COMMITTEE TE-001

DR AS/NZS 5813.1

(Project ID: 100959)

Draft for Public Comment Australian/New Zealand Standard

LIABLE TO ALTERATION—DO NOT USE AS A STANDARD

BEGINNING DATE FOR COMMENT:	**21 October 2011**
CLOSING DATE FOR COMMENT:	**23 December 2011**

Important: The procedure for public comment has changed – please read the instructions on the inside cover of this document.

Information technology equipment—Energy performance of computers
Part 1: Methods of measurement

DRAFT

STANDARDS Australia

STANDARDS NEW ZEALAND PAEREWA AOTEAROA

COPYRIGHT

Draft for Public Comment
Australian/New Zealand Standard

The committee responsible for the issue of this draft comprised representatives of organizations interested in the subject matter of the proposed Standard. These organizations are listed on the inside back cover.

Comments are invited on the technical content, wording and general arrangement of the draft.

The method for submission of comment on this document is to register and fill in an online form via Standards Hub Website. Instructions and examples of comment submission are available on the website. . Please use the following link—

https://www.hub.standards.org.au/hub/public/listOpenCommentingPublication.action

Comment must be via Hub, any emails or forms sent to us by fax or mail will not be considered by the Committee when it reviews the Public Comment received.

Please place relevant clause numbers beside each comment.

Editorial matters (i.e. spelling, punctuation, grammar etc.) will be corrected before final publication.

The coordination of the requirements of this draft with those of any related Standards is of particular importance and you are invited to point out any areas where this may be necessary.

Please provide supporting reasons and suggested wording for each comment. Where you consider that specific content is too simplistic, too complex or too detailed please provide an alternative.

If the draft is acceptable without change, an acknowledgment to this effect would be appreciated.

Once you have registered and submitted you comments via the online form, your comments are automatically submitted to the committee for review.

Normally no acknowledgment of comment is sent. All comments received via the Standards Hub Website by the due date will be reviewed and considered by the relevant drafting committee. We cannot guarantee that comments submitted in other forms will be considered along with those submitted via the Standards Hub online form. Where appropriate, changes will be incorporated before the Standard is formally approved.

If you know of other persons or organizations that may wish to comment on this draft Standard, could you please advise them of its availability. Further copies of the draft are available from the Publisher SAI Global at *http://www.saiglobal.com/*

DRAFT

SAI GLOBAL Customer Service Centre

Telephone: 13 12 42

Facsimile: 1300 65 49 49

e-mail: mailto:sales@saiglobal.com

Internet: http://www.saiglobal.com/shop

Draft for Public Comment

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Committee TE-001—Safety of electronic equipment

Subcommittee TE-001-10—MEPS computer standard

DRAFT

Australian/New Zealand Standard

Information technology equipment—Energy performance of computers

Part 1: Methods of measurement

(To be AS/NZS 5813.1:20XX)

Comment on the draft is invited from people and organizations concerned with this subject. It would be appreciated if those submitting comment would follow the guidelines given on the inside front cover.

Important: The procedure for public comment has changed – please read the instructions on the inside cover of this document

This document is a draft Australian/New Zealand Standard only and is liable to alteration in the light of comment received. It is not to be regarded as an Australian/New Zealand Standard until finally issued as such by Standards Australia/Standards New Zealand.

DRAFT

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-001, Safety of Electronic Equipment.

The objective of this Standard is to provide designers, manufacturers, importers, test laboratories, regulators and users of computers with a test method to assess the energy efficiency of this equipment.

This Standard was prepared in response to the publication of a plan for the regulation of computers under the Equipment Energy Efficiency Program (E3) in 2004. This Standard draws upon the test method specified in the International Electrotechnical Commission draft standard 62623-post CD Rev Nov 2 and ENERGY STAR® Program Requirements for Computers: Version 5.2 (ENERGY STAR® V5.2 Computer Specification) published by the United States' Environmental Protection Agency (EPA) in 2010. This Standard is based on but not equivalent to the test method specified in the draft standard 62623-post CD Rev Nov 2.

This series consists of 2 parts. These are:

AS/NZS		
5813	Information technology equipment—Energy performance of computers	
5813.1	Part 1:	Methods of measurement (this Standard)
5813.2	Part 2:	Minimum energy performance standard (MEPS) requirements

Part 1 contains the test method for assessing the energy performance of computers.

Part 2 specifies minimum energy performance standard (MEPS) requirements. The MEPS requirements include typical energy consumption (TEC) calculations or maximum power allowances by operational mode for applicable computer types as defined in the ENERGY STAR® V5.2 Computer Specification. The MEPS requirements also include power management, power supply efficiency requirements and additional TEC allowances for additional components. Regulatory authorities have advised that it is intended to mandate Part 2 in regulations in Australia and New Zealand no earlier than 1 October 2012.

The term 'informative' is used to define the application of the appendix to which it applies. An informative appendix is only for information and guidance.

