



ENERGY STAR® Program Requirements for Computer Monitors

Table of Contents

Partner Commitments.....	2
Commitment.....	2
Performance for Special Distinction.....	3
Draft 2 Eligibility Criteria.....	4
Definitions.....	4
Qualifying Products.....	5
Energy-Efficiency Specifications for Qualifying Products.....	5
Test Methodology.....	6
User Interface.....	10
Effective Date.....	11
Future Specification Revisions.....	11



ENERGY STAR® Program Requirements for Computer Monitors

Partner Commitments

Commitment

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified computer monitors. The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on computer monitors and specifying the testing criteria for computer monitors. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR labels and name may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR qualified computer monitor model within six months of activating the computer monitor portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;
- provide clear and consistent labeling of ENERGY STAR qualified computer monitors. The ENERGY STAR label must be clearly displayed on the top/front of the product, on the product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed;

Note: EPA acknowledges partner concerns with the ENERGY STAR labeling requirements. While the above standard language remains unchanged from Draft 1, EPA plans to present several options to industry for discussion at the ENERGY STAR Computer Monitor Partner Meeting in Washington, DC on July 22, 2003.

- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying computer monitor models. Once the Partner submits its first list of ENERGY STAR qualified computer monitor models, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;
- provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified computer monitors shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely

controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;

- notify EPA of a change in the designated responsible party or contacts for computer monitors within 30 days.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed on the progress of these efforts:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;
- purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes;
- ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in company facilities, particularly upon installation and after service is performed;
- provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified product models;
- feature the ENERGY STAR label(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;
- provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, communicate, and/or promote Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;
- provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.



ENERGY STAR® Program Requirements for Computer Monitors

DRAFT 2 Eligibility Criteria (Version 4.0)

Below is the DRAFT 2 product specification (Version 4.0) for ENERGY STAR qualified Computer Monitors. A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

1) Definitions: Below is a brief description of a Computer Monitor and other terms as relevant to ENERGY STAR.

- A. Computer Monitor (also referred to as "Monitor"): A commercially available electronic product with a display screen and its associated electronics encased in a single housing that is capable of displaying output information from a computer via one or more inputs, such as VGA, DVI, and/or IEEE 1394. The monitor usually relies upon a cathode-ray tube (CRT), liquid crystal display (LCD), or other display device. This definition is intended primarily to cover standard monitors designed for use with computers. To qualify, the monitor must be capable of being powered from either a wall outlet or a battery unit that is sold with an AC adapter. Computer monitors with a tuner/receiver may qualify as ENERGY STAR under this specification as long as they are marketed and sold to consumers as computer monitors (i.e., focusing on computer monitor as the primary function) or as dual function computer monitors and televisions. However, products with a tuner/receiver and computer capability that are marketed and sold as televisions are not included in this specification.

Note: *It is EPA's intent to allow computer monitors and dual function computer monitor/television products to qualify for ENERGY STAR under this specification. To be consistent with the latest TV/VCR specification and discussions with EIA/CEA and manufacturers, we have attempted to differentiate products based on how they are marketed and sold to consumers. Our preference, however, would be for a more definitive delineation; for example, one based on resolution. EPA encourages industry to provide comments and suggestions on an appropriate computer monitor definition.*

- B. On Mode/Active Power: The product is connected to a power source and produces an image. The power requirement in this mode is typically greater than the power requirement in Sleep and Off Modes.
- C. Sleep Mode/Low Power: The reduced power state that the monitor model enters after receiving instructions from a computer or via other functions. A blank screen and reduction in power consumption characterize this mode. The monitor returns to On Mode with full operational capability upon sensing a request from a user/computer (e.g., user moves the mouse or presses a key on the keyboard).
- D. Off Mode/Standby Power: The lowest power-consuming state of the monitor. For purposes of this specification, off mode is defined as the power being used when the product is connected to a power source, produces no images, and is waiting to be switched to On Mode by a direct signal from a user/computer (e.g., user pushes power switch).
- E. Disconnect: The product has been unplugged from the mains and therefore is disconnected from all external power sources.

