# DATA PACKAGE INFORMATION SHEET

| | | |
|---|---|---|
| Applicant Information | Name / Address: | AAEON TECHNOLOGY INC / 5TH FL,135 LANE 235 PAO CHIAO RD HSIN-TIEN,TAIPEI,TAIWAN,231 |

| | | |
|---|---|---|
| Product Information | Standard(s): | ☒ Energy Star Program Requirements for Computers: Version 5.2 |
| | | ☐ |
| | | ☐ |
| | | ☐ |
| | CCNs: | ENVP |
| | Product Name/Type: | Computers |
| | Models: | Fanless embedded controller |

| | | | |
|---|---|---|---|
| Test Location Information | DAP and UL: | ☐ CTDP ☐ TCP ☐ TPTDP ☐ WTDP ☒ UL | |
| | Test Location Name/Address: | Underwriters Laboratories Taiwan Co., Ltd. 260 Da-Yeh Road Peitou Taipei City, Taiwan 112 | |
| | Tests Conducted By**: | Sign | BRUCE YANG |
| | | Print | BRUCE YANG |
| | **When one person conducts all tests, the printed name and signature can be inserted here instead of on each page containing data. | | |
| | Authorized Signatory or TCP Reviewer: | Sign | -- |
| | | Print | -- |
| | | Date | -- |
| | | | |
| | UL WTDP / WMT Witness: | Sign | -- |
| | | Print | -- |

| | | | |
|---|---|---|---|
| Reviewed & Accepted | Qualified Project Handler: | Sign | Cast Yang |
| | | Print | Cast Yang |

# LIST OF TESTS

## Contents

## Witness Test Data Program (WTDP) Information:

Environment:

Accommodations and Environmental conditions, including proper power source meet the requirements of the test standard or UL default criteria (ISO/IEC 17025 Clause 5.3.1, 5.3.2. 5.3.3) ☐ Yes ☐ No ☐ N/A

Equipment:

Testing is being conducted within the test equipment calibration dates. (See Test Instrument Information Page and ISO/IEC 17025 5.6.2.2) ☐ Yes ☐ No

Critical Consumables:

Critical consumables are compliant with test standard requirements. (ISO/IEC 17025 Clause 4.6) ☐ Yes ☐ No ☐ N/A

Sample Identification:

Identification of items to be tested has been made (e.g. model no., Serial No., etc.) (See Test Sample Identification page and ISO/IEC 17025 Clause 5.8.2) ☐ Yes ☐ No

Summary:

The test facility was deemed to have the environment and capabilities necessary to perform the tests included in this data package. ☐ Yes ☐ No

# TEST SAMPLE IDENTIFICATION

The table below is to provide correlation of sample numbers to specific product related information. Refer to this table when a test identifies a test sample by "Sample No." only.

| Sample Number | Sample Card Number | Date Received | Manufacturer, Product Identification, Serial Number and Ratings |
|---|---|---|---|
| 1094769-1~4 | 1094769 | 2011-04-28 | AAEON Technology Inc, Fanless embedded controller, TF-AEC-6872-A2-1010.DC 9-30V, 3A |
| Sampling Procedure (if used) : | | | |

# TEST INSTRUMENTS REFERENCE LIST

| Instr. Code | Instrument I.D. | Instrument Type | Range Used Or *** | Make and Model ** | Calibration Date | |
|---|---|---|---|---|---|---|
| | | | | | Last | Due |
| | | | | | | |
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~~"Chamber setting(s) ☐ was ☐ were monitored to ensure that the setting(s) ☐ was ☐ were stable throughout the test time frame. Any deviations from the setting(s) are noted below~~.

| Date | Test | Instrument Code | Time period of deviation | Setting(s) |
|---|---|---|---|---|
| N/A | N/A | N/A | N/A | N/A |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

** Information to be recorded when tests are conducted at a non-UL facility.
*** Refer to specific data sheet for individual scale used.

☒ Test equipment information is recorded on UL's Laboratory Project Management (LPM)/Laboratory Equipment Management (LEM) database. (This statement may be selected only if datasheets are completed at a UL facility)

## PRODUCT REFERENCE PAGE

| | | |
|---|---|---|
| Model: | Fanless embedded controller | |
| Product Coding: | Desktop | |
| Model Differences: | -- | |
| Base Product: | -- | |
| Electrical Ratings: | Voltage ☐Vac ☒Vdc: | 9-30V |
| | Current ☒A ☐mA: | 3 |
| | Frequency, Hz: | -- |
| | Power, Watts: | -- |

| Unit Configuration | Comments |
|---|---|
| Product Classification: | ☒ Desktop Computer ☐ Thin Client<br>☐ Integrated Desktop Computer ☐ Workstation<br>☐ Notebook Computer<br>☐ Small-Scale Server |
| Product Category (see Tables 3 and 4 provided in this data sheet package): | ☐ Category A ☐ Category D<br>☒ Category B ☐ N/A<br>☐ Category C |
| Processor Type/Model: | Intel ATOM D510 |
| Processor Speed/Core (GHz): | 1.6GHz |
| # of CPU Cores/Processor Package: | 2 cores/ micro-FCBGA package |
| # of Discrete Processor Packages Installed: | 1 pcs |
| Operating System: | Windows 7 |
| # of HDDs: | TOSHIBA 2.5", 160GB |
| RPMs for HDDs: | 5400 |
| # of Solid State Drives: | N/A |
| System Memory (GB): | 2GB |
| # of DIMMs Installed: | 1 pcs |
| Video Card (GPU) Brand/Model: | N/A |
| Discrete GPU: | N/A |
| Discrete GPU Frame Buffer Width: | N/A |
| Video Card Dedicated Non-Shared Memory (MB) | N/A |
| Ethernet Capable System: | 10/100/1000Mbps |
| WOL Enabled from Sleep: | Enabled |
| WOL Enable from Off: | Enabled |
| Other: | -- |