DRAFT

CONTENTS

Page

SECTION 1 SCOPE AND GENERAL
1.1 SCOPE 4
1.2 REFERENCED DOCUMENTS 4
1.3 DEFINITIONS—GENERAL 5
1.4 DEFINITIONS—COMPUTER TYPES 6
1.5 DEFINITIONS—COMPONENTS 7
1.6 DEFINITIONS—POWER MODES 8
1.7 DEFINITIONS—NETWORKING AND POWER MANAGEMENT 9
1.8 ABBREVIATIONS 10

SECTION 2 GENERAL CONDITIONS FOR MEASUREMENT
2.1 GENERAL 11
2.2 POWER MEASUREMENTS 11
2.3 UNCERTAINTY, RESOLUTION AND ROUNDING 11
2.4 AMBIENT LIGHT METER SPECIFICATION 12
2.5 TEST ROOM 12
2.6 POWER SUPPLY 12
2.7 SUPPLY VOLTAGE WAVEFORM 12

SECTION 3 MEASUREMENT APPROACH
3.1 EUT PREPARATION 13
3.2 TEST SETUP 14
3.3 TESTING PROCEDURE 15

SECTION 4 TEST REPORT
4.1 GENERAL 17
4.2 MANDATORY INFORMATION 17
4.3 OPTIONAL INFORMATION 18

APPENDIX A ENERGY STAR SHORT AND LONG IDLE MODES 19

DRAFT

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Information technology equipment—Energy performance of computers

Part 1: Methods of measurement

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies a standardized test method to measure the energy performance of computers for defined operational modes when connected to the mains electricity supply (nominally 230 V, 50 Hz a.c.).

Computers include both stationary and portable units, including desktop computers, integrated computers, notebook computers, tablet computers, thin clients and small-scale servers.

This Standard also specifies the following:

(a) Computer types and associated components.

(b) Operational modes which are relevant for measuring power consumption.

(c) Terminology used in the test method.

(d) Information required for test reports.

The scope includes computers supplied with operating systems that do not include the ability to activate computer and computer monitor sleep modes.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
2706 Numerical values—Rounding and interpretation of limiting values

AS/NZS
4665 Performance of external power supplies

5813 Information technology equipment—Energy performance of computers
5813.2 Part 2: Minimum energy performance standards

62301 Household electrical appliances—Measurement of standby power

IEC
60050 International Electrotechnical Vocabulary
60050-300 Part 300: Electrical and electronic measurements and measuring instruments

IEEE
802 Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements
802.3 Part 3: Carrier sense multiple access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

IEEE

802.3az	Part 3az:	Carrier sense multiple access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications—Amendment 5: Media Access Control Parameters, Physical Layers and Management Parameters for Energy-Efficient Ethernet
802.11	Part 11:	Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications

1.3 DEFINITIONS—GENERAL

For the purpose of this Standard the definitions contained in IEC 60050-300 and the following definitions apply.

1.3.1 Ambient temperature

The temperature of the ambient air immediately surrounding the equipment under test (EUT).

1.3.2 As shipped

Configuration of the EUT in accordance with the instructions provided with the EUT.

1.3.3 Computer

A device which performs logical operations and processes data. Computers are composed of, at a minimum—

(a) a central processing unit (CPU) to perform operations;

(b) user input devices such as a keyboard, mouse, digitizer or game controller; and

(c) a display screen to output information.

Computers include both stationary and portable units, including desktop computers, integrated desktop computers, notebook computers, tablet computers and small-scale servers. Although computers are capable of using input devices and displays, as noted in Items (b) and (c) above, computer systems do not need to include these devices on shipment to meet this definition.

1.3.4 Equipment under test (EUT)

Refers to the computer being tested.

1.3.5 Local area network (LAN)

Refers to two primary technologies used in computers: IEEE 802.3 Ethernet or Wired LAN, and IEEE 802.11 WiFi or Wireless LAN.

1.3.6 Manufacturer

An organization responsible for the design, development and production of a product in view of its being placed on the market, regardless of whether these operations are carried out by that organization itself or on its behalf.

1.3.7 Red green blue (RGB)

These colours represent the primary colours that make-up a pixel on a computer display.

NOTE: The RGB values represent the intensity settings of each colour of that pixel to specify an exact colour.

1.3.8 Total harmonic distortion (THD)

The ratio, expressed as a percent, of the r.m.s. value of an a.c. signal after the fundamental component is removed to the r.m.s. value of the fundamental component.

DRAFT

THD of voltage is defined as:

$$THD_V = \frac{\sqrt{V_2^2 + V_3^2 + V_4^2 + V_5^2 \ldots + V_{13}^2}}{V_1} \quad \ldots 1.3$$

where

V_1 = r.m.s. value of the fundamental of the voltage signal

V_{2-13} = r.m.s. values of the 2nd to 13th harmonics of the voltage signal respectively

AC signals have only odd number harmonics.

1.4 DEFINITIONS—COMPUTER TYPES

For the purpose of this Standard, the following computer type definitions apply.