Note: *In this draft, EPA has reordered the operational mode definitions to proceed from highest to lowest power consumption. In addition, a few examples of a "request from a user/computer" have been inserted into the Sleep Mode definition.*

- 2) **Qualifying Products:** Any computer monitor that is marketed to the consumer as such and meets the definition in Section 1 is eligible for the ENERGY STAR. As explained in Section 1, this specification does not cover products with computer capability that are marketed and sold as televisions.
- 3) **Energy-Efficiency Specifications for Qualifying Products:** Only those products listed in Section 2 that meet the following criteria may qualify as ENERGY STAR. Effective dates for Tiers 1 and 2 are provided in Section 6 of this specification.

A. On Mode/Active Power

1. **Tier 1:** To qualify as ENERGY STAR, monitor models must not exceed the following maximum active power consumption equation: $Y = 30 + 33X$. Y is expressed in watts and rounded up to the nearest whole number and X is the number of megapixels in decimal form (e.g., 1,920,000 pixels = 1.92 megapixels). For example, the maximum power consumption for a monitor with 1800 x 1440 resolution, or 2,592,000 pixels, would be: $30 + 33(2.592) = 115.54$ or 116 watts when rounded up. Under this metric, maximum allowed power consumption for monitors with various standard resolutions is provided below in Table 1.
2. **Tier 2:** To qualify as ENERGY STAR, monitor models must not exceed the following maximum active power consumption equation: If $X < 1$ megapixel, then $Y = 20$; if $X > 1$ megapixel, then $Y = -5 + 26X$. Y is expressed in watts and rounded up to the nearest whole number and X is the number of megapixels in decimal form (e.g., 1,920,000 pixels = 1.92 megapixels). For example, the maximum power consumption for a monitor with 1024 x 768 resolution would be 20 watts and for a monitor with 1600 x 1200 resolution would be $-5 + 26(1.92) = 44.92$ or 45 watts when rounded up.

Table 1: Sample Tier 1 On Mode Maximum Power Levels

Resolution	Total Pixels	Maximum Power Use for Tier 1
640 x 480	307,200	41 watts
800 x 600	480,000	46 watts
1024 x 768	786,432	56 watts
1280 x 1024	1,310,720	74 watts
1600 x 1200	1,920,000	94 watts
1800 x 1440	2,592,000	116 watts
2048 x 1536	3,145,728	134 watts

To qualify a computer monitor as ENERGY STAR, it must be tested according to the protocol outlined in Section 4, Test Methodology.

B. Sleep and Off Modes

Tiers 1 and 2: Maximum power consumption levels for Sleep and Off Modes are provided in Table 2, below. Monitors capable of multiple Sleep Modes (i.e., Sleep and Deep Sleep) shall meet the Sleep Mode requirement below in all such modes. For example, under Tier 1, a monitor tested at 7 watts in Sleep and 3 watts in Deep Sleep would not qualify because one of the Sleep Modes exceeds 4 watts.

Table 2: Energy-Efficiency Criteria for Sleep and Off Modes (Tiers 1 and 2)

	Tier 1	Tier 2
Sleep Mode	≤ 4 watts	≤ 2 watts
Off Mode	≤ 2 watts	≤ 1 watt

Note: As currently defined in the Version 3.0 Computer Agreement, the computer shall activate the monitor's Sleep Mode within 30 minutes of user inactivity. Since this new Monitor Specification (Version 4.0) does not specify a Deep Sleep Mode, the 60-minute default time will no longer apply when this Monitor Specification takes effect. Finally, in future specification discussions for computers, EPA is contemplating a proposal for a 15-minute or less default time for monitors.

Regarding the performance levels, please note the following:

- Tier 1 levels for all three modes are based on test data submitted to EPA by monitor manufacturers and represent the top 17% of CRTs and 90% of LCDs from this data set.
- Tier 1 Sleep and Off Mode levels have not changed and remain consistent with Draft 1.
- The 1-watt Off Mode level proposed for Tier 2 is designed to coordinate with FEMP's standby recommendations for monitors.

Finally, based on industry feedback on Draft 1, EPA has either removed altogether or integrated into the Test Methodology requirements or information regarding Brightness (Luminance), Contrast Ratio, Defective Pixels, and Warranty.