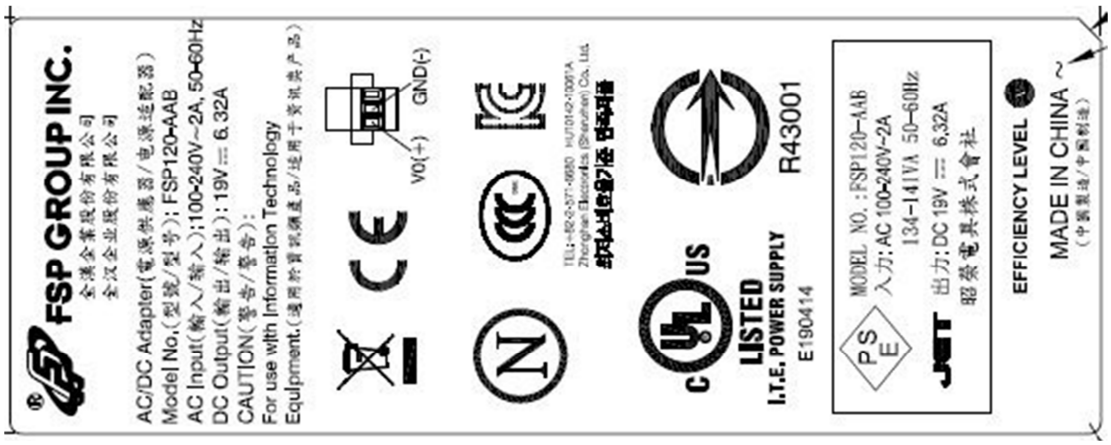
## POWER SUPPLY REFERENCE PAGE

| | | | |
|---|---|---|---|
| Product Type: | ☐ Internal | | ☒ External |
| Manufacturer: | FSP TECHNOLOGY INC. | | |
| Brand Name: | FSP | | |
| Model Number/Designation: | FSP120-AAB | | |
| Nameplate Rating: | Input: | 100-240V, 2mA, 50-60Hz | |
| | Output: | 19V, 6.32A | |
| ~~ULE EEC Certified?~~ | ~~☐ Yes~~ | ~~☒ No~~ | ~~EEC Certificate #:~~ |
| ~~EPA Approved Lab certified?~~ | ~~☐ Yes~~ | ~~☒ No~~ | ~~Lab Info:~~ |

☐ The internal power supply shall meet the applicable requirements from Table 1 provided in this data sheet package. See separate data sheet package for the internal power supply testing.

☐ The external power supply with integral cooling fans shall meet the applicable requirements from Table 1 provided in this data sheet package. See separate data sheet package for the external power supply testing.

☒ The external power supply without integral cooling fans shall meet the level V performance requirements under the International Efficiency Marking Protocol and include the level V marking. See separate data sheet package for the external power supply testing.



# TECHNICIAN'S REFERENCE GUIDE

## Definitions:

**Desktop Computer**: A computer whose main unit is designed to be located in a permanent location, often on a desk or on the floor. Desktop computers are not designed for portability and are designed for use with an external display, keyboard, and mouse. Desktop computers are intended for a broad range of home and office applications.

**Integrated Desktop Computer**: A desktop computer in which the computing hardware and display are integrated into a single housing, and which is connected to ac mains power through a single cable. Integrated desktop computers come in one of two possible forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a dc power cord and both the computer and display are powered from a single power supply. As a subset of desktop computers, integrated desktop computers are typically designed to provide similar functionality as desktop systems.

**Notebook Computer:** A computer designed specifically for portability and to be operated for extended periods of time both with and without a direct connection to an ac mains power source. Notebook computers include an integrated display and are capable of being powered by an integrated battery or other portable power source. In addition, most notebooks use an external power supply and have an integrated keyboard and pointing device. Notebook computers are typically designed to provide similar functionality to desktops, including operation of software similar in functionality as that used in desktops.

**Small-Scale Server**: A computer that typically uses desktop components in a desktop form factor, but is designed primarily to be a storage host for other computers. Small-scale Servers are designed to perform functions such as providing network infrastructure services (e.g., archiving) and hosting data/media. These products are not designed to process information for other systems or run web servers as a primary function.

**Thin Client:** An independently-powered computer that relies on a connection to remote computing resources to obtain primary functionality. Main computing functions (e.g., program execution, data storage, interaction with other Internet resources) are provided by the remote computing resources. Thin Clients covered by this specification are (1) limited to devices with no rotational storage media integral to the computer and (2) designed for use in a permanent location (e.g. on a desk) and not for portability.

**Workstation:** A high-performance, single-user computer typically used for graphics, CAD, software development, financial and scientific applications among other compute intensive tasks. Workstations covered by this specification (a) are marketed as a workstation; (b) provide mean time between failures (MTBF) of at least 15,000 hours (based on either Bellcore TR-NWT-000332, issue 6, 12/97 or field collected data); and (c) support error-correcting code (ECC) and/or buffered memory.

**Typical Energy Consumption (TEC):** A method of testing and comparing the energy performance of computers, which focuses on the typical electricity consumed by a product while in normal operation during a representative period of time.

