

*Revisions to this Memorandum of Understanding will not be accepted.
This MOU becomes effective April 1, 1997.*

Memorandum of Understanding between
The United States Environmental Protection Agency
and

I. Common Agreements and Principles

A. This is a voluntary agreement between _____ ("ENERGY STAR[®] Partner" or "Partner") and the United States Environmental Protection Agency (EPA), by which _____ joins the ENERGY STAR Program. The terms of this MOU shall apply to multifunction devices sold by Partner under its own brand name(s).

B. ENERGY STAR Partner and EPA agree that the primary purpose of the ENERGY STAR Program is to promote the manufacturing and marketing of energy-efficient equipment, thereby potentially reducing combustion-related air pollution.

C. ENERGY STAR Partner and EPA agree that the use of energy-efficient equipment may also increase profits and competitiveness.

D. ENERGY STAR Partner and EPA agree that the ENERGY STAR Program may also improve or enhance equipment's useful lifetime, customer satisfaction, and overall product quality.

E. ENERGY STAR Partner and EPA agree that publicizing the ENERGY STAR Program is important to demonstrate the following: the concern of Partner for the environment, the vitality of the free enterprise system in reducing costs, and the capability of voluntary programs to achieve environmental goals.

F. ENERGY STAR Partner and EPA agree that maintaining public confidence in the ENERGY STAR Program is critical to achieving the shared goals of Partner and EPA.

G. ENERGY STAR Partner and EPA agree that membership in the ENERGY STAR Program is essential to the cooperative effort to achieve the shared goals stated above.

II. Definitions

A. Multifunction Device: As defined in this MOU, a Multifunction Device (MFD) is a physically integrated device or a combination of functionally integrated components (the "base unit," see definition below) that produces hard copy duplicates from graphical hard copy originals (distinct from single sheet convenience copying, see next paragraph) as well as performing one or both of the following core functions: printing of documents (from digital information received from direct connect computers, networked computers, file servers and fax transmissions) or faxing (send and

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receive). An MFD may also include scanning to computer file or any other capabilities not listed in this MOU. The device may be connected to a network, and may output black & white, gray scale, or color images. EPA anticipates that a separate MOU may ultimately be required to cover color devices, because of likely technological developments related to color imaging, but for now these devices are included in this MOU.

This MOU covers products that are marketed and sold as multifunction equipment whose primary function is copying, but that are able to perform one or both of the additional core functions of printing or faxing. Devices whose primary function is faxing and offer limited sheet copying capabilities (so-called single sheet "convenience copying") are covered under the Printer/Fax MOU.

If the MFD is not a single integrated unit but a set of functionally integrated components, then the manufacturer must certify that when installed correctly in the field, the sum of all power use for all MFD components comprising the base unit will achieve the power levels listed below to qualify as an ENERGY STAR compliant MFD.

Some digital copiers can be upgraded into an MFD *in the field* with the installation of add-on devices that allow printing or faxing capabilities. Partners may consider this system of components to be an MFD, and may qualify it according to specifications below. However, when sold independently, the copier cannot be represented as an ENERGY STAR compliant device unless it meets the ENERGY STAR *copier* specifications.

Some printers can be upgraded into an MFD *in the field* with the installation of add-on devices that allow copying (not just single sheet convenience copying) and may also allow faxing capabilities. Partners may consider this system of components to be an MFD, and may qualify it according to specifications below. However, when sold independently, the printer cannot be represented as an ENERGY STAR compliant device unless it meets the ENERGY STAR *printer* specifications.

B. Image Reproduction Speed: Images per minute (ipm) measures the image reproduction speed specified in terms of monochrome text output per minute at the default resolution of the MFD. One image is defined as one 8.5" x 11" or A4-sized printed page of single-spaced monochrome text output, 12 point type, Times font, 1" (2.54 cm) margins on all sides of the page. Double-sided prints or copies count as two images even though they are printed on one piece of paper. If at a later date EPA creates a test procedure specifically designed to measure print speed, then that test procedure shall supersede the output speed specifications listed in this section.

For all multifunction device models sold in the US market, measurement of engine speed shall be based on 8.5" x 11" letter-sized paper. For MFDs sold in other markets than the US, engine speed shall be based on either 8.5" x 11" or A4-sized paper, depending on which is the standard in a particular market. If copier and print speeds are different, whichever speed is higher shall be used to determine to which speed category the device belongs.

For large format multifunction device models designed to handle primarily A2 or 17" x 22" paper or larger, the reproduction speed measured as A2 or A0-sized images per minute, shall be converted

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into A4-sized image reproduction speeds, as follows: (a) One A2 image per minute is equivalent to 4 A4 images per minute; (b) One A0 image per minute is equivalent to 16 A4 images per minute.

Multifunction Devices will be divided into the following categories:

Personal Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of 10 images per minute or less.

Low Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 10 and less than or equal to 20 images per minute.

Medium Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 20 and less than or equal to 44 images per minute.

Medium/High Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 44 and less than or equal to 100 images per minute.

High Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 100 images per minute.

C. Base Unit: For a given engine speed, the base unit is defined as the most basic version of a multifunction device that is actually sold as a fully operational model. The base unit can be designed and shipped as a single piece or as a combination of functionally integrated components. The base unit must allow copying and one or both of the additional core functions of printing or faxing. The base unit does not include any external power-consuming accessories that may be sold separately.

D. Accessories: A piece of additional equipment that is not necessary for the standard operation of the base unit, but that may be added before or after shipping in order to enhance or change multifunction device performance. Examples of accessories include: sorters, large capacity paper feeders, paper finishing equipment, large paper supply devices, output paper organizers, and key counters. An accessory may be sold separately under its own model number, or sold with a base unit as part of a multifunction device package or configuration. It is assumed that the addition of any accessories will not substantially increase (more than a total of 10 percent for all accessories) the low-power or sleep mode power consumption of the base unit (irrespective of the power consumption of the accessories). Any accessories shall not impede the normal operation of the low-power and sleep mode features.