1.4.1 Desktop computer

A desktop computer is a computer where the main unit is intended to be located in a permanent location, often on a desk or on the floor. Desktops are not designed for portability and utilize an external computer display, keyboard, and mouse. Desktop computers may also use touchscreen technology. Desktops are designed for a broad range of home and office applications.

1.4.2 Integrated computer or integrated desktop computer

An integrated desktop computer is a desktop computer where the computer and computer display function as a single unit receiving its a.c. power through a single cable. Integrated desktop computers come in one of two possible forms:

(a) a product where the computer display and computer are physically combined into a single unit; or

(b) a product packaged as a single product where the computer display is separate but is connected to the main chassis by a d.c. power cord and both the computer and computer 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 computers.

NOTE: An integrated desktop computer may also be referred to as an all-in-one computer.

1.4.3 Notebook and tablet computers

A notebook computer is a computer designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to a mains power supply. Notebooks utilize an integrated computer display and be capable of operation off 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. For the purposes of this standard, docking stations are considered accessories and therefore, should not be considered as part of the EUT. Tablet PCs, which may use touch-sensitive screens and/or a physical keyboard, are considered notebook computers in this Standard. Netbook computers which are typically identified by a smaller screen size (constrained) and base memory size are also considered notebook computers in this Standard.

1.4.4 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. A computer has the following characteristics to be considered a small-scale server:

(a) Designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box/product.

(b) Intended to be operational 24 hours per day and 7 days per week, and unscheduled downtime is extremely low (on the order of hours per year).

(c) Capable of operating in a simultaneous multi-user environment serving several users through networked client units.

(d) Designed for an industry accepted operating system for home or low-end server applications (e.g. Windows Home Server, Mac OS X Server, Linux, UNIX, Solaris).

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. Small-scale servers covered by this Standard are limited to computers marketed for non-data centre operation (e.g. homes, small offices).

1.4.5 Test operating system

A temporarily loaded operating system to allow activation and testing of computer and computer sleep modes, in the event that the computer is normally shipped with an operating system that does not allow activation of these modes.

1.5 DEFINITIONS—COMPONENTS

For the purpose of this Standard, the following component definitions apply.

1.5.1 Computer monitor/display

A display screen and its associated electronics encased in a single housing, or within the computer housing (e.g. notebook or integrated desktop computer), that is capable of displaying output information from a computer via one or more inputs, such as a VGA, DVI, Display Port, and/or IEEE 1394. Examples of computer monitor technologies are the cathode-ray tube (CRT) and liquid crystal display (LCD).

1.5.2 Discrete graphics processing unit (dGfx)

A graphics processor with a local memory controller interface and a local, graphics-specific memory.

1.5.3 External power supply (EPS)

A power supply external to the computer casing and designed to convert line voltage a.c. input from the mains to lower d.c. voltage(s) for the purpose of powering the computer.

1.5.4 Internal power supply (IPS)

A component internal to the computer casing and designed to convert ac voltage from the mains to d.c. voltage(s) for the purpose of powering the computer components. An internal power supply is contained within the computer casing but separate from the main computer board. The power supply connects 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 computer components, with the exception of a d.c. connection to the computer display, is internal to the computer casing (i.e. no external cables running from the power supply to the computer or individual components). Internal d.c.-to-d.c.

converters used to convert a single d.c. voltage from an external power supply into multiple voltages for use by the computer are not considered internal power supplies.

1.6 DEFINITIONS—POWER MODES

For the purpose of this Standard, the following operational mode definitions apply.

1.6.1 On mode (P_{on})

Represents the mode the EUT is in when not in the sleep or off modes. The on mode has several sub-modes that include the long idle mode, the short idle mode and the active (work) mode.

P_{on} represents the average power measured when in the on mode.

1.6.2 Idle modes

Modes in which the operating system and other software have completed loading, the product is not in sleep mode, and activity is limited to those basic applications that the product starts by default. There are two forms of idle mode: short idle mode (see 1.7.2.1) and long idle mode (see 1.7.2.2).*

1.6.2.1 *Short idle mode (P_{idleS})*

The mode where the EUT has reached an idle condition (for example, 5 min after OS boot or after completing an active workload or after resuming from sleep, the screen is on and set to as-shipped brightness, long idle power management features have not have engaged (for example, HDD is spinning and the EUT is prevented from entering sleep mode)

P_{idleS} represents the average power measured when in the short idle mode.

1.6.2.2 *Long idle mode (P_{idleL})*

The mode where the EUT has reached an idle condition (for example, 15 min after OS boot or after completing an active workload or after resuming from sleep), the screen of the primary display has just entered a low power state where the screen contents cannot be observed, but the EUT remains in the working mode (ACPI G0/S0). Power management features, if configured as shipped, should have engaged (for example, the display is on, HDD may have spun-down) but the EUT is prevented from entering sleep mode.

P_{idleL} represents the average power measured when in the long idle mode.

1.6.3 Active (work) mode (P_{work})

The mode in which the EUT is carrying out work in response to—

(a) prior or concurrent user input; or

(b) prior or concurrent instruction over the network.