## TECHNICIAN'S REFERENCE GUIDE (Cont'd)

Definitions:

**Off Mode**: The lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.

**Sleep Mode:** A low power mode that the computer enters automatically after a period of inactivity or by manual selection. A computer with Sleep capability can quickly "wake" in response to network connections or user interface devices with a latency of less than or equal to 5 seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep Mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.

**Idle State**: The power state in which the operating system and other software have completed loading, a user profile has been created, activity is limited to those basic applications that the system starts by default, and the computer is not in Sleep Mode.

**Active State**: The power state in which the computer is carrying out useful work in response to a) prior or concurrent user input or b) prior or concurrent instruction over the network. Active State includes active processing, seeking data from storage, memory, or cache, including Idle State time while awaiting further user input and before entering low power modes.

**Significant Digits and Rounding:**

All calculations shall be carried out with actual measured or observed values. Only the final result of a calculation shall be rounded. Calculated results shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from further rounding.

## TECHNICIAN'S REFERENCE GUIDE (Cont'd)

AC 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 or Table 2.

1. Products shipped with external power supplies (EPSs) shall first be connected to the EPS and then to the voltage source specified in Table 1 or Table 2.

**Table 1: Input Power Requirements for Products with Nameplate Rated Power Less Than or Equal to 1500 W**

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

**Table 2: Input Power Requirements for Products with Nameplate Rated Power Greater than 1500 W**

| Market | Voltage | Voltage Tolerance | Maximum Total Harmonic Distortion | Frequency | Frequency Tolerance |
|---|---|---|---|---|---|
| North America, Taiwan | 115 Vac | +/- 4.0 % | 5.0 % | 60 Hz | +/- 1.0 % |
| Europe, Australia, New Zealand | 230 Vac | +/- 4.0 % | 5.0 % | 50 Hz | +/- 1.0 % |
| Japan | 100 Vac | +/- 4.0 % | 5.0 % | 50 Hz/60 Hz | +/- 1.0 % |

**Ambient Temperature:** Ambient temperature shall be from 18℃ to 28℃.

**Relative Humidity**: Relative humidity shall be from 10% to 80%.

## TECHNICIAN'S REFERENCE GUIDE (Cont'd)

### Input Meter Considerations:

The power meter shall include the following attributes:

1. Crest Factor: Possesses an available current crest factor of 3 or more at its rated range value.
2. Minimum Frequency Response: 3.0 kHz
3. Minimum Resolution:
    a. W for measurement values less than 10 W;
    b. 0.1 W for measurement values from 10 W to 100 W; and
    c. 1.0 W for measurement values greater than 100 W.

### Measurement Accuracy:

1. 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.

2. 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.

### User Information Requirements:

Based on the informational materials shipped with the product, please confirm the following:

| Requirement | Yes/No | |
|---|---|---|
| (1) A description of power management settings that have been enabled by default, | ☒ Yes | ☐ No |
| (2) A description of the timing settings for various power management features, and | ☒ Yes | ☐ No |
| (3) Instructions for properly waking the product from Sleep Mode. | ☒ Yes | ☐ No |

Please confirm that the products are shipped with one or more of the following:

| Requirement | Yes/No | |
|---|---|---|
| (1) A listed of default power management settings. | ☒ Yes | ☐ No |
| (2) A note stating that default power management settings have been selected for compliance with ENERGY STAR (within 15 min of user inactivity for the display, within 30 min for the computer, if applicable per Table 2), and are recommended by the ENERGY STAR program for optimal energy savings. | ☒ Yes | ☐ No |
| (3) Information about ENERGY STAR and the benefits of power management, to be located at or near the beginning of the hard copy or electronic user manual, or in a package or box insert. | ☒ Yes | ☐ No |

Tested by: _____ Tested by: _____ Test date: 2011-05-16
signature print

Sample # : 1094769-1~4 Instrument Code / Range: _____

## UUT PREPARATION FOR ALL PRODUCTS

Test Method (Rev. Aug-2010)

METHOD

The unit was connected to a variable ac source of supply as indicated below.

☐ Desktops, Integrated Desktops, Notebooks, Thin Clients, Small-Scale Servers with Ethernet (IEEE 802.3) capability shall be connected to a live Ethernet network switch and any wireless radios shall be turned off. Computers without Ethernet capability must maintain a live wireless connection to a wireless router or network access point.

☐ Thin Clients shall be connected to a live server via a live Ethernet (IEEE 802.3) network switch and shall run intended terminal/remote connection software.

☐ Desktop computers, Small-Scale Servers and Thin Clients shipped without accessories shall be configured with a standard mouse, keyboard and external computer display (if server has display output functionality).

☐ Integrated Desktop computers shipped without accessories shall be configured with a standard mouse and keyboard.

☐ Notebook computers without an integrated pointing device or digitizer shall be configured with a mouse.

☐ Notebook computers shall not be configured with a docking station.

☐ Notebooks should have the battery pack(s) removed during testing. For systems where operation without a battery pack is not a supported configuration, the test may be performed with fully charged battery pack(s) installed, making sure to report this configuration in the test results.

☒ Desktops, Integrated Desktop, and Notebook Computers shall be tested with proxying features enabled or disabled as shipped.

☐ Primary hard drives shall not be power managed (“spun-down”) during Idle testing unless containing non-volatile cache integral to the drive (e.g. “hybrid” hard drives or similar non-removable disk caching architectures). Any secondary internal hard drive(s) may be tested with hard drive power management enabled as shipped. If these additional drives are not power managed when shipped to customers, they shall be tested without such features implemented.

.