E. Multifunction Device Model: For purposes of this MOU, a multifunction device model is defined as a base unit and one or more specific accessories that are advertised and sold to consumers under a single model number. When advertised and sold to consumers without any additional accessories, a base unit is also considered a multifunction device model.

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F. Standby Mode: The condition that exists when the machine is not producing output, has reached operating conditions and is ready to make hard copy output, but has not yet entered into the low-power mode. When the multifunction device is in this mode, there will be virtually no delay before the multifunction device is capable of making the next hard copy output.

G. Low-power Mode: For purposes of this MOU, the low-power mode is the condition that exists when the multifunction device is not producing hard copy output and is consuming less power than when in a standby mode. When the multifunction device is in this mode, there may be some delay in the production of hard copy output. In this mode, there shall be no delay in the acceptance of information from fax or printing or scanning input sources. The multifunction device enters this mode within a specified period of time after the last hard copy output was made no matter what the input source. For products that meet the low-power mode power requirements in standby mode, no further power reductions are required to be compliant.

H. Sleep Mode: For purposes of this MOU, the sleep mode is the lowest power state the multifunction device can automatically enter without actually turning off. In this mode, both hard copy output and the acceptance of imaging information from some input ports may be delayed. The multifunction device enters the sleep mode within a specified period of time after the last hard copy output was made or after it has entered the low-power mode if a low-power mode is provided.

I. Default Times: The time period set by the Partner prior to shipping that determines when the multifunction device will enter its various modes, i.e., the low-power mode, the sleep mode, etc. Both the sleep mode default times and the low-power mode default times shall be measured from the time the last hard copy output was made.

J. Recovery Time: The amount of time needed to bring the multifunction device from the low-power mode to the standby mode.

K. Automatic Duplex Mode: The mode in which the multifunction device automatically places images on both sides of a sheet by automatically sending both the sheet and the graphic original through the multifunction device. Examples of this are one-sided to two-sided copying, two-sided to two-sided copying, or double-sided printing. For purposes of this MOU, a multifunction device model is considered to have an automatic duplex mode only if the multifunction device model includes all accessories needed to satisfy the above conditions, i.e., an automatic document feeder and accessories for automatic duplexing capabilities.

L. Weekly Timer: An internal device that turns a multifunction device on and off at predetermined times each day. When programming a timer, the customer shall be able to distinguish between business days and weekends/holidays (i.e., a timer shall not turn on an MFD on Saturday and Sunday mornings if employees are not normally in the office on weekends). The customer shall also have the ability to disable the timer. Weekly timers are *optional* features, and therefore are not required on ENERGY STAR compliant MFDs. If included in multifunction device models, weekly timers shall not conflict with the functioning of the low-power and sleep mode features.

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III. Entry into Force and Duration

A. This MOU enters into force when signed by both EPA and Partner.

B. Both parties agree to the following schedule for implementing the specifications contained in this MOU.

1. The first tier of the program shall commence on April 1, 1997 and conclude on March 31, 1999. Partners can qualify multifunction device models for Tier 1 starting April 1, 1997.

2. The second tier of the program shall commence on April 1, 1999. The criteria for Tier 2 shall apply to multifunction device models that Partner begins to ship after March 31, 1999. Tier 1 models may continue to bear the ENERGY STAR logo until the models are phased out of the market (i.e., the new specifications will not apply retroactively to previously qualified products). Models that Partner begins to ship after March 31, 1999 must be qualified under the new specifications outlined in Tables 2 and 4 of Section IV.B., below, though Partner may choose, at its discretion, to implement the new terms prior to this date.

C. The terms of this MOU shall remain in force until such time as EPA institutes new specifications or discontinues the ENERGY STAR Program. Both parties agree that as technologies and markets change, it may become desirable to change the technical specifications included in this MOU in order to keep the ENERGY STAR Program responsive and to maintain its integrity.

D. Both parties agree that this agreement can be terminated by ENERGY STAR Partner or EPA at any time, and for any reason, with no penalty. However, both parties agree that termination for noncompliance would only occur in accordance with the procedures of Section VII., below.

IV. ENERGY STAR Partner's Responsibilities

A. Company Representative:

ENERGY STAR Partner agrees to appoint a responsible representative of the company as liaison with EPA for the ENERGY STAR Program and to notify EPA within one month of any change in liaison responsibility. (See Attachment A.)

B. Product Qualification for the ENERGY STAR Logo

1. Technical Specifications

ENERGY STAR Partner agrees to introduce one or more specific multifunction device models that meet the specifications outlined in the Tables below.

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a. Standard-sized Multifunction Devices

To qualify as ENERGY STAR compliant, multifunction device models designed to handle primarily 8.5" x 11" or A4-sized paper shall meet the specifications provided in Tables 1 and 2. All device speeds shall be measured with respect to the number of 8.5" x 11" or A4-sized images that feed through per minute, as described in Section II.B., above.

Table 1. Tier 1 Criteria for the ENERGY STAR Multifunction Device Program (April 1, 1997.)

Multifunction Device Speed (images per minute)	Sleep Mode (Watts)	Sleep Mode Default Time	Automatic Duplex Mode
$0 < \text{ipm} \leq 10$	≤ 30	≤ 15 minutes	No
$10 < \text{ipm} \leq 20$	≤ 120	≤ 30 minutes	No
$20 < \text{ipm} \leq 44$	≤ 160	≤ 60 minutes	Optional
$44 < \text{ipm} \leq 100$	≤ 180	≤ 90 minutes	Default (copying only)
$100 < \text{ipm}$	≤ 200	≤ 120 minutes	Default (copying only)

Table 2. Tier 2 Criteria for the ENERGY STAR Multifunction Device Program (April 1, 1999.)