This mode includes active processing, seeking data from storage, memory, or cache, while awaiting further user input and before entering other power modes. In this mode, the screen is on and set to as-shipped brightness.

P_{work} represents the average power measured when in the active mode

1.6.4 Sleep mode

The lowest power mode that the EUT is capable of entering automatically after a period of inactivity or by manual selection. A EUT with sleep capability can quickly wake in response to network connections or user interface devices with a latency of ≤ 5 s from

* ENERGY STAR version 5.2 refers only to idle mode, however the status of some components in idle mode depends upon the computer type. APPENDIX B provides information on the status of components for testing to ENERGY STAR version 5.2 using this Standard's terminology of short and long idle.

initiation of wake event to product becoming fully usable including rendering of display. For products where ACPI standards are applicable, sleep mode most commonly correlates to ACPI system level G1/S3 (suspend to RAM) state.

1.6.4.1 *Sleep mode—WoL disabled (P_{sleep})*

When the EUT is tested with the WoL capability disabled in the sleep state.

P_{sleep} represents the average power measured in the sleep mode with the WoL capability disabled.

1.6.4.2 *Sleep mode—WoL enabled ($P_{sleepWoL}$)*

When the EUT is tested with the WoL capability enabled in the sleep state.

$P_{sleepWoL}$ represents the average power measured in the sleep mode with the WoL capability enabled.

1.6.5 Off mode (standby) with WoL disabled (P_{off})

The lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the EUT is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For products where ACPI standards are applicable, off mode correlates to ACPI system level G2/S5 state.

P_{off} represents the average power measured in the off mode with WoL disabled.

1.6.6 Off mode (standby) WoL enabled (P_{offWoL})

The lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the EUT is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For products where ACPI standards are applicable, off mode correlates to ACPI system level G2/S5 state.

P_{offWoL} represents the average power measured in the off mode with WoL enabled.

1.7 DEFINITIONS—NETWORKING AND POWER MANAGEMENT

For the purpose of this Standard, the following network and power management definitions apply.

1.7.1 Full network connectivity

The ability of the computer to maintain network presence while in low power modes and intelligently wake when further processing is required (including occasional processing required to maintain network presence). Presence of the computer, its network services and applications, is maintained even though the computer is in a low power mode. From the vantage point of the network, a computer with full network connectivity that is in a low power mode is functionally equivalent to an idle computer with respect to common applications and usage models. Full network connectivity in a low power mode is not limited to a specific set of protocols but can cover applications installed after initial installation. Also referred to as 'network proxy' functionality, which is defined in AS/NZS 5813.2.

1.7.2 Network interface

The components (hardware and software) whose primary function is to make the computer capable of communicating over one or more network technologies. Examples of Network Interfaces are IEEE 802.3 (Ethernet or Wired LAN) and IEEE 802.11 (Wi-Fi).

1.7.3 Wake event

A user, scheduled, or external event or stimulus that causes the computer to transition from Sleep or Off to active mode of operation. Examples of wake events include, but are not limited to, movement of the mouse, keyboard activity, controller input, real-time clock

event, or a button press on the chassis, and in the case of external events, stimulus conveyed via a remote control, network, modem, etc.

1.7.4 Wake on LAN (WoL)

Functionality which allows a computer to wake from sleep or standby (off mode) when directed by a network request via a network interface.

1.8 ABBREVIATIONS

ACPI Advanced configuration and power interface

NOTE: ACPI specification can be found here http://www.acpi.info/.

CPU Central processing unit

dGfx Discrete graphics processing unit

EPS External power supply

EUT Equipment under test

NOTE: Also referred to as 'Product' in this Standard and sometimes referred to as UUTS (unit under test) in other specifications.

FB_BW Frame buffer bandwidth

GPU Graphics processing unit

HDD Hard disk drive

iGfx Integrated graphics processing unit

IPS Internal power supply

LAN Local area network

OS Operating system

RAM Random access memory

RGB Red green blue

RMS Root mean square

SSD Solid state drive

TEC Typical energy consumption

ULE Ultra low energy

UPS Uninterruptible power supply

WoL Wake on LAN

DRAFT

SECTION 2 GENERAL CONDITIONS FOR MEASUREMENT

2.1 GENERAL

Measurements shall be made under test conditions and with equipment specified in AS/NZS 62301, except where otherwise specified below.

Computers shipped with operating systems, such as FreeDOS and Linux, that do not include the ability to activate computer and computer monitor sleep modes shall be loaded and tested with a test operating system that allows activation of these modes and Wake on LAN shall be enabled.

2.2 POWER MEASUREMENTS

True RMS watt meters shall include the following attributes:

(a) Measurements shall be reported by the meter with an overall accuracy of 1% or better for the ranges measured during the test. Overall accuracy is the sum of all specified analyzer accuracies for the measurements made during the test.

(b) An available current crest factor of 3 or more at its rated range value. For meters that do not specify the crest factor, the analyzer shall be capable of measuring an amperage spike of at least three times the maximum amperage measured during any 1 s sample of the measurement.