4) Test Methodology

Product Testing Set-up, Methodology, and Documentation: EPA utilizes, where possible, existing, widely accepted industry practices for measuring product performance and power use under normal or typical operating conditions. The testing and measurement methods below reference published specifications from the Video Electronics Standards Association (VESA) Display Metrology Committee and the International Electrotechnical Commission (IEC), and supplement those guidelines where necessary with methods developed in cooperation with the computer monitor industry.

Manufacturers are required to perform tests and self-certify those product models that meet the ENERGY STAR guidelines. Families of monitor models that are built on the same chassis and identical in every respect but housing and color may be qualified through submission of test data for a single representative model. Likewise, models that are unchanged or that differ only in finish from those sold in a previous year may remain qualified without the submission of new test data, assuming the specification remains unchanged.

The power requirement shall be measured from the outlet or power source to the product under test. The Partner shall measure the average true power consumption of the monitor during the On Mode/Active Power, the Sleep Mode/Low Power, and the Off Mode/Standby Power. When performing measurements to self-certify a product model, the product being tested must initially be in the same condition (e.g., configuration and settings) as when shipped to the customer, unless adjustments need to be made pursuant to instructions below.

To ensure a consistent means for measuring the power consumption of electronics products, the following protocol must be followed, which has three main components:

Product Testing Set-up and Conditions: Outlined in Sections A through H, below, are the ambient test conditions and measurement protocols that must be respected when performing power measurements.

Product Testing Methodology: The actual test steps for measuring power in On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power are provided in Section I, below.

Product Testing Documentation: Documentation requirements for submittal of qualified product data to EPA are detailed in Section J, below.

This protocol ensures that outside factors do not adversely affect the test results and that the test results can be consistently reproduced. Manufacturers may elect to use an in-house or independent

laboratory to provide the test results. A sample of test facilities and recommended test equipment will be provided in the near future on the ENERGY STAR Web site at www.energystar.gov.

Product Testing Set-up and Conditions

A. Test Conditions:

General Criteria

Supply Voltage:	115 (± 1%) Volts AC, 60 Hz (± 0.5Hz)
Total Harmonic Distortion (Voltage):	< 2% THD
Ambient Temperature:	20°C ± 5°C

(Reference IEC 62301: Household Electrical Appliances – Measurement of Standby Power, Sections 3.2, 3.3 and VESA Flat Panel Display Measurements (FPDM) Standard 2.0, Section 301-2)

- B. Dark Room Conditions: When performing light measurements, the monitor shall be located in a dark room condition. The monitor screen illuminance measurement (E), when screen is switched off, must be 1.0 Lux or less. Measurements should be made at a point perpendicular to the center of the screen using a Light Measuring Device (LMD) with the power to the monitor off (Reference VESA FPDM Standard 2.0, Section 301-2F).
- C. Color Controls and Peripherals: All color controls (hue, saturation, gamma, etc.) shall be placed at their factory default settings. No external devices shall be connected to any included Universal Serial Bus (USB) hubs or ports. Any built-in speakers, TV tuners, etc. may be placed in their minimum power configuration, as adjustable by the user, to minimize power use not associated with the display itself. Circuit removal or other actions not under user control may not be taken to minimize power use.
- D. Power Measurement Test Conditions: CRT pixel format shall be set at the preferred pixel format with the highest resolution that is intended to be driven at a 75 Hz refresh rate. A VESA Discrete Monitor Timing (DMT) or newer standard pixel format timing must be used for the test. The CRT monitor must be capable of meeting all its manufacturer-stated quality specifications in the tested format. For LCDs and other fixed pixel technologies, pixel format shall be set to the native level. LCD refresh rate shall be set to 60 Hz, unless a different refresh rate is specifically recommended by the manufacturer, in which case that rate shall be used.
- E. Power Measurement Protocols: Monitor power consumption shall be measured in watts with an imposed test pattern. Warm-up time shall be a minimum of a 20-minute period (Reference VESA FPDM Standard 2.0, Section 301-2D or 305-3 for warm-up test). A true RMS power meter with a crest factor of at least five shall be used to measure the power use of each of three or more randomly chosen units at the following voltage/frequency combination: 115 Volts AC at 60 Hz (Reference VESA Standard: Display Specifications and Measurement Procedures, Version 1.0, Revision 1.0, Section 8.1.3). Measurements shall be taken after wattage values are stable over a three-minute period. Measurements are considered stable if the wattage reading does not vary more than 1% over the three-minute period (Reference IEC 4.3.1). (For models with DVI inputs, manufacturers shall ignore the DVI input check cycle when metering the model in Off Mode/Standby Power.) Manufacturers shall use calibrated measuring equipment capable of measurements accurate to one-tenth of a watt or better. Manufacturers shall report all values as well as mean values (based on the three or more data points) for On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power on an ENERGY STAR Qualified Product Information (QPI) form.