Multifunction Device Speed (images per minute)	Low-power Mode ¹ (Watts)	Recovery Time 30 seconds	Sleep Mode (Watts)	Sleep Mode Default Time	Automatic Duplex Mode
$0 < \text{ipm} \leq 10$	NA	NA	≤ 25	≤ 15 min	No
$10 < \text{ipm} \leq 20$	NA	NA	≤ 70	≤ 30 min	No
$20 < \text{ipm} \leq 44$	$3.85 \times \text{ipm} + 50$	Yes	≤ 80	≤ 60 min	Optional
$44 < \text{ipm} \leq 100$	$3.85 \times \text{ipm} + 50$	Recommended	≤ 95	≤ 90 min	Default for both copying and printing/ fax receipt
$100 < \text{ipm}$	$3.85 \times \text{ipm} + 50$	Recommended	≤ 105	≤ 120 min	Default for both copying and printing/ fax receipt

¹ The low-power mode formula for MFD speeds of $20 < \text{ipm}$ should be read as 3.85 multiplied by the number of images per minute plus 50 W.

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b. Large Format Devices

To qualify as ENERGY STAR compliant, large format multifunction device models designed to handle primarily A2 or 17" x 22" paper or larger shall meet the specifications provided in Tables 3 and 4. All large format device speeds shall be measured with respect to the number of A4-sized images that feed through per minute, as described in Section II.B., above.

Table 3. Tier 1 Criteria for the ENERGY STAR Multifunction Device Program--LARGE FORMAT DEVICES (April 1, 1997.)

Multifunction Device Speed (images per minute)	Sleep Mode (Watts)	Sleep Mode Default Time	Automatic Duplex Mode
$0 < \text{ipm} \leq 40$	≤ 120	≤ 30 minutes	No
$40 < \text{ipm}$	≤ 200	≤ 120 minutes	No

Table 4. Tier 2 Criteria for the ENERGY STAR Multifunction Device Program--LARGE FORMAT DEVICES (April 1, 1999.)

Multifunction Device Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode (Watts)	Sleep Mode Default Time	Automatic Duplex Mode
$0 < \text{ipm} \leq 40$	NA	NA	≤ 70	≤ 30 min	No
$40 < \text{ipm}$	$4.85 \times \text{ipm} + 50$	Recommended	≤ 105	≤ 90 min	No

2. Additional Requirements

In addition to the requirements shown in Tables 1 through 4, the following requirements must also be met.

a. Default Time for Low-power Mode

For Tier 2, Partner shall ship multifunction device models with the default time for the low-power mode set at 15 minutes. Partner shall set the default times for the sleep mode to the levels specified in Tables 1 through 4. The default times for the low-power mode and the sleep mode shall be measured from the time the last copy was made or the last page was printed (see Figure 1).

b. Recovery Time from Low-power Mode

For Tier 2, the actual recovery time from low-power mode shall be placed in product literature for those products that have a low-power mode (see Section IV.C.1.).

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c. Weekly Timers

Note that weekly timers may be incorporated, but shall not adversely affect or interfere with the normal operation of the low-power or sleep modes. It is EPA's intention that any added features complement the reduced power modes and not negate their effects.

d. Auto-duplex Features

For all multifunction device speeds where it is *optional* that the duplex mode be set as the default, if a model is shipped with automatic duplexing capabilities, then it is *recommended* that duplexing be set as the default mode. Partner may provide users with the ability to override this default duplex mode for single-sided copies.

For all multifunction device speeds where it is *required* that duplex be set as default, Partner may provide users with the option to override this default mode for a specific job that requires single-sided hard copy outputs. Once the particular single-sided job is completed, however, the multifunction device model shall return to its default duplex mode. The default duplex mode shall only apply when originals are fed from the automatic document feeder or printed from the network. (Please note that the automatic duplex mode may be disabled by Partner or designated service representative at the customer's request. See Section IV.B.3.b. of the MOU.)

For Medium/high and high speed MFDs, the Partner will test and qualify the multifunction device model that has automatic duplexing capabilities (this could be a base unit with built-in automatic duplexing capabilities or a base unit with automatic duplexing accessories). The ENERGY STAR logo may be placed directly onto any qualified base unit that includes built-in automatic duplexing capabilities, or on the shipping box. However, for multifunction device models that include a base unit and separate automatic duplexing accessories, the logo shall not be applied directly to the base unit except when the base unit is sold with the automatic duplexing accessories.

3. Exceptions and Clarifications

After shipping, Partner or its designated service representative shall not alter the multifunction device model in any way that will affect the multifunction device's ability to meet the specifications outlined above. Certain exceptions are allowed in changing the default times and the duplex mode. These exceptions are as follows:

a. Default Times

After shipping, the Partner, designated service representative, or customer may change the default times for either the low-power or sleep-mode feature, but only up to a factory-set maximum of 240 minutes (i.e., the combined total of the default times shall not exceed 240 minutes--see Figure 1).

b. Automatic Duplex Mode

In an individual case where the duplexing feature is causing a customer sizable inconvenience due to their particular usage patterns, the Partner (or the designated service representative) may disable this default mode at the customer's request. Before any changes are made, the multifunction device must be installed in the customer base and have been used for several

weeks by the customer.

c. Anti-humidity Devices

In some cases, Partner may need to ship a multifunction device model with the anti-humidity device disconnected in order to meet sleep mode power requirements. If this situation leads to sizable inconvenience for a specific customer, Partner (or the designated service representative) may connect the anti-humidity device. If Partner determines that in a certain geographical area there are chronic reliability problems associated with high humidity levels, Partner may contact the EPA Program Manager (as named in Attachment A) and discuss alternative solutions. For example, EPA may allow Partner to connect the anti-humidity devices in multifunction device models that are shipped to a very humid geographical area.

d. Disabling the Sleep Mode

In an individual case where the Sleep Mode is causing a customer sizable inconvenience due to his/her particular usage patterns, the Partner, designated service representative, or customer may disable this Sleep Mode feature. If Partner chooses to design its multifunction device models to allow the customer to disable the Sleep Mode feature, then the disable option shall be accessed in a manner different from the time settings (e.g., If a software menu provides sleep mode delay times of 15, 30, 60, 90, 120, and 240 minutes, then "disable" or "off" shall not be a choice in this menu. It shall be a hidden (or less obvious) choice or included in a different menu.).