Tested by: _____ Tested by: _____ Test date: 2011-05-16
signature print

Sample # : 1094769-1~4 Instrument Code / Range: _____

## UUT PREPARATION FOR ALL PRODUCTS (Cont'd)

Test Method (Rev. Aug-2010)

METHOD

Record the ac voltage and frequency. Boot the computer and wait until the operating system has fully loaded. If necessary, run the initial operating system setup and allow all preliminary file indexing and other one-time/periodic processes to complete.

Record basic information about the computer's configuration – computer type, operating system name and version, processor type and speed, and total and available physical memory, etc.

Record basic information about the video card or graphics chipset (if applicable) - video card/chipset name, frame buffer width, resolution, amount of onboard memory, and bits per pixel.

Record in the following table if the product includes the following power management features in their "as-shipped" condition, subject to the following conditions:

a. For Thin Clients, the WOL requirement shall apply products designed to receive software updates from a centrally managed network while in Sleep Mode or in Off Mode. Thin Clients whose standard software upgrade framework does not require off-hours scheduling are exempt from the WOL requirement.

b. For Notebooks, WOL may be automatically disabled when the product is disconnected from ac mains power.

c. For all products with WOL, directed packet filters shall be enabled and set to an industry standard default configuration.

Shut down the UUT.

Tested by: _____ (signature) Tested by: _____ (print) Test date: _____

Sample # : _____ Instrument Code / Range: _____

## UUT PREPARATION FOR ALL PRODUCTS (Cont'd)

Test Method (Rev. Aug-2010)

RESULTS

| Mode or Model Transition | Requirement | Yes/No | |
|---|---|---|---|
| Sleep Mode | (1) Sleep Model shall be set to activate after no more than 30 minutes of user inactivity.<br><br>(2) The speed of any active 1 Gb/s Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode. | ☒ Yes | ☐ No |
| Display Sleep Mode | (1) Display Sleep Mode shall be set to activate after no more than 15 minutes of user inactivity. | ☒ Yes | ☐ No |
| Wake on LAN (WOL) | (1) Computers with Ethernet capability shall provide users with an option to enable and disable WOL for Sleep Mode.<br><br>(2) Computers with Ethernet capability that are shipped through enterprise channels shall either:<br>(a) be shipped with WOL enabled by default for Sleep Mode, when the computer is operating on ac mains power; or<br>(b) provide users with the ability to enable WOL that is accessible from both the client operating system user interface and over the network. | ☒ Yes | ☐ No |
| Wake Management | 1) Computers with Ethernet capability that are shipped through enterprise channels shall either:<br>(a) be capable of both remote (via network) and scheduled (via real-time clock) wake events from Sleep Mode, and<br>(b) provide clients with the ability to centrally manage (via vendor tools) any wake management settings that are configured through hardware settings if the manufacturer has control over such features. | ☒ Yes | ☐ No |

☒ The power management features ☒ meet ☐ does not meet the requirements outlined in Table 2 provided in this data sheet package.

Tested by: _____ Tested by: _____ Test date: 2011-05-16
signature print

Sample # : 1094769-1~4 Instrument Code / Range: _____

## OFF MODE POWER CONSUMPTION TEST

Test Method (Rev. Aug-2010)

METHOD

The unit was connected to a variable ac source of supply as indicated below while in the off mode condition.

Computers shall be tested in their "as-shipped" condition for Off Mode. Models that will be shipped with WOL enabled for Off Mode shall be tested with WOL enabled.

With the UUT shut down and in Off, set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second. Accumulative power values for 5 additional minutes and record the watt-hour value observed during that 5 minute period using both the "Wh" and time functions on the input meter. The average power consumed over that time period was then calculated.

| Off Mode Unit Configuration Details: | |
|---|---|
| Operating System/Version: | Windows 7 |
| Processor Type and Speed: | Intel ATOM D510, 1.6GHz |
| Total/Available Physical Memory: | 2GB |
| Wake On LAN (WOL) Enabled: | Enabled |
| Other: | -- |

Tested by: _____ (signature) Tested by: _____ (print) Test date: 2011-05-16

Sample # : 1094769-1~4 Instrument Code / Range: _____

## OFF MODE POWER CONSUMPTION TEST (Cont'd)

Test Method (Rev. Aug-2010)

RESULTS

Ambient Temperature, °C 21 Relative Humidity, % 66

| Input | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required | | Measured | | | | | | Elapsed Time | |
| V | Hz | V | Hz | A | Wh | Wh Integration time, min | $P_{OFF,}$ WATTS*** | TIME START | TIME END |
| 115 | 60 | 115.06 | 60 | 0.04 | 0.31 | 5 | 3.72 | 0'00'' | 5'00'' |
| 230 | 50 | 230.16 | 50 | 0.04 | 0.33 | 5 | 3.96 | 0'00'' | 5'00'' |
| 100 | 50 | 100.09 | 50 | 0.04 | 0.31 | 5 | 3.72 | 0'00'' | 5'00'' |
| 100 | 60 | 100.31 | 60 | 0.03 | 0.3 | 5 | 3.6 | 0'00'' | 5'00'' |

☐ **For Small-Scale Servers**, the measured input power $P_{off}$ during the measurement period:
☐ exceeded ☐ did not exceed _____ Watt(s)*.

Note (*) this value is derived from the Equation 5 Worksheet provided in this data sheet package.

☐ **For Thin Clients**, the measured input power $P_{off}$ during the measurement period:
☐ exceeded ☐ did not exceed _____ Watt(s)**.

Note (**) this value is derived from the Equation 6 Worksheet provided in this data sheet package.

*** The average power is calculated by the following equation:
Avg. Power (Watts) = (Wh X 60 minutes/hr)/(Wh Interval, minutes)

Supplemental Information:

☐ For UUT running Windows, "Off" is defined as selecting "Shut Down" from the start menu.

