settings via the BIOS, OS, or an application.

If the charging capabilities have been limited in the factory default settings, the battery run time of the computer can be tested in that state. However, those test conditions must be disclosed.

While this measurement method does not specify where the video file should be stored, that storage location must be disclosed.

5. Indications and Disclosures

- When indicating battery run time, state that it is compliant with JEITA-BAT 3.0.
- Battery run time is stated in units of hours, which can be indicated to the first decimal place.
- Battery run time indications can be stated as “approximate.”
- State both the Video Playback Time and the Idle Time.
- Indicate the Video Playback Time and the Idle Time so that they are clearly identifiable, as in the examples below.

Example Indication:

Battery run time (JEITA-BAT 3.0)	10.0 hours (Video Playback) / 15.5 hours (Idle)
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Battery run time ¹	10.0 hours (Video Playback) / 15.5 hours (Idle)
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¹ Tested in accordance with the JEITA Battery Run Time Measurement Method (Ver 3.0)

Battery run time (Video/Idle) ¹	10.0 hours / 15.5 hours
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¹ Tested in accordance with the JEITA Battery Run Time Measurement Method (Ver 3.0)

- When displaying the values horizontally, write the Video Playback Time on the left.
- When displaying the values vertically, write the Video Playback Time on top.
- The font used to display the Idle Time cannot be larger than the font used to display the Video Playback Time.
- If space is limited (such as in catalog descriptions etc.), the Video Playback Time alone can be displayed. However, it must be clearly stated to be the Video Playback Time, and both the Video Playback Time and the Idle Time must be indicated on websites and other locations with no space restrictions.
- The following information must be displayed on websites, in catalogs, etc.:
 - How to set the screen brightness to approximately 200 cd/m² without the use of a luminance meter
 - Which video player application was used
 - Which settings were changed from the default prior to conducting the testing.

6. The use of trademarks, patent rights, etc.

The video and image files specified by this measurement method are protected by the Copyright Act and other laws and may only be used for the purpose of testing battery run time. When using these files, be sure to read the guidelines listed on the download page.

Bluetooth is a registered trademark of U.S.-based Bluetooth SIG, Inc.

All other names of systems, products, or services that appear in this document are generally trademarks or registered trademarks of their respective developers or manufacturers. Symbols such as TM and ® are not used in this text.

7. Date of Issue

JEITA Measurement Method Ver. 3.0 will be published on May 31, 2023.

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[Commentary]

1. Establishment and Revisions

In response to demands for a standardized method of measuring battery run time for notebook PCs, we established JEITA-BAT 1.0 in 2001 and later revised it into JEITA-BAT 2.0 in 2014. In previous JEITA measurement methods, battery run time was defined as the average of the measured Video Playback Time and Idle Time.

The technology inside PCs has continued to advance, and the instantaneous power consumption of CPUs and other components grows every year. Energy-saving features can now dynamically lower energy usage when idle state then ramp up to supply sufficient power for heavy computation when such performance is needed. This means that while the performance of PCs continues to improve, the energy they consume when idle state has fallen dramatically. That decrease in idle power consumption extended the battery run time when idle state to the point that the measured results when idle state were having a tremendous effect on battery run time under JEITA-BAT 2.0, which defined battery run time as the average of the Video Playback Time and Idle Time.

In addition, PCs are now being used in many diverse situations. Devices on which they are installed and the usage of those PCs are also diverse. This has made it more difficult than ever to define battery run time in a way that is applicable to all users.

Taking these factors into account, this revision follows the basic tenet upon which this measurement method was established—the standardization of testing—and makes it easier to understand the relationship between use case and battery run time by indicating both the Video Playback Time and the Idle Time rather than the average of the two.

2. Comparison of New and Old Measurement Conditions

Below are the key differences between Ver. 2.0 and Ver. 3.0.

Comparison of the New and Old JEITA Battery Run Time Measurement Method

Item	Ver. 3.0	Ver. 2.0
Indication of Battery run time	Both the Video Playback Time and Idle Time are stated	Average of the the Video Playback Time and Idle Time

Screen Brightness	At least 200 cd/m ²	At least 150 cd/m ²
Video File	3,840 x 2,160 @ 60 fps	1,920 x 1,080 @ 30 fps
Volume When Video Playback Time measurement	50% volume if headphones are connected; otherwise, the minimum speaker volume	Mute is permitted
Wallpaper When Idle Time measurement	Specified wallpaper	Not specified

3. Details of measurement conditions and measurement methods

3.1 Measurement Conditions

- 1) Ver. 2.0 required that the volume be “set to the minimum (mute is permitted).” However, in consideration of the increased opportunities for audio output due to the popularization of online meetings etc., Ver. 3.0 was changed to “require audio output during testing.