C. Customer Education

1. Product Literature:

Partner shall provide general information to users regarding the ENERGY STAR features of the multifunction device model. This information might include a description of the ENERGY STAR Program, a discussion of the savings associated with using the power-management features, the benefits of duplex copying or printing and the method for changing the settings or default times. Partner may determine the best manner through which to disseminate this general information to users. Examples of acceptable approaches include: user's manual, special brochures included in the shipping box, etc.

In addition, Partner shall provide information on recommended types of recycled paper that can best be used in a particular MFD, including the amount of post-consumer content in the paper.² Partner shall include clear statements addressing the recovery time from the low-power mode in both the user's manual and on data sheets. Brochures and advertisements shall be worded to avoid misleading interpretations.

Partner shall also provide in the user's manual and/or other collateral sales and marketing materials three specific pieces of information regarding the sleep mode feature. First, the economic

² The US Government has specified a minimum of 20% post-consumer content for all paper purchased for government use. Partner may wish to include information on this or other types of recycled paper.

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and environmental benefits of using the sleep mode feature shall be addressed. Second, Partner shall explain that the multifunction device model is shipped with the sleep mode feature enabled and clearly state the default time. Third, Partner shall suggest how to determine the appropriate default time (based on the user's work pattern) and provide instructions for changing the time setting. In addition, Partner may explain the process for disabling the sleep mode feature (e.g., by providing written instructions and/or by including a customer support telephone number), so long as the benefits of the feature and instructions for extending the default time are discussed first.

2. Logo Usage

To help consumers become familiar with the ENERGY STAR Multifunction Device Program, the Partner shall consider placing the ENERGY STAR logo onto all qualified multifunction device models or their packaging. The logo may appear on the front/top of the multifunction device model, on the nameplate, on the electronic display screen, or on the shipping box. The Partner shall also consider including the ENERGY STAR logo in brochures, manuals, and advertisements for qualified multifunction device models. See Section VI for more information.

D. Measuring Power Consumption

1. Partner agrees to perform tests, as necessary, to determine which products comply. Based on the results of these tests, Partner shall self-certify those products that it determines are compliant with the specifications outlined above. Partner may submit information to EPA on compliant products on a voluntary basis.

2. Power consumption shall be measured from the outlet or power supply source to the product under test. Partner must measure power consumption of either the base unit or an automatic duplexing model, as appropriate (see Section IV.B.2.d.). See EPA testing guidelines for more information. When measuring power consumption in the sleep mode, Partner shall exclude control equipment required for remote servicing.

E. At EPA's request, Partner will attempt to locate customers who have profited from the program and are willing to share information about performance and savings, as well as locate employees who have contributed to its success. This customer- or employee-supplied information is to be without reference to or endorsement of specific Partner, specific products, or other supply sources.

F. ENERGY STAR Partner agrees to provide information about the ENERGY STAR Program to all of its employees whose jobs are relevant to the development, marketing, sales, and service of ENERGY STAR compliant multifunction device models.

G. ENERGY STAR Partner understands that participation in the ENERGY STAR Program does not constitute EPA endorsement of ENERGY STAR Partner or its products.

H. Through its normal training process, ENERGY STAR Partner agrees to develop and disseminate ENERGY STAR training materials that explain the benefits of compliant devices to dealers or designated service representatives. These materials shall emphasize that the low-power and sleep

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modes conserve energy, which helps to prevent air pollution and saves money on utility bills. Dealers or designated service representatives shall also be encouraged to extend the sleep mode default time up to a maximum of 4 hours before electing to disable the feature. In addition, Partner shall communicate the benefits provided by the automatic duplex mode (e.g., reduced paper costs, decreased national energy consumption, and less paper in the waste stream) to dealers or designated service representatives.

I. If Partner tracks dealer/designated service representative and customer reactions to the sleep mode feature and other aspects of the ENERGY STAR Multifunction Device Program, then Partner agrees (assuming that no confidential or competitively valuable information is disclosed) to share this information with EPA in an effort to continually improve the ENERGY STAR Multifunction Device Program and ensure its relevance in the marketplace. In turn, EPA agrees to share the information it collects (appropriately aggregated to preserve any confidential information) with all Partners.

V. EPA's Responsibilities

A. EPA agrees to designate a single liaison point for the ENERGY STAR Program, and to notify Partner within one month of any change in liaison responsibilities. Please send signed MOU and other correspondence to this person. (See Attachment A.)

B. EPA agrees to accept the test data as submitted by Partner, whether it is self-determined or determined by an independent third party. EPA will not officially approve any individual test reports submitted by Partner. While this is a self-certifying process, EPA reserves the right to conduct tests on products bearing the ENERGY STAR logo from either the open market or other available sources, or voluntarily received from Partner.

C. EPA agrees to make an effort to encourage consumer acceptance of multifunction device models introduced under this agreement and bearing the ENERGY STAR logo.

D. EPA agrees to provide Partner with recognition for its public service in protecting the environment by performing analyses about the pollution prevented by corporate participants, and providing this and other program information to appropriate news media sources for publication. EPA agrees to provide materials to Partner from which Partner can create fact sheets, brochures and posters about the ENERGY STAR features of the multifunction device model.

E. EPA agrees to promote energy-efficient equipment and inform consumers about the ENERGY STAR Program and ENERGY STAR logo by writing articles and/or cooperating with the news media by sharing information, where appropriate.

F. EPA agrees to work with Partner independently and/or in conjunction with other Partners to coordinate the placement of advertisements to promote energy-efficient equipment, educate consumers about the ENERGY STAR Program and logo, and provide Partner with due recognition for its public service in protecting the environment.