Note: EPA realizes that the first draft of the test methodology, which suggested that manufacturers provide 15 data points per model (five serial numbers tested per model, at each of three different voltage/frequency combinations), proved burdensome to some companies. Based on a voltage variability analysis of data received to date, EPA feels comfortable that there is sufficient data consistency to reduce the sample size to three data points per model, at a single voltage/frequency combination of 115 volts, 60 Hz. Further, EPA is evaluating whether any additional adjustments are needed to the test sample. A proposal received from one manufacturer is currently being reviewed by the Agency. EPA would like to hear from manufacturers about this issue on July 22, 2003.

Also, please note that EPA has added a statement regarding stable power measurements in Off Mode/Standby Power for models with DVI inputs, in response to a comment received from two manufacturers. This statement has been added throughout the specification, as appropriate.

- F. **Luminance Test Patterns and Procedures:** For CRT monitors, the technician shall initiate the AT01P (Alignment Target 01 Positive Mode) pattern (VESA FPDM Standard 2.0, A112-2F, AT01P) for screen size and use it to set the monitor to the manufacturer's recommended image size, which is typically slightly smaller than maximum viewable screen size. Then, test pattern (VESA FPDM Standard 2.0, A112-2F, SET01K) shall be displayed that provides eight shades of gray from full black (0 volts) to full white (0.7 volts).¹ Input signal levels shall conform to VESA Video Signal Standard (VSIS), Version 1.0, Rev. 2.0, December 2002. The technician shall adjust (where feasible) the monitor brightness control downward from its maximum until the lowest black bar luminance level is just slightly visible (VESA FPDM Standard 2.0, Section 301-3K). The technician shall then display a test pattern (VESA FPDM Standard 2.0, A112-2H, L80) that provides a full white (0.7 volts) box that occupies 80% of the image. The technician shall then adjust the contrast control until the white area of the screen provides at least 100 candelas per square meter of luminance, measured according to VESA FPDM Standard 2.0, Section 302-1.

For all Fixed Pixel displays (e.g., LCDs and others), test pattern (VESA FPDM Standard 2.0, A112-2F, SET01K) shall be displayed that provides eight shades of gray from full black (0 volts) to full white (0.7 volts).¹ Input signal levels shall conform to VESA Video Signal Standard (VSIS), Version 1.0, Rev. 2.0, December 2002. With the brightness and contrast controls at maximum, the technician shall check that, at a minimum, the white and near white gray levels can be distinguished. If white and near white gray levels cannot be distinguished, then contrast shall be adjusted until they can be distinguished. The technician shall next display a test pattern (VESA FPDM Standard 2.0, A112-2H, L80) that provides a full white (0.7 volts) box that occupies 80% of the image. The technician shall then adjust the brightness control until the white area of the screen provides at least 175 candelas per square meter of luminance, measured according to VESA FPDM Standard 2.0, Section 302-1. [If monitor's maximum luminance is less than 175 candelas per square meter (e.g., 150), then technician shall use the maximum luminance (e.g., 150) and report the value to EPA with other required testing documentation. Similarly, if the monitor's minimum luminance is greater than 175 candelas per square meter (e.g., 200), then technician shall use the minimum luminance (e.g., 200) and report the value to EPA.]

¹ Corresponding voltage values for digital only interface monitors that correspond to the brightness of the image (0 to 0.7 volts) are:

0 volts (black) = a setting of 0

0.1 volts (darkest shade of gray analog) = 36 digital gray

0.7 volts (full white analog) = 255 digital gray

Please note that future digital interface specifications may widen this range, but in all cases, 0 volts shall correspond to black and the maximum value shall correspond to white, with 0.1 volts corresponding to one-seventh of the maximum value.