Set the volume of the audio output to 50% if headphones are connected and to the minimum volume if using the computer’s speakers (mute is not permitted).

The headphones used during testing can be connected through a standard headphone jack or via a wireless technology such as Bluetooth.

- 2) Regarding the wireless LAN, consideration was given to transferring the file in real time. However, differences in communication protocol, the electromagnetic environment during testing, distance from the access point, etc. would likely cause significant variation in measured results. Since the purpose here is to provide a standardized method for measuring battery run time, the only requirement is that the test unit be connected to an access point.
- 3) As for other wireless features (Bluetooth, LTE/5G, and other configurations other than wireless LAN), turning them off in some products can cause issues such as the inability to perform primary functions, so the only rule is that they “can be turned off.”
- 4) Generally, the installed video player application listed in informational disclosures should be used. However, if that application cannot play the specified video, then the user may download or purchase another application, just as if there is no video player installed. If two or more video players are installed on the product, then any of them can be used for the test.

- 5) OS processes running in the background can be suspended and other applications can be terminated or uninstalled to achieve stability etc. during testing. Any settings that are changed from the factory default must be disclosed. Regarding power-management settings and the handling of other applications, those conditions must be explicitly stated and users must be able to configure them via a simple method. This “simple method” includes an OS control panel or an application provided by the manufacturer, but does not include special methods that are not in common usage (debug programs etc.).
- 6) As with Ver. 2.0, the video doesn’t have to be stored in a specified location. The video file format was changed to 4K in Ver 3.0 to take into account the proliferation of high-resolution, high-framerate video.
- 7) While Ver. 2.0 did not specify a wallpaper, Ver. 3.0 uses a designated wallpaper to further standardize the measurement method. The designated wallpaper image must be displayed full screen and not merely in a portion of the desktop space.
Elements other than the designated image, such as icons and taskbars that are displayed in the factory default configuration, can also be displayed during testing. The brightness level in Ver. 2.0 was 150 cd/m², but this was increased to 200 cd/m² in Ver. 3.0 to take into account the popularization of displays with high brightness.

3.2 Measurement method

Measure the battery run time in the following two states:

- 1) Video Playback Time
- 2) Idle Time

When studying the revision of this measurement method, we considered adding other applications such as those used for online meetings or the playback of Web video. However, the use cases of our customers are many, so we selected 4K Video Playback from the perspective of defining a standardized testing protocol.

Idle Time has become the standard way to indicate PC power, even within the international Energy Star program and IEC 62623 (a test procedure for measuring energy consumption). We therefore reviewed the brightness level, wallpaper, and other test conditions and clarified the relationship between use case and battery run time by displaying the Idle Time next to the Video Playback Time.

With the support of NHK Engineering System, we created the test video from eight types of videos published by the Institute of Image Information and Television Engineers and the Association of Radio Industries and Businesses in *Standard Videos For Assessing HDTV Systems, Second Edition*.

4. Transition from Ver. 2.0 to Ver. 3.0

Ideally, products that enter the market on or after December 1, 2023, will use data measured with Ver. 3.0.

This does not prohibit the side-by-side indication of battery run time values measured under both the old and new versions aiming for a year or so to prevent market confusion. However, avoid misleading representations that only use Ver. 2.0 values or emphasize them etc.

When indicating both values, it is advisable to consider the below items and display the information so that users can clearly identify which method each value was measured with.

- When Ver. 3.0 and Ver. 2.0 are displayed horizontally, Ver. 3.0 shall be placed on the left

Example Indication:

Battery run time (JEITA 3.0 ¹ / 2.0 ²)	8.0 hours (Video Playback) / 15.6 hours (Idle) / 13.3 (Ver. 2.0)
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¹ Tested in accordance with the JEITA Battery Run Time Measurement Method (Ver. 3.0)

² Tested in accordance with the JEITA Battery Run Time Measurement Method (Ver. 2.0)

- When displaying Ver. 3.0 and Ver. 2.0 values vertically, write the Ver. 3.0 value on top.

Example Indication:

Battery run time JEITA 3.0 ¹	Video Playback: 8.0 hours / Idle: 15.6 hours
----- JEITA 2.0 ²	----- 13.3 hours

¹ Tested in accordance with the JEITA Battery Run Time Measurement Method (Ver. 3.0)

² Tested in accordance with the JEITA Battery Run Time Measurement Method (Ver. 2.0)

- When displaying Ver. 3.0 and Ver. 2.0 next to each other, the font used to display Ver. 2.0 cannot be larger than that used for Ver. 3.0.

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