(c) True r.m.s. power (watts) shall be reported and at least two of the following measurement units:

   (i) Voltage.

   (ii) Amperes.

   (iii) Power factor.

2.3 UNCERTAINTY, RESOLUTION AND ROUNDING

Measurements of power of 1.0 W or greater shall be made with an accuracy of 2% or better at the 95% confidence level. Measurements of power of less than 1.0 W shall be made with an accuracy of 0.02 W or better at the 95% confidence level. The power measurement instrument shall have a resolution of—

(a) 0.01 W or better for power measurements of 10 W or less;

(b) 0.1 W or better for power measurements of greater than 10 W up to 100 W; and

(c) 1.0 W or better for power measurements of greater than 100 W.

All power figures should be in watts and rounded to the second decimal place in accordance with AS 2706. For loads greater than or equal to 10 W, three significant figures shall be reported in accordance with AS 2706.

For products connected to more than one phase, the power measuring instrument shall be capable of measuring the total power of all phases connected.

Where the power is measured using the accumulated energy method (see Clause 2.2) the calculated power measurement uncertainty shall meet the above requirements.

DRAFT

2.4 AMBIENT LIGHT METER SPECIFICATION

If the EUT supports an automatic display luminance control, then the EUT shall be tested in an environment that meets the ambient light requirements defined in 2.5. A meter used to measure the ambient light conditions shall measure illumination and shall meet the following requirements:

Resolution	Accuracy
10 Lx	±5%

2.5 TEST ROOM

The tests shall be carried out in a room that has an air speed close to the EUT of ≤0.5 m/s. The ambient temperature shall be maintained at 23 ±5°C throughout the test. The relative humidity shall be maintained between 10% and 80%. There shall be no intentional cooling of the EUT by use of separately powered fans, air conditioners or heat sinks. The EUT shall be tested on a thermally non-conductive surface. If the EUT supports an automatic display luminance control, then the ambient light shall be 250 ±50 Lx.

2.6 POWER SUPPLY

An a.c. reference source shall be used to provide input voltage to the EUT. The input test voltage to the EUT shall be 230 V a.c. ±2% at 50 Hz ±1%.

2.7 SUPPLY VOLTAGE WAVEFORM

The THD of the supply voltage, when supplying the EUT in the specified mode, shall not exceed 2%, up to and including the 13th harmonic for products rated ≤1.5 kW. For products rated above 1.5 kW THD shall not exceed 5%. The ratio of peak value to root-mean-square (r.m.s.) value of the test voltage (i.e. crest factor) shall be between 1.34 and 1.49 when supplying the EUT in the specified mode.

DRAFT

SECTION 3 MEASUREMENT APPROACH

3.1 EUT PREPARATION

The following steps shall be undertaken to prepare the EUT for the measurement of power consumption:

(a) Record the manufacturer and model name of the EUT.

(b) If the operating system does not allow activation of computer and computer monitor sleep modes, load a test operating system that allows activation of these modes and record the operating system name. Enable Wake on LAN.

(c) The EUT shall be configured in accordance with the instructions provided with the product (unless Clause b) above applied or otherwise stated in this test procedure) including all hardware accessories and software shipped by default. The EUT shall also be configured using the following requirements for all tests:

(i) Desktop, integrated desktop computers and small-scale servers shipped without an input device shall be configured with a manufacturer's recommended input device (e.g. mouse and/or keyboard). No other external peripherals shall be connected.

(ii) Desktop computers and small-scale servers, if the small-scale server has display output functionality, shall be configured with an external computer display, however the external display shall be connected to a power source external to the test and measurement equipment.

(iii) Notebook computers need not include a separate keyboard or mouse when equipped with an integrated pointing device or digitizer.

(iv) Notebook computers shall be connected to the mains power source using the EPS shipped with the product. Battery pack(s) shall be removed for all tests. For EUT where operation without a battery pack is not a supported configuration, the test shall be performed with fully charged battery pack(s) installed, making sure to report this configuration in the test results.

(v) The screen shall be configured with a 'desktop background' (wallpaper) of a solid colour defined by a bitmap set to the RGB values of 130, 130, and 130. The screen brightness shall be set as shipped.

NOTE: The as-shipped screen brightness is defined as a level the manufacturer deems to be appropriate for how an end user would want to use the product.

A notebook and integrated desktop computer shall include the power used by the integrated display in reported results. A desktop computer shall not include the power used by the display device in reported results.

Figure 1 illustrates a typical test setup for a notebook and a desktop computer.