Note: High-resolution test patterns are available through VESA. However, because the test pattern files are very large for resolutions over 1600 x 1200, VESA is currently not able to upload them to www.vesa.org/public/Fpdm2/Test%20Patterns/ for download by the public. For high-resolution test patterns on a CD-ROM, please contact Bill Lempesis, Executive Director, at (408) 957-9270 or bill@vesa.org.

- G. Light Measurement Protocols: When light measurements, such as illuminance and luminance, need to be made, a LMD shall be used with the monitor located in darkroom conditions. The LMD shall be used to make measurements at the center of, and perpendicular to the monitor screen (Reference VESA FPDM Standard 2.0, Appendix A115). The screen surface area to be measured shall cover at least 500 pixels, unless this exceeds the equivalent of a rectangular area with sides of lengths equal to 10% of the visible screen height and width (in which case this latter limit applies). However, in no case may the illuminated area be smaller than the area the LMD is measuring (Reference VESA FPDM Standard 2.0, Section 301-2H).
- H. Display Set-up and Characterization: The monitor test sample characteristics shall be recorded prior to the test. The following information shall be recorded at a minimum:

Product Description/Category (e.g., 17-inch computer monitor with white housing)
Display Technology (e.g., CRT, LCD, Plasma)
Brand Name/Manufacturer
Model Number
Serial Number
Rated Voltage (VAC) and Frequency (Hz)
Viewable Diagonal Size (inches)
Aspect Ratio (e.g., 4:3)
Recommended Image Size (actual size tested) Width X Height
Viewing Angle (horizontal and vertical degrees)
Screen Refresh Rate (during test) (Hz)
Number of Pixels as Tested (horizontal)
Number of Pixels as Tested (vertical)
Maximum Claimed Resolution (horizontal)
Maximum Claimed Resolution (vertical)
Analog, Digital, or Both Interfaces
Instrumentation Information (e.g., type of signal generator)

Product Testing Methodology

- I. Test Method: Following are the test steps for measuring the true power requirements of the test unit in On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power. Manufacturers are required to test their monitors using the analog interface, except in those cases where one is not provided (i.e., digital interface monitors, which are defined as only having a digital interface for purposes of this test method). For digital interface monitors, please see Footnote 1 on page 8 for voltage information and then follow the test method below using a digital signal generator.

On Mode/Active Power

1. Connect the test sample to the outlet or power source and test equipment. For monitors shipped with an external power supply, the external power supply (as opposed to a reference power supply) must be used in the test.
2. Power on all test equipment and properly adjust power source voltage and frequency.
3. Check for normal operation of the test unit and leave all customer adjustments set to factory default settings.
4. Bring the test unit into On Mode/Active Power either by using the remote control device or by using the ON/OFF switch on the test unit cabinet. Allow the unit under test to reach operating

- temperature (approximately 20 minutes).
5. Set the proper display mode. Refer to Section D, Power Measurement Test Conditions.
 6. Provide dark room conditions. See Sections G, Light Measurement Protocols, and B, Dark Room Conditions.
 7. Set size and luminance. Refer to Section F, Luminance Test Patterns and Procedures for CRT or Fixed Pixel displays. Once luminance is set, dark room conditions are no longer needed.
 8. Either verify that the wall outlet power is within specifications or adjust the AC power source output as described in Section A ($115V_{rms} \pm 1V_{rms}$, $60Hz \pm 0.5Hz$).
 9. Set the power meter current range. The full-scale value selected multiplied by the crest factor rating (I_{peak}/I_{rms}) of the meter must be greater than the peak current reading from the oscilloscope.
 10. Allow the readings on the power meter to stabilize and then take the true power reading in watts from the power meter. Measurements are considered stable if the wattage reading does not vary more than 1% over the three-minute period. See Section E, Power Measurement Protocols.
 11. Power consumption shall be recorded, as well as total pixel format (horizontal x vertical pixels displayed), to calculate pixels/watt.
 12. Record the test conditions and test data.

Sleep Mode/Low Power (Power Switch On, No Video Signal)

1. At the conclusion of the On Mode/Active Power test, initiate the monitor Sleep Mode/Low Power. The method of adjustment shall be documented along with the sequence of events required to reach the Sleep Mode/Low Power. Power on all test equipment and properly adjust operation range.
2. Allow the monitor to remain in Sleep Mode/Low Power until stable power readings are measured. Measurements are considered stable if the wattage reading does not vary more than 1% over the three-minute period.
3. Record the test conditions and test data. The measurement time shall be sufficiently long to measure the correct average value. If the device has different Sleep Modes that can be manually selected, the measurement should be taken with the device in the most energy consumptive of those modes. If the modes are cycled through automatically, the measurement time should be long enough to obtain a true average that includes all modes.