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VI. Use of the ENERGY STAR Logo

A. EPA agrees to loan to Partner, at no charge, materials from which Partner can create the ENERGY STAR logo.

B. It is the responsibility of the Partner to associate EPA, the ENERGY STAR logo, and the ENERGY STAR Program only with those specific multifunction device models that qualify under the terms and conditions of this MOU. As noted in Section IV above, Partner may place logo directly on qualified multifunction device models, as well as on associated packaging, literature, and advertisements for qualified multifunction device models. See EPA's logo usage guidelines for more details and specific examples.

C. Partner understands that the ENERGY STAR name is a registered mark of the EPA. As such, Partner shall note this registered status, as appropriate. This may include (a) inserting the registered symbol, ®, next to the ENERGY STAR name (i.e., ENERGY STAR®) each time it appears in a brochure, poster, advertisement, or other document *or* (b) providing the following statement with the first use of the ENERGY STAR name: "ENERGY STAR is a U.S. registered mark." See the Logo Use Guidelines for more details.

D. When the ENERGY STAR logo is used, Partner agrees that it shall be accompanied by the following statement: "As an ENERGY STAR Partner, _____ has determined that this multifunction device model meets the ENERGY STAR guidelines for energy efficiency." When the ENERGY STAR logo is applied directly to the product, Partner may place this statement in the user's manual.

E. Partner shall not utilize the logo in a manner that might imply EPA endorsement of the Partner or of Partner's products, other than with regard to a product's energy efficiency.

F. ENERGY STAR Partner agrees not to alter the ENERGY STAR logo.

G. If either EPA or Partner terminates this Agreement, Partner will no longer be entitled to apply the ENERGY STAR logo to newly manufactured models, and will no longer make reference to the ENERGY STAR Program so as to construe continuing involvement in the program.

H. Partner shall not include misleading statements in product literature that imply a product is approved or certified by the EPA, i.e., Partner shall not make claims such as "this multifunction device model is EPA approved," or "this multifunction device model is EPA certified."

VII. Conflict Resolution

A. Each party agrees to assume good faith as a general principle for resolving conflicts under the ENERGY STAR Program.

B. Both parties agree to informally notify each other if any problems or issues arise and to work

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together to provide maximum public confidence in the program.

C. Procedure for Addressing Noncompliant Products

1. If EPA receives information that one or more products certified by Partner as ENERGY STAR compliant may not meet all of the terms of this MOU, then EPA will immediately notify Partner and attempt to address and resolve the problem informally.

2. If these informal discussions do not produce a mutually agreeable resolution, EPA shall notify Partner in writing that Partner shall be terminated from the program unless it undertakes the specific corrective actions sought by EPA. Partner agrees to reply to EPA in writing within 20 business days of receiving EPA's letter. At that time, Partner shall agree to do one of the following: (a) undertake in a timely and effective manner, the corrective actions sought by EPA; or (b) voluntarily terminate this agreement. If Partner does not respond to EPA's letter within 20 business days, or responds but does not agree to either (a) or (b), then this agreement is terminated.

D. If ENERGY STAR Partner believes that EPA is not meeting all of its commitments, Partner agrees to formally notify EPA in writing. EPA agrees to respond in writing within 20 business days of receiving ENERGY STAR Partner's letter. At that time, EPA will do one of the following: (a) undertake the corrective actions sought by Partner, or (b) explain why such corrective actions cannot be undertaken.

VIII. Freedom of Information Act and Confidential Business Information

Both parties understand that information provided by Partner to EPA will be treated pursuant to EPA's public information regulations under 40 Code of Federal Regulations, Part Two.

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The undersigned hereby execute this Memorandum of Understanding on behalf of their parties. The signer of this agreement affirms that he/she has the authority to commit Partner to participation in the ENERGY STAR Multifunction Device Program.

For the U.S. Environmental Protection Agency (EPA):

Signature: _____ Date: _____

Name: Kathleen Hogan

Title: Director, Climate Protection Partnerships Division

For

Signature: _____ Date: _____

Name: _____

Title: _____

Amendment 1.0 to the
ENERGY STAR® Multifunction Device
Memorandum of Understanding between
The United States Environmental Protection Agency
and
[REDACTED]

I. This amendment modifies the voluntary agreement between [REDACTED] (“ENERGY STAR® Partner” or “Partner”) and the United States Environmental Protection Agency (EPA). Amendment 1.0 is effective upon signature. In order to continue to participate in the ENERGY STAR Multifunction Device Program, Partner shall sign this amendment and return it to EPA. Amendment 1.0 revises specific sections of the Multifunction Device MOU as noted below; sections of the MOU not addressed in this Amendment shall remain unchanged and in effect.

Definitions

II. Paragraph 4 of Section II.A of the Multifunction Device MOU shall be deleted and replaced with the following text.

Some digital copiers can be upgraded into an MFD in the field with the installation of add-on devices that allow printing or faxing capabilities. Partners may consider this system of components to be an MFD, and may qualify it according to the specifications in Tables 1 through 4. However, when the digital copier is sold independently of the add-on devices, the copier must qualify according to the upgradeable digital copier specifications in Tables 5 through 8.

III. The definition below shall be added after Section II.L. to become the final paragraph of Section II.

M. Upgradeable Digital Copier: A commercial reprographic imaging unit whose sole function is the production of duplicates from a graphic hard copy original using digital imaging technology, but that provides the option of being upgraded to offer multiple functions, such as printing or fax capabilities, through the installation of add-on devices. In order to be classified as an upgradeable digital copier under the MFD MOU, the upgrade options must be available on the market or intended for availability within one year after the base unit is launched. Digital copiers that are not designed for functional upgrades must qualify for the ENERGY STAR label under the Copier MOU.

ENERGY STAR is a U.S. registered mark.

Product Qualification for the ENERGY STAR Label

IV. The following text and tables shall be added after Table 4 in Section IV.B.1.b.

c. Upgradeable Digital Copiers

To qualify as ENERGY STAR compliant under the Multifunction Device MOU, upgradeable digital copiers designed to handle primarily 8.5" x 11" or A-4 sized paper shall meet the specifications provided in Tables 5 and 6. All device speeds shall be measured with respect to the number of 8.5" x 11" or A-4 sized images that feed through per minute, as described in Section II.B of the MOU.