DRAFT

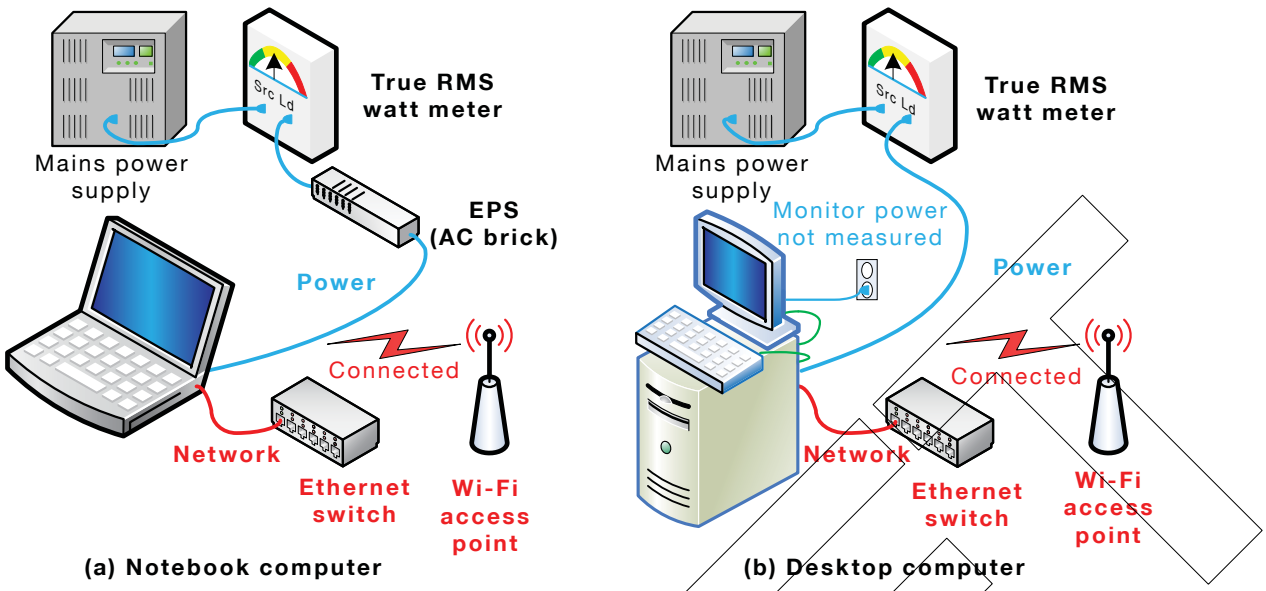

FIGURE 1 TYPICAL TEST SETUP

3.2 TEST SETUP

Figure 1 shows wired and wireless connections, however, only one connection to a network is required.

The following steps illustrate a typical test setup:

(a) Connect a true r.m.s. watt meter between the mains power supply and the EUT power supply. No power strips or UPS units shall be connected between the meter and the EUT. The meter shall remain in place until all required power mode data is recorded.

(b) For sleep, long idle, short idle and the optional active measurements, the EUT energy consumption shall be measured with network connectivity in one of the following states:

(i) For EUT with ethernet support, the EUT shall be connected to an active network switch that supports the highest link speed supported by the EUT (the network switch does not need to be connected to a live network). Only a single network connection needs to be made in the case of a EUT with multiple network connections. It shall also support the minimum requirements needed to support additional power management functions that are supported by the EUT.

NOTE: As an example, IEEE 802.3az specification supports power management of Ethernet links that must be supported by both the EUT and network switch.

To test this function, the switch shall also support this function. Power to alternative network devices such as wireless radios shall be turned off for all tests. This applies to wireless network adapters or device-to-device wireless protocols (e.g. Bluetooth).

NOTE: For examples of wireless network adapters, see IEEE 802.11.

(ii) For EUT that do not support Ethernet, but support some other sort of network connectivity, that network shall be turned on and be in a connected state. A live wireless 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.

(iii) Small-scale servers shall be connected to a live Ethernet (IEEE 802.3) network switch capable of the EUT's highest and lowest network speeds.

(c) Measure, adjust if necessary and record the test conditions as per Section 2.

(d) Record as shipped power management and WoL settings.

(e) The sleep timer of the EUT shall be disabled or set to 30 min to prevent the EUT from entering the sleep state during the idle or active tests.

3.3 TESTING PROCEDURE

3.3.1 General

The specific procedure for measuring each power mode shall be followed, however, the power measurements of each energy mode may be made in any order. Refer to AS/NZS 5813.2 to establish which power modes are to be tested and which short and long idle modes shall be utilized.

After preparing the EUT for testing, the measurement of a.c. power consumption in each required mode should be conducted as set out below.

3.3.2 Off (standby) mode testing

The procedure is as follows:

(a) With the EUT shut down and in off mode (standby) (see Clause 1.7.5), set the meter to begin accumulating true power values at an interval of greater than or equal to one reading per second.

(b) Accumulate power values for five additional minutes and record the average (arithmetic mean) value observed during that 5 minute period as P_{off}.

3.3.3 Sleep mode testing

The procedure is as follows:

(a) Switch on the EUT.

(b) 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, and place the EUT in sleep mode (see 1.7.4).

(c) Reset the meter (if necessary) and begin accumulating true power values at an interval of one or more readings per second.

(d) Accumulate power values for 5 min and record the average (arithmetic mean) value observed during that 5 min period as P_{sleep} if WoL is not enabled as shipped or as $P_{sleepWoL}$ if WoL is enabled at shipment.