☐ For UUT running Linux, "Off" is defined as typing the "shutdown -h now" command from the Command Line Interface (CLI).

☐ Other:

Note: Air speed:0.06m/s
THD:0.26

Tested by: _____ Tested by: _____ Test date: 2011-05-16
signature print

Sample # : 1094769-1~4 Instrument Code / Range: _____

## IDLE MODE POWER CONSUMPTION TEST

Test Method (Rev. Aug-2010)

METHOD

Immediately after the off mode power consumption test, switch on the computer and begin recording elapsed time after completing any login activity necessary to fully boot the system. Once logged in with the operating system fully loaded and ready, close any open windows so that the standard operational desktop screen or equivalent ready screen is displayed. Between 5 and 15 minutes after the initial boot or log in, set the meter to begin accumulating true power values at an interval or greater than or equal to 1 reading per second. Accumulate power values for 5 additional minutes and record the watt-hour value value observed during that 5 minute period using both the "Wh" and time functions on the input meter. The average power consumed over that time period was then calculated.

☒ For Computers with external computer displays (most desktops), use the computer display power management setting to prevent the display from powering down to ensure it stays on for the full length of the Idle Mode Power Consumption Test as described below.

☐ For Computers with integrated computer displays (notebooks and integrated systems), use the power management settings to set the display to power down after 1 minute.

☐ For Small-Scale Servers and Thin Clients, if the initial unit tested is less than or equal to the applicable requirements for idle but falls within 10% of that level, one additional unit of the same model with an identical configuration must also be tested.

| Idle Mode Unit Configuration Details: | |
|---|---|
| Operating System/Version: | Windows 7 |
| Processor Type and Speed: | Intel ATOM D510, 1.6GHz |
| Total/Available Physical Memory: | 2GB |
| Wake On LAN (WOL) Enabled: | Enabled |
| Other: | -- |

Tested by: _____ (signature) Tested by: _____ (print) Test date: 2011-05-16

Sample # : 1094769-1~4 Instrument Code / Range: _____

## IDLE MODE POWER CONSUMPTION TEST (Cont'd)

Test Method (Rev. Aug-2010)

Ambient Temperature, °C 21 Relative Humidity, % 66

| Input | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Required | | Measured | | | | | | Elapsed Time | | |
| V | Hz | V | Hz | A | Wh | Wh Integration time, min | $P_{idle}$, Watts*** | Verified Screen Power Management Set for 1 minute (Y) Integrated Display Only | Time Start | Time End |
| 115 | 60 | 115.03 | 60 | 0.155 | 1.41 | 5 | 16.92 | YES | 0'00'' | 5'00'' |
| 230 | 50 | 230.14 | 50 | 0.1 | 1.5 | 5 | 18 | YES | 0'00'' | 5'00'' |
| 100 | 50 | 100.02 | 50 | 0.17 | 1.41 | 5 | 16.92 | YES | 0'00'' | 5'00'' |
| 100 | 60 | 100.04 | 60 | 0.169 | 1.4 | 5 | 16.8 | YES | 0'00'' | 5'00'' |

☐ **For Small-Scale Servers:**

The measured input power $P_{idle}$ during the measurement period ☐ exceeded ☐ did not exceed _____ Watt(s)*.

Note (*) this value is derived from table 10 provided in this data sheet package.

☐ **For Thin Clients:**

The measured input power $P_{idle}$ during the measurement period ☐ exceeded ☐ did not exceed_____ Watt(s)**.

Note (**) this value is derived from table 11 provided in this data sheet package.

*** The average power is calculated by the following equation:

Avg. Power (Watts) = (Wh X 60 minutes/hr)/(Wh Interval, minutes)

Tested by: _____ (signature) Tested by: _____ (print) Test date: 2011-05-16

Sample # : 1094769-1~4 Instrument Code / Range: _____

## SLEEP MODE POWER CONSUMPTION TEST

Test Method (Rev. Aug-2010)

METHOD

After completing the idle measurements, measure the time of user inactivity to place both the computer and display in sleep mode.

Then, reset the meter (if necessary) and begin accumulating true power values at an interval of greater than or equal to 1 reading per second. Accumulate power values for 5 additional minutes and record the watt-hour value value observed during that 5 minute period using both the "Wh" and time functions on the input meter. The average power consumed over that time period was then calculated.

☐ If testing both WOL enabled and WOL disabled for Sleep, wake the computer and change the WOL from Sleep setting through the operating system settings or by other means. Repeat the sleep mode test with the alternate configuration.

| Sleep Mode Unit Configuration Details: | |
|---|---|
| Operating System/Version: | Windows 7 |
| Processor Type and Speed: | Intel ATOM D510, 1.6GHz |
| Total/Available Physical Memory: | 2GB |
| Wake On LAN (WOL) Enabled: | Enabled |
| Other: | -- |

Tested by: _____ (signature) Tested by: _____ (print) Test date: 2011-05-16

Sample # : 1094769-1~4 Instrument Code / Range: _____

## SLEEP MODE POWER CONSUMPTION TEST (Cont'd)

Test Method (Rev. Aug-2010)

RESULTS

Ambient Temperature, °C 21 Relative Humidity, % 66

| Input | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Required | | Measured | | | | | | Elapsed Time | |
| V | Hz | V | Hz | A | Wh | Wh Integration time, min | $P_{sleep}$, Watts** | Time Start | Time End |
| 115 | 60 | 115.03 | 60 | 0.04 | 0.31 | 5 | 3.72 | 0'00'' | 5'00'' |
| 230 | 50 | 230.16 | 50 | 0.05 | 0.33 | 5 | 3.96 | 0'00'' | 5'00'' |
| 100 | 50 | 100.05 | 50 | 0.03 | 0.31 | 5 | 3.72 | 0'00'' | 5'00'' |
| 100 | 60 | 100.04 | 60 | 0.03 | 0.31 | 5 | 3.72 | 0'00'' | 5'00'' |

☐ **For Thin Clients**:

The measured input power $P_{sleep}$ during the measurement period ☐ exceeded ☐ did not exceed _____ Watt(s)*.