*Table 5. Tier 1 Criteria for the ENERGY STAR Multifunction Device Program —
UPGRADEABLE DIGITAL COPIERS (September, 1998 - March 31, 1999)*

Upgradeable Digital Copier Speed (images per minute)	Sleep Mode¹ (Watts)	Sleep Mode Default Time
0 < ipm ≤ 10	≤ 30	≤ 15 min
10 < ipm ≤ 20	≤ 60	≤ 30 min
20 < ipm ≤ 44	≤ 80	≤ 60 min
44 < ipm ≤ 100	≤ 90	≤ 90 min
100 < ipm	≤ 100	≤ 120 min

*Table 6. Tier 2 Criteria for the ENERGY STAR Multifunction Device Program —
UPGRADEABLE DIGITAL COPIERS (April 1, 1999)*

Upgradeable Digital Copier Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode¹ (Watts)	Sleep Mode Default Time
0 < ipm ≤ 10	NA	NA	≤ 5	≤ 15 min
10 < ipm ≤ 20	NA	NA	≤ 5	≤ 30 min
20 < ipm ≤ 44	3.85 x ipm + 5	Yes	≤ 15	≤ 60 min
44 < ipm ≤ 100	3.85 x ipm + 5	Recommended	≤ 20	≤ 90 min
100 < ipm	3.85 x ipm + 5	Recommended	≤ 20	≤ 120 min

Note that Tier 2 criteria for upgradeable digital copiers are identical to those of the Copier

¹For MFDs that consist of functionally integrated units such as print, scan, and computer components, sleep mode Watts for the total system may be increased by an amount equal to the sleep mode Watts allowed for an ENERGY STAR computer.

MOU, Tier 2.

d. Large Format Upgradeable Digital Copiers

To qualify as ENERGY STAR compliant under the Multifunction Device MOU, upgradeable digital copiers designed to handle primarily A2 or 17" x 22" or larger sized paper shall meet the specifications provided in Tables 7 and 8. All device speeds shall be measured with respect to the number A-4 sized images that feed through per minute, as described in Section II.B of the MOU.

Table 7. Tier 1 Criteria for the ENERGY STAR Multifunction Device Program — LARGE FORMAT UPGRADEABLE DIGITAL COPIERS (September, 1998 - March 31, 1999)

Upgradeable Digital Copier Speed (images per minute)	Sleep Mode (Watts)¹	Sleep Mode Default Time
0 < ipm ≤ 40	≤ 115	≤ 30 min
40 < ipm	≤ 195	≤ 90 min

Table 8. Tier 2 Criteria for the ENERGY STAR Multifunction Device Program — LARGE FORMAT UPGRADEABLE DIGITAL COPIERS (April 1, 1999)

Upgradeable Digital Copier Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode (Watts)¹	Sleep Mode Default Time
0 < ipm ≤ 40	NA	NA	≤ 65	≤ 30 min
40 < ipm	4.85 x ipm + 45	NA	≤ 100	≤ 90 min

V. Paragraph IV.B.2.a shall be deleted and replaced with the following text.

2. Additional Requirements

In addition to the requirements shown in Tables 1 through 8, the following requirements must also be met.

a. Default Time for Low-power Mode

For Tier 2 MFDs and upgradeable digital copiers, Partner shall ship multifunction device models with the default time for the low-power mode set at 15 minutes. Partner shall set the default times for the sleep mode to the levels specified in Tables 1 through 8. The default times for the low-power mode and the sleep mode shall be measured from the time the last copy was made or the last page was printed.

Duplexing

VI. Paragraph IV.B.2.d shall be deleted and replaced with the following text.

d. Auto-duplex features

Duplexing is not required to be the default setting for any multifunction devices. However, it is required to be offered as an *option* for all standard size multifunction devices faster than 20 ipm. Further, it is *recommended* that multifunction devices be shipped with automatic duplexing set as the default mode for copying and any other feasible functions and described to customers upon installation. This also applies to the last columns (titled "Automatic Duplex Mode") of Tables 1 and 2 on page six of the Original MOU.

ENERGY STAR Label

VIII. Section VI.C of the MOU shall be deleted and replaced with the text below.

C. Partner understands that the ENERGY STAR® name and the ENERGY STAR label are registered marks of the United States Government as represented by the Administrator of EPA, and are subject to the provisions of Title 15, Chapter 22, United States Code, the various state laws applicable to trademarks, and this Memorandum of Understanding. Please note that the Partner shall adhere to the ENERGY STAR Logo Uses Guidelines when using the ENERGY STAR logo or name.

* * * * *

The undersigned hereby execute this amendment to the Multifunction Device Memorandum of Understanding on behalf of their parties. The signer of this agreement affirms that he/she has the authority to commit Partner to participation in the ENERGY STAR Office Equipment Program.

For the U.S. Environmental Protection Agency (EPA):

Signature: _____ Date: _____

Name: Kathleen Hogan

Title: Director, Climate Protection Partnerships Division

For [redacted] [redacted]

Signature: _____ Date: _____

Name: _____

Title: _____

Attachment A

Please complete and return with the signed Memorandum of Understanding.

EPA Contact:

Mailing Address:

Craig Hershberg
Manager, ENERGY STAR Office Equipment
US EPA
Ariel Rios Bldg.
1200 Pennsylvania Ave., NW
(Mail Code 6202 J)
Washington, DC 20460

Overnight Delivery Address:

Craig Hershberg
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US EPA
1310 L Street, NW
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(202) 343-9120

Partner's Contacts:

Primary Contact (to receive all program administrative materials):

Name:
Title:
Address:
City, State, ZIP:
Telephone Number:
Fax Number:
E-mail Address:
Location of US Headquarters (if applicable):

Marketing/PR Contact (to receive marketing and communications materials):

Name:
Title:
Address:
City, State, ZIP:
Telephone Number:
Fax Number:
E-mail Address:

Customer Service Contact (to be given to the public for further information on products):

Telephone number:
Fax Number:
Web Site:



U.S. ENVIRONMENTAL PROTECTION AGENCY
 ENERGY STAR® for Office Equipment (MC: 6202J)
 Washington, DC 20460
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TESTING CONDITIONS FOR ENERGY STAR® MEASUREMENT MULTIFUNCTION DEVICES AND UPGRADEABLE DIGITAL COPIERS

Revised February 2000

In order to eliminate confusion and ensure consistency, the following protocol should be followed when measuring power under the ENERGY STAR® Multifunction Device (MFD) Program.