(e) If testing both WoL enabled and WoL disabled for sleep, wake the EUT and change the WoL from sleep setting through the operating system settings or by other means.

(f) Place the EUT back in sleep mode and repeat test, recording sleep power necessary for this alternate configuration as $P_{sleepWoL}$ as P_{sleep} as appropriate.

(g) Upon completion of this alternate test, change the WoL from sleep setting back to its original as shipped setting.

Sleep mode testing is not required for small-scale servers.

3.3.4 Long idle mode testing

Refer to AS/NZS 5813.2 to establish the definition for the long idle mode configuration to be tested and if applicable.

The procedure is as follows:

(a) Switch on the EUT.

(b) 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, and place the EUT in long idle mode (see Clause 1.7.2.2 or A2 as specified in AS/NZS 5813.2).

(c) Once the EUT has entered the long idle mode, reset the meter (if necessary) and begin accumulating true power values at an interval of one or more readings per second.

(d) Accumulate power values for 5 min and record the average (arithmetic mean) value observed during that 5 min period as P_{idleL}.

3.3.5 Measuring short idle mode

Refer to AS/NZS 5813.2 to establish the definition for the long idle mode configuration to be tested and if applicable.

The procedure is as follows:

(a) Switch on the EUT.

(b) 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, and place the EUT in short idle mode (see Clause 1.7.2.1 or A1 as specified in AS/NZS 5813.2).

(c) Once the EUT has entered short idle mode, reset the meter (if necessary) and begin accumulating true power values at an interval of one or more readings per second.

(d) Accumulate power values for 5 min and record the average (arithmetic mean) value observed during that 5 min period as P_{idleS}.

3.3.6 Measuring active mode (see Clause 1.7.3)

To measure active mode:

(a) Switch on the EUT.

(b) 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, and place the EUT in short idle mode (see Clause 1.7.2.1).

(c) Load the active workload and prepare it to run.

(d) Reset the meter (if necessary) and start the active workload. Begin accumulating true power values at an interval of one or more readings per second.

(e) When the active workload indicates it has finished, record the average power as P_{work}.

Criteria for the active workload shall be defined by the commissioner of the test.

3.3.7 End of testing configuration

After completing all tests, reset all settings to the 'as shipped states', e.g. WoL and computer and computer monitor time to sleep.

DRAFT

SECTION 4 TEST REPORT

4.1 GENERAL

When reporting data:

(a) Indicate additional values or ranges where applicable.

(b) Indicate source(s) of information, if it is not marked on the EUT.

(c) Use N/S for 'not stated' and N/A for 'not applicable'.

(d) Information, with the exception of that in Clause 4.2.2, may be provided by the client.

(e) Information in Clause 4.2.2 shall be recorded by the test laboratory.

4.2 MANDATORY INFORMATION

4.2.1 Information provided by the test laboratory or the client

The following information shall be recorded for each computer tested:

(a) EUT manufacturer or brand.

(b) EUT model number.

(c) EUT country of manufacture.

(d) Computer type, e.g. desktop, desktop-derived server, integrated computer, notebook, netbook or tablet.

(e) Chassis type, e.g. portable, small form factor, tower, multimedia.

(f) As shipped operating system name and version and, if applicable, the test operating system and version.

(g) Processor brand and model number.

(h) Number of processors.

(i) Number of cores and speed per core.

(j) Number of hard disk drives.

(k) System memory, e.g. number, type and capacity.

(l) Number of channels of memory.

(m) Integrated (iGfx) or discrete (dGfx) GPU.

(n) Number of discrete GPU's (dGfx) installed.

(o) dGfx frame buffer width and data frequency.

(p) Additional components installed, e.g discrete television tuner, discrete audio card, optical drive.

(q) Notebooks only—Diagonal screen size.

(r) Computer power supply type, e.g. internal, external passive cooled or external active cooled.

(s) Nameplate voltage or voltage range, frequency or frequency range, input current for computers using internal power supplies and output power for external power supplies. If available, internal power supply output power.

DRAFT

(t) Where the EUT includes a physical or electronic energy label, such as ENERGY STAR®, record the label name and specification version if available. Where the documentation accompanying the EUT refers to compliance with an energy efficiency program, record details of compliance, the program name and specification version if available.

4.2.2 Information determined by the test laboratory

The following information shall be recorded for each computer tested:

(a) Name and address of test lab.

(b) Laboratory type and accreditation.

(c) Date of test.

(d) Test report number.

(e) Test Standard used for testing.

(f) Test equipment utilized and date of calibration.

(g) AC test voltage.

(h) Ambient temperature immediately surrounding the EUT.

(i) Serial number.

(j) Photographs of the EUT showing—

  (i) nameplate information for the EUT and power supply if external; and

  (ii) an overview of the EUT with a metric rule for scale.

(k) Notebooks—battery pack removed or in place during tests.

(l) Standby (off mode) power as per Clause 1.7.5 or 1.7.6 depending upon WoL status as shipped.

(m) If applicable, short idle mode power and record which Clause, 1.7.2.1 or A1, utilized.