Note (*) this value is derived from the Equation 7 Worksheet provided in this data sheet package.

Notes:

** The average power is calculated by the following equation:

Avg. Power (Watts) = (Wh X 60 minutes/hr)/(Wh Interval, minutes)

Tested by: _____ (signature) Tested by: _____ (print) Test date: _____

Sample # : _____ Instrument Code / Range: _____

## MAXIMUM POWER TEST FOR WORKSTATIONS

Test Method (Rev. Aug-2010)

No test, CY 2011-04-27

Method

Record the ac voltage and frequency. The meter should be able to store and output the maximum power measurement reached during the test.

Run linpack (linx) with the memory allocation set to: _____mb and the number of tests set to: _____.

Run specviewperf10/specviewperf10 with multithreading for all tests at the highest resolution supported by the display and graphic card used.

Set the meter to begin accumulating true power values at an interval of less than or equal to 1 reading per second, and begin taking measurements. Accumulate power values until specviewperf and all its instances have completed running. Record the maximum power value attained during the test.

This test must be repeated three times on the same UUT, and all three measurements must fall within a ± 2% tolerance relative to the average of the three measured maximum power values.

| Maximum Mode Unit Configuration Details: | |
|---|---|
| Operating System/Version: | |
| Processor Type and Speed: | |
| Total/Available Physical Memory: | |
| Wake On LAN (WOL) Enabled: | |
| # of HDDs: | |
| Other: | |

Tested by: _____ (signature) Tested by: _____ (print) Test date: _____

Sample # : _____ Instrument Code / Range: _____

## MAXIMUM POWER TEST FOR WORKSTATIONS (Cont'd)

Test Method (Rev. Aug-2010)

RESULTS

Ambient Temperature, °C _____ Relative Humidity, % _____

No test, CY 2011-04-27

| Input | | | | | | | |
|---|---|---|---|---|---|---|---|
| Required | | Measured | | | | Elapsed Time | |
| V | Hz | V | Hz | Input Current, A | $P_{max}$ Watts | Time Start | Time End |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |

## WORKSHEETS

☒ Equation 1: Calculation 0f Typical Annual Electricity Use ($E_{tec}$) for Desktop, Integrated Desktop, and Notebook Computers:

$$E_{TEC} = (8760/1000)*(P_{off} * T_{off} + P_{sleep} * T_{sleep} + P_{idle} * T_{idle}),$$

Where all Px are power values in watts, all Tx are mode weightings as specified in Table 5 (for Desktops and Integrated Desktops) or Table 6 (for Notebooks) , and the $E_{TEC}$ is in units of kWh and represents annual consumption based on mode weightings.

| Input | | Calculated | | | |
|---|---|---|---|---|---|
| V | Hz | $P_{off}$ | $P_{idle}$ | $P_{sleep}$ | $E_{TEC}$ |
| 115 | 60 | 3.72 | 16.92 | 3.72 | 78.84 |
| 230 | 50 | 3.96 | 18 | 3.96 | 83.88576 |
| 100 | 50 | 3.72 | 16.92 | 3.72 | 79.002936 |
| 100 | 60 | 3.6 | 16.8 | 3.72 | 77.84136 |

☒ Equation 2: Calculation of Maximum Typical Annual Electricity Use ($E_{tec\_Max}$) For Desktop, Integrated Desktop, and Notebook Computers:

$$E_{TEC\_MAX}\ (kWh) = TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE}$$

Where $TEC_{BASE}$, $TEC_{MEMORY}$, $TEC_{GRAPHICS}$ and $TEC_{STORAGE}$ are adders as specified in Table 7 (for Desktops and Integrated Desktops) or Table 8 (for Notebooks).

| Calculated | | | | |
|---|---|---|---|---|
| $TEC_{BASE}$ (kWh) | $TEC_{MEMORY}$ (kWh) | $TEC_{GRAPHICS}$ (kWh) | $TEC_{STORAGE}$ (kWh) | $E_{TEC\_MAX}$ (kWh) |
| 175 | 0 | 0 | 0 | 175 |

☒ For Desktops, Integrated Desktop, and Notebook Computers, the calculated $E_{TEC}$ ☐ exceeded ☒ did not exceed $E_{TEC\_MAX}$ .

☐ For Desktops, Integrated Desktop, and Notebook Computers, if the initial unit tested is less than or equal to the applicable requirements for TEC but falls within 10% of that level, one additional unit of the same model with an identical configuration must also be tested.