I. TEST CONDITIONS

- Line Impedance: < 0.25 ohm
- Total Harmonic Distortion: < 3%
(Voltage)
- Ambient Temperature: 21E C +/- 3E C
- Relative Humidity: 40 - 60 %
- Distance From Wall: 2 ft. min.
- Other Market-Specific Criteria:

Market	Paper Size	Voltage/ Frequency
United States	8.5" x 11"	115 V RMS +/- 5 V 60 Hz +/- 3Hz
Europe, New Zealand	A4	230 V RMS +/- 10 V 50 Hz +/- 3 Hz
Japan	A4	100 V RMS +/- 5 V 50 Hz +/- 3 Hz and 60 Hz +/- 3 Hz 200 V RMS +/- 10 V 50 Hz +/- 3 Hz and 60 Hz +/- 3 Hz

Partners shall perform tests on their products based on the market in which the product will be sold. For example, a Program Participant that is shipping a multifunction device to Europe must determine the multifunction device speed based on A4 paper, and then measure the power consumption using the voltage and frequency values specified for the European market. For equipment that is rated at multiple input voltages and sold in multiple international markets, the Program Participant must test at all rated voltages if it plans to display the ENERGY STAR[®] logo on the product in all markets.

All supplies used shall be those specified by the MFD manufacturer and preconditioned for a minimum of 24 hours at room ambient temperature prior to evaluating the MFD power rating.

AC power shall be supplied as a true sine wave.

II. TEST METHOD

Manufacturers should measure the **Average** power consumption of their MFD products¹ when in the low-power and/or sleep mode. This should be done by measuring the **Energy** consumption over a 1-hour period. The resulting energy consumption can be divided by 1 hour to calculate average Watts.

A. Sleep Mode Power Measurement

Prior to the start of this test, the machine should be plugged into a live power line but turned off and stabilized at room ambient conditions for at least 12 hours. An appropriate Watt-hour meter should be in line with the machine, ready to give an accurate indication of machine energy consumption without disruption of the power source.

Turn on the machine, and let it go through its warm-up cycle. When it is ready to make a hard-copy output, make one copy or print one page, then wait exactly the amount of time specified in Tables 1 through 8 of the MFD MOU and Amendment for the multifunction device or the upgradable digital copier to enter the sleep mode. After the appropriate delay time has passed, read and record the Watt-hour meter indication and the time (or start the stopwatch or timer). After 1 hour, read and record the Watt-hour indication again. The difference between the two readings of the Watt-hour meter is the sleep mode energy use; divide by 1 hour to obtain the average power rating.

B. Low-Power Mode Power Measurement

Prior to the start of this test, the machine should have been plugged into a live power line but turned off and stabilized at room ambient conditions for at least 12 hours. An appropriate Watt-hour meter should be in line with the machine, ready to give an accurate indication of machine energy consumption without disruption of the power source. This measurement may be done sequentially with

¹ These testing procedures also apply to upgradable digital copiers that qualify for the ENERGY STAR[®] MFD program as described in Amendment 1.0 of the MFD MOU.

the sleep mode power measurement; the two tests together should take no more than about 14 hours to perform, including the time required for the machine to be plugged in and turned off.

Turn on the machine, and let it go through its warm-up cycle. Make one copy or print one page, then wait exactly 15 minutes (for medium, medium/high, and high-speed products only). After 15 minutes has passed, read and record the Watt-hour meter indication and the time (or start the stopwatch or timer). After 1 hour, read and record the Watt-hour indication again. The difference between the two readings of the Watt-hour meter is the low-power mode energy use; divide by 1 hour to obtain the average power rating.

For a multifunction device or upgradable digital copier where the above method would give an inaccurate result (because the device is not completely warmed up after the first warm-up cycle plus 15 minutes standby time), the following procedure (in line with ASTM Standard F757-94) may be used:

Turn on the machine and allow it to warm up and stabilize in the ready mode (=standby mode) for two hours. During the first 105 minutes, prevent the machine from entering the low power mode (e.g., by making one copy every 14 minute during this period). Make the last copy at 105 minutes after the machine was turned on. Then wait exactly 15 minutes. After 15 minutes has passed, read and record the Watt-hour meter indication and the time (or start the stopwatch or timer). After 1 hour, read and record the Watt-hour indication again. The difference between the two readings of the Watt-hour meter is the low power mode energy use; divide by 1 hour to obtain the average power rating.

III. TESTING EQUIPMENT

The goal is to accurately measure the TRUE power consumption² of the MFD. This necessitates the use of a **True RMS** Watt-Hour Meter, one per phase, accurate to three figures. There are many Watt-hour meters to choose from, but manufacturers will need to exercise care in selecting an appropriate model. The following factors should be considered when purchasing a meter and setting up the actual test.