(n) If applicable, long idle mode power and record which Clause, 1.7.2.2 or A2, utilized.

(o) Sleep mode power WOL disabled (if applicable) as per Clause 1.7.4.1.

(p) Sleep mode power WOL enabled (if applicable) as per Clause 1.7.4.2.

(q) Active power as per Clause 1.7.3.

(r) Power management settings as shipped.

(s) Network type and connectivity maintained during tests.

(t) Additional components enabled or disabled during tests.

(u) WoL status as shipped.

(v) Name of the tester.

4.3 OPTIONAL INFORMATION

The following information should be provided, if available:

(a) Date of manufacture.

(b) Passively cooled external power supplies—brand, model and performance mark.

(c) Internal power supplies and actively cooled external power supplies—brand and model. Efficiency at 20%, 50% and 100% loading. Power factor at 100% loading.

DRAFT

APPENDIX A

ENERGY STAR SHORT AND LONG IDLE MODES

(Informative)

A1 GENERAL

'Long idle' (see Clause 1.7.2.2) refers to how ENERGY STAR V5.0 and V5.2 tests a system with an integrated monitor (display), such as notebooks and integrated computers, where the computer is tested when the computer monitor has entered sleep mode.

'Short idle' (see Clause 1.7.2.1) refers to how ENERGY STAR V5.0 and V5.2 tests a system with an external monitor (display), where the computer is tested with the computer monitor on. In addition to the above, other conditions apply for the purposes of testing short and long idle modes for ENERGY STAR as set out below.

A2 SHORT IDLE (P_{idleS})–COMPUTERS WITH AN EXTERNAL MONITOR/ DISPLAY

The mode where the EUT has reached an idle condition (e.g. 15 minutes after OS boot or after completing an active workload or after resuming from sleep), the screen is on (system is re-configured to prevent the display from entering a low power state where the screen contents cannot be observed or turning off) and set to as shipped brightness and long idle power management features should not have engaged (e.g. HDD is spinning and the EUT is prevented from entering sleep mode) and low brightness control by a timer is prohibited.

P_{idleS} represents the average power measured when in the short idle mode.

A3 LONG IDLE (P_{idleL})–COMPUTERS WITH AN INTEGRATED MONITOR/ DISPLAY

The mode where the EUT has reached an idle condition (e.g. 15 minutes after OS boot or after completing an active workload or after resuming from sleep), the screen has just entered a low power state where the screen contents cannot be observed, but the EUT remains in the working mode (ACPI G0/S0). Power management features, configured as shipped, have engaged (e.g. display is on), but the EUT is prevented from entering sleep mode, and the HDD, where applicable, is not allowed to be power managed ('spun-down') during testing unless containing non-volatile cache integral to the drive (e.g. 'hybrid' hard drives). If more than one internal hard drive is installed as shipped, the non-primary, 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 must be tested without such features implemented.

P_{idleL} represents the average power measured when in the long idle mode.

*** END OF DRAFT ***

PREPARATION OF AUSTRALIAN STANDARDS

Australian Standards are prepared by a consensus process involving representatives nominated by organizations drawn from all major interests associated with the subject. Australian Standards may be derived from existing industry Standards, from established international Standards and practices or may be developed within a Standards Australia technical committee.

During the development process, Australian Standards are made available in draft form at all sales offices and through affiliated overseas bodies in order that all interests concerned with the application of a proposed Standard are given the opportunity to submit views on the requirements to be included.

The following interests are represented on the committee responsible for this draft Australian Standard:

Australian Chamber of Commerce and Industry

Australian Communications and Media Authority

Australian Industry Group

Australian Information Industry Association

Australian Subscription Television and Radio Association

Certification Interests (New Zealand)

CHOICE

Consumer Electronics Association of New Zealand

Consumer Electronics Suppliers Association

Department of Climate Change and Energy Efficiency

Electrical Compliance Testing Association

Electrical Regulatory Authorities Council

Energy Efficiency & Conservation Authority of New Zealand

Engineers Australia

For Information

Free TV Australia

Ministry of Economic Development (New Zealand)

Telstra Corporation

DRAFT

Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognized as Australia's peak national standards body.

Standards New Zealand

The first national Standards organization was created in New Zealand in 1932. The Standards Council of New Zealand is the national authority responsible for the production of Standards. Standards New Zealand is the trading arm of the Standards Council established under the Standards Act 1988.

Australian/New Zealand Standards

Under a Memorandum of Understanding between Standards Australia and Standards New Zealand, Australian/New Zealand Standards are prepared by committees of experts from industry, governments, consumers and other sectors. The requirements or recommendations contained in published Standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian/New Zealand Standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

International Involvement

Standards Australia and Standards New Zealand are responsible for ensuring that the Australian and New Zealand viewpoints are considered in the formulation of international Standards and that the latest international experience is incorporated in national and Joint Standards. This role is vital in assisting local industry to compete in international markets. Both organizations are the national members of ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission).

Visit our web sites

www.standards.org.au www.standards.co.nz

www.standards.com.au

DRAFT