## WORKSHEETS (Cont'd)

☐ Equation 3: Calculation of Weighted Power Consumption ($P_{tec}$) for Workstations:

$$P_{TEC} = (P_{off} * T_{off}) + (P_{sleep} * T_{sleep}) + (P_{idle} * T_{idle}),$$

Where all Px are power values in watts, all Tx are mode weightings as specified in Table 9.

| Input | | Calculated | | | |
|---|---|---|---|---|---|
| V | Hz | $P_{off}$ | $P_{idle}$ | $P_{sleep}$ | $P_{TEC}$ |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

No test, CY 2011-04-27

☐ Equation 4: Calculation of Maximum Weighted Power Consumption ($P_{tec\_Max}$) for Workstations**:**

$$P_{TEC\_MAX} (W) \leq 0.28 * \{P_{MAX} + (N_{HDD} * 5)\},$$

Where $P_{MAX}$ = measured maximum power consumption (W) and $N_{HDD}$ = number of installed hard disk drives (HDD) or solid state drives (SSD).

| $P_{MAX}$ (W) | $N_{HDD}$ | $P_{TEC\_MAX}$ (W) |
|---|---|---|
| | | |
| | | |

☐ For Workstations, the calculated $P_{TEC}$ ☐ exceeded ☐ did not exceed $P_{TEC\_MAX}$.

☐ For Workstations, if the initial unit tested is less than or equal to the applicable requirements for TEC but falls within 10% of that level, one additional unit of the same model with an identical configuration must also be tested.

## WORKSHEETS (Cont'd)

☐ Equation 5: Calculation of Maximum Off Mode Power Consumption ($P_{off\_Max}$) for Small-Scale Servers**:**

$$P_{OFF\_MAX}\ (W) = P_{OFF\_BASE} + P_{OFF\_WOL},$$

Where $P_{OFF\_WOL}$ shall only be applied to products that offer WOL that is enabled by default upon shipment.

| $P_{OFF\_BaSE}$ (W) | $P_{OFF\_WOL}$ | $P_{OFF\_MAX}$ (W) |
|---|---|---|
| | | |
| | | |

☐ Equation 6: Calculation of Maximum Off Mode Power Consumption ($P_{off\_Max}$) for Thin Clients:

$$P_{OFF\_MAX}\ (W) = P_{OFF\_BASE} + P_{OFF\_WOL},$$

No test, CY 2011-04-27

Where $P_{OFF\_WOL}$ shall only be applied to products that offer WOL that is enabled by default upon shipment.

| $P_{OFF\_BaSE}$ (W) | $P_{OFF\_WOL}$ | $P_{OFF\_MAX}$ (W) |
|---|---|---|
| | | |
| | | |

☐ Equation 7: Calculation of Maximum Sleep Mode Power Consumption ($P_{sleep\_Max}$) for Thin Clients:

$$P_{SLEEP\_MAX}\ (W) = P_{SLEEP\_BASE} + P_{SLEEP\_WOL},$$

Where $P_{SLEEP\_WOL}$ shall only be applied to products that offer WOL that is enabled by default upon shipment.

| $P_{SLEEP\_BaSE}$ (W) | $P_{SLEEP\_WOL}$ | $P_{SLEEP\_MAX}$ (W) |
|---|---|---|
| | | |
| | | |

**Table 1:**
**Requirements for Internal Power Supplies and External Power Supplies with Integral Cooling**

| Loading Condition (Percentage of Nameplate Output Current) | Minimum Efficiency | Minimum Power Factor |
|---|---|---|
| 20% | 0.82 | - |
| 50% | 0.85 | - |
| 100% | 0.82 | 0.90 |

**Table 2:**
**Power management requirements**

| Mode or Mode Transition | Requirement | Desktops | Integrated Desktops | Notebooks | Workstations | Small-scale Servers | Thin Clients |
|---|---|---|---|---|---|---|---|
| Sleep Mode | (1) Sleep Mode shall be set to activate after no more than 30 minutes of user inactivity.<br>(2) The speed of any active 1 Gb/s Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode. | Yes | Yes | Yes | Yes | No | No |
| Display Sleep Mode | (1) Display Sleep Mode shall be set to activate after no more than 15 minutes of user inactivity. | Yes | Yes | Yes | Yes | Yes | Yes |
| Wake on LAN (WOL) | (1) Computers with Ethernet capability shall provide users with an option to enable and disable WOL for Sleep Mode.<br>(2) Computers with Ethernet capability that are shipped through enterprise channels shall either:<br>(a) be shipped with WOL enabled by default for Sleep Mode, when the computer is operating on ac mains power; or<br>(b) provide users with the ability to enable WOL that is accessible from both the client operating system user interface and over the network. | Yes | Yes | Yes | Yes | Yes | Yes |
| Wake Management | (1) Computers with Ethernet capability that are shipped through enterprise channels shall:<br>(a) be capable of both remote (via network) and scheduled (via real-time clock) wake events from Sleep Mode, and<br>(b) provide clients with the ability to centrally manage (via vendor tools) any wake management settings that are configured through hardware settings if the manufacturer has control over such features. | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 3:**
**Categorization of Desktop and Integrated Desktop Computers**

| | |
|---|---|
| **Category A** | All desktop computers that do not meet the definition of Category B, Category C, or Category D below will be considered under Category A for ENERGY STAR qualification. |
| **Category B** | To qualify under Category B, desktops must have:<br>▪ Equal to 2 Physical Cores; and<br>▪ Greater than or equal to 2 gigabytes (GB) of System Memory. |
| **Category C** | To qualify under Category C, desktops must have:<br>▪ Greater than 2 Physical Cores.<br>In addition to the requirement above, models qualifying under Category C must be configured with a minimum of 1 of the following 2 characteristics:<br>▪ Greater than or equal to 2 gigabytes (GB) of System Memory; and/or<br>▪ A Discrete GPU. |
| **Category D** | To qualify under Category D, desktops must have:<br>▪ Greater than or equal to 4 Physical Cores.<br>In addition to the requirement above, models qualifying under Category D must be configured with a minimum of 1 of the following 2 characteristics:<br>▪ Greater than or equal to 4 gigabytes (GB) of System Memory; and/or<br>▪ A Discrete GPU with a Frame Buffer Width greater than 128-bit. |