Crest Factor

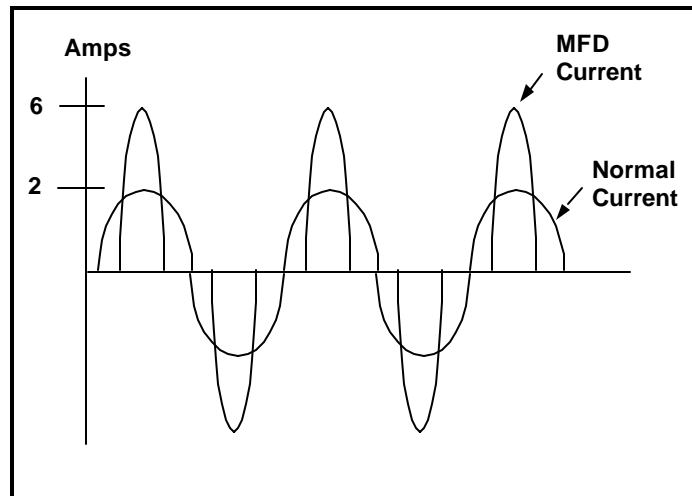
To begin, it is important to understand that MFDs which contain switching power supplies draw current in a waveform different from typical sinusoidal current.³ Figure 1 shows the typical current

²True power is defined as (volts)x(amps)x(power factor), and is typically reported as Watts. Apparent power is defined as (volts)x(amps) and is usually expressed in terms of VA or volt-amps. The power factor for equipment with switching power supplies is always less than 1.0; so true power is always less than apparent power.

³The crest factor for a sinusoidal 60 Hz current waveform is always 1.4. The crest factor for a current waveform associated with a MFD containing a switching power supply will always be greater than 1.4 (though typically no higher than 8). The crest factor of a current waveform is defined as the ratio of the peak current (amps) to the RMS current (amps).

waveform for a multifunction device with a switching power supply. While virtually any meter can measure a standard current waveform, it is more difficult to select a meter when irregular current waveforms are involved.

Figure 1



It is critical that the meter selected be capable of reading the current drawn by the MFD without causing internal peak distortion (i.e., clipping off the top of the current wave). This requires a review of the meter's crest factor,⁴ and of the current ranges available on the meter. Better meters will have higher crest factors, and more choices of current ranges.

When preparing the test, the first step should be to determine the peak current (amps) associated with the MFD or upgradeable digital copier being measured. This can be accomplished using an oscilloscope. Then a current range must be selected that will enable the meter to register the peak current. Specifically, the full scale value of the current range selected multiplied by the crest factor of the meter (for current) must be greater than the peak current reading from the oscilloscope. For example, if a Watt-hour meter has a crest factor of 4, and the current range is set on 3 amps, the meter can register current spikes of up to 12 amps. If measured peak current is only 6 amps, the meter would be satisfactory. The other concern to be aware of is that if the current range is set too high in order to register peak current, it may lose accuracy in measuring the non-peak current. Therefore, some delicate balancing is necessary. Again, with more current range choices and higher crest factors Partners will get better results.

Frequency Response

⁴The crest factor of a Watt-hour meter is often provided for both current and voltage. For current, it is the ratio of the peak current to the RMS current in a specific current range. When only one crest factor is given, it is usually for current. An average True RMS Watt-hour meter has a crest factor in the range of 2:1 to 6:1.

Another issue to consider when selecting a Watt-hour meter is the frequency response rating of the meter. Electronic equipment that contains switching power supplies causes harmonics (odd harmonics typically up to the 21st). These harmonics must be accounted for in measurement, or the energy and power consumption will be inaccurate. Accordingly, EPA recommends that manufacturers purchase Watt-hour meters that have a frequency response of at least 3 kHz. This will account for harmonics up to the 50th, and is recommended by IEC 555.

Resolution

Manufacturers will probably want a meter that can provide resolution of 0.1 W.

Accuracy

Another feature to consider is the resulting accuracy that can be achieved. Catalogues and specification sheets for Watt-hour meters typically provide information on the accuracy of energy and power readings that can be achieved at different range settings. When measuring a product that is very close to the MOU specifications, Partners will need to set up a test that will provide greater accuracy. For example, if the resulting accuracy for a Watt-hour meter at the test settings is ± 0.5 W, then be sure the measured power consumption of the MFD or upgradeable digital copier is within at least 0.5 W of the MOU specification.

Calibration

Watt-hour meters should be calibrated every year to maintain their accuracy.

QUESTIONS AND ANSWERS REGARDING TESTING PROCEDURES FOR ENERGY STAR® MULTIFUNCTION DEVICES AND UPGRADEABLE DIGITAL COPIERS

Q: Are these testing requirements mandatory?

A: Stringency in testing is to your own advantage. It can help protect you from being accused of cheating by one of your competitors. However, the stringency and accuracy of your own testing can be determined based on your specific product. For example, if your product does not contain a switching power supply, some of the issues discussed are not relevant, and a more straightforward testing protocol could be used. Also, if you know your product is well below the MOU specifications, then you do not need to be as accurate in your measurement. If your product is closer to the MOU specifications, however, it is better to follow these guidelines.

Q: Where can I find a True RMS Watt-hour meter that will meet my requirements?

A: A true RMS Watt-hour meter can be ordered from several manufacturers. Some manufacturers that carry watt-meters that may be appropriate include: Basic Measuring Instruments, Dranetz, RFL, and Valhalla. When you call any of these manufacturers be sure to tell them what you need the equipment for, and request their specification sheets. (As companies find adequate meters, please let us know so we can share them with other Partners.)

Q: Can I send my multifunction device or digital copier to an outside laboratory for testing?

A: Yes. It is also possible to send your multifunction device or digital copier to an outside testing lab for measurement. You can make the decision to buy your own equipment, or pay to have it tested depending on the number of models you plan to test. Be sure to tell any lab about your accuracy requirements. A good test lab will be aware of the issues surrounding the power measurement for electronic devices such as MFDs or upgradeable digital copiers, but don't assume this is the case. You will probably want to give them copies of the EPA ENERGY STAR® testing procedure and equipment requirements.

Q: Will the voltage coming out of the wall have a harmonic distortion <3%?

A: Not always. However, a "resonant" line voltage regulator will help to regulate distortion to within 3%.

Q: Can I assume the voltage coming out of my wall socket is close to 115 V?

A: No. The voltage coming out the wall could easily vary by more than +/- 5 V from the suggested 115 Volts AC. By applying a "resonant" line voltage regulator between the wall outlet and the device under test, the input voltage can be regulated to 115