Off Mode/Standby Power (Power Switch Off)

1. At the conclusion of the Sleep Mode/Low Power test, initiate the monitor Off Mode/Standby Power. The method of adjustment shall be documented along with the sequence of events required to reach the Off Mode/Standby Power. Power on all test equipment and properly adjust operation range.
2. Allow the monitor to remain in Off Mode/Standby Power until stable power readings are measured. Measurements are considered stable if the wattage reading does not vary more than 1% over the three-minute period. (For models with DVI inputs, manufacturers shall ignore the DVI input check cycle when metering the model in Off Mode/Standby Power.)
3. Record the test conditions and test data. The measurement time shall be sufficiently long to measure the correct average value.

Product Testing Documentation

- J. Submittal of Qualified Product Data to EPA: Partners are required to self-certify those product models that meet the ENERGY STAR guidelines and report information to EPA on a QPI form. ENERGY STAR qualifying product lists, including information about new as well as discontinued models, must be provided on an annual basis, or more frequently if desired by the manufacturer.
- 5) User Interface: Manufacturers are strongly recommended to design products in accordance with the user interface standards being developed by the Power Management Controls project to make power controls more consistent and intuitive across all electronic devices. For details on this project, see <http://eetd.LBL.gov/Controls>.

6) Effective Date: The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. Any previously executed agreement on the subject of ENERGY STAR qualified computer monitors shall be terminated effective October 31, 2004.

- A. Qualifying Products Under Tier 1 of the Version 4.0 Specification: Tier 1 of the Version 4.0 specification shall commence on **November 1, 2004**. All products, including models originally qualified under Version 3.0, with a **date of manufacture** on or after **November 1, 2004**, must meet the new (Version 4.0) requirements in order to qualify for ENERGY STAR (including additional shipments of models originally qualified under Version 3.0). The **date of manufacture** is specific to each unit and is the date (e.g., month and year) of which a unit is considered to be completely assembled.
- B. Qualifying and Labeling Products Under Tier 2 of the Version 4.0 Specification: The second phase of this specification, Tier 2, shall commence on **November 1, 2005**. Specifications for Tier 2 shall apply to products with a date of manufacture after October 31, 2005. For example, a unit with a date of manufacture of November 1, 2005 must meet the Tier 2 specification in order to qualify as ENERGY STAR.

Note: *This draft proposes effective dates for Tiers 1 and 2 of the new monitor specification. Due to the elimination of grandfathering, EPA has delayed the introduction of the Version 4.0 specification by one year until November 1, 2004 (assuming the specification is finalized no later than October/November 2003). This one-year lead-time is provided to allow manufacturers to make appropriate plans or other adjustments based on their products' design and manufacturing cycles. For both Tiers 1 and 2, a product model must meet the ENERGY STAR specification in effect on the units' date of manufacture in order to qualify as ENERGY STAR.*

- C. Elimination of Grandfathering: EPA will not allow grandfathering under this Version 4.0 ENERGY STAR specification. **ENERGY STAR qualification under Version 3.0 is not automatically granted for the life of the product model.** Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification in effect at that time.

Note: *EPA has made this important programmatic change for two reasons:*

1. *To deliver on expectations about ENERGY STAR by ensuring that the products perform at levels promised by the program.*
2. *To ensure that ENERGY STAR's ability to differentiate more efficient products is not undermined by high percentages of labeled products qualifying at less stringent performance levels.*

- 7) Future Specification Revisions: ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions.

Approximately in October 2004 (one year prior to the Tier 2 effective date), ENERGY STAR will review the Tier 2 specification. During this evaluation process, ENERGY STAR will assess the market in terms of energy efficiency and new technologies. Prior to and during this time frame, industry will have an opportunity to share its data, submit proposals, and voice any concerns. ENERGY STAR will strive to ensure that the Tier 2 specification recognizes the most energy-efficient models and rewards those manufacturers who have made efforts to further improve energy efficiency.