**Table 4:**
**Categorization of Notebook Computers**

| | |
|---|---|
| **Category A** | All notebook computers that do not meet the definition of Category B or Category C below will be considered under Category A for ENERGY STAR qualification. |
| **Category B** | To qualify under Category B, notebooks must have:<br>▪ A Discrete GPU. |
| **Category C** | To qualify under Category C, notebooks must have:<br>▪ Greater than or equal to 2 Physical Cores;<br>▪ Greater than or equal to 2 gigabytes (GB) of System Memory; and<br>▪ A Discrete GPU with a Frame Buffer Width greater than 128-bit. |

**Table 5:**
**Mode Weightings for Desktop and Integrated Desktop Computers**

| Mode Weighting | Conventional | Full Network Connectivity | | | |
|---|---|---|---|---|---|
| | | Base Capability | Remote Wake | Service Discovery/Name Services | Full Proxying |
| $T_{off}$ | 55% | 50% | 47% | 43% | 40% |
| $T_{sleep}$ | 5% | 14% | 20% | 25% | 30% |
| $T_{idle}$ | 40% | 36% | 33% | 32% | 30% |

**Table 6:**
**Mode Weightings for Notebook Computers**

| Mode Weighting | Conventional | Full Network Connectivity | | | |
|---|---|---|---|---|---|
| | | Base Capability | Remote Wake | Service Discovery / Name Services | Full Proxying |
| $T_{off}$ | 60% | 54% | 49% | 48% | 45% |
| $T_{sleep}$ | 10% | 18% | 24% | 26% | 30% |
| $T_{idle}$ | 30% | 28% | 27% | 26% | 25% |

**Table 7:**
**Maximum TEC Allowances for Desktop and Integrated Desktop Computers**

| Product Category | $TEC_{BASE}$ (kWh) | $TEC_{MEMORY}$ (kWh) *Where: m = System Memory (GB)* | $TEC_{GRAPHICS}$ (kWh) | $TEC_{STORAGE}$ (kWh) *(Applies once if system has more than one Additional Internal Storage element.)* |
|---|---|---|---|---|
| A | 148.0 | 1.0 *(per GB > 2.0)* | 35.0 *(GPU Frame Buffer Width ≤ 128-bit)*<br>50.0 *(GPU Frame Buffer Width > 128-bit)* | 25.0 |
| B | 175.0 | 1.0 *(per GB > 2.0)* | 35.0 *(GPU Frame Buffer Width ≤ 128-bit)*<br>50.0 *(GPU Frame Buffer Width > 128-bit)* | 25.0 |
| C | 209.0 | 1.0 *(per GB > 2.0)* | 50.0 *(GPU Frame Buffer Width > 128-bit)* | 25.0 |
| D | 234.0 | 1.0 *(per GB > 4.0)* | 50.0 *(GPU Frame Buffer Width > 128-bit)* | 25.0 |

**Table 8:**
**Maximum TEC Allowances for Notebook Computers**

| Product Category | $TEC_{BASE}$ (kWh) | $TEC_{MEMORY}$ (kWh) *Where: m = System Memory (GB)* | $TEC_{GRAPHICS}$ (kWh) | $TEC_{STORAGE}$ (kWh) *(Applies once if system has more than one Additional Internal Storage element.)* |
|---|---|---|---|---|
| A | 40.0 | 0.4 *(per GB > 4.0)* | - | 3.0 |
| B | 53.0 | 0.4 *(per GB > 4.0)* | 3.0 *(GPU Frame Buffer Width > 64-bit)* | 3.0 |
| C | 88.5 | 0.4 *(per GB > 4.0)* | - | 3.0 |

**Table 9:**
**Mode Weightings for Workstations**

| $T_{OFF}$ | $T_{SLEEP}$ | $T_{IDLE}$ |
|---|---|---|
| 0.35 | 0.10 | 0.55 |

**Table 10:**
**Classification & Power Consumption Requirements for Small-scale Servers**

| Small-scale Server Classification | | Operational Mode Requirements | | |
|---|---|---|---|---|
| **Product Category** | **Category Description** | **$P_{OFF\ BASE}$ (watts)** | **$P_{OFF\ WOL}$ (watts)** | **$P_{IDLE\ MAX}$ (watts)** |
| A | All Small-Scale Servers that do not meet the definition of Category B will be considered under Category A for ENERGY STAR qualification. | 2.0 | 0.7 | 50.0 |
| B | To qualify under Category B Small-Scale Servers must have:<br>• Processor(s) with greater than 1 physical core or greater than 1 discrete processor; and<br>• Minimum of 1 gigabyte of system memory. | 2.0 | 0.7 | 65.0 |

**Table 11:**
**Classification & Power Consumption Requirements for Thin Clients**

| Thin Client Classification | | Operational Mode Requirements | | | | |
|---|---|---|---|---|---|---|
| **Product Category** | **Category Description** | **$P_{OFF\ BASE}$ (watts)** | **$P_{OFF\ WOL}$ (watts)** | **$P_{SLEEP\ BASE}$ (watts)** | **$P_{SLEEP\ WOL}$ (watts)** | **$P_{IDLE\ MAX}$ (watts)** |
| A | All Thin Clients that do not meet the definition of Category B, below, will be considered under Category A for ENERGY STAR qualification. | 2.0 | 0.7 | 2.0 | 0.7 | 12.0 |
| B | To qualify under Category B, Thin Clients must support local multimedia encode/decode. | 2.0 | 0.7 | 2.0 | 0.7 | 15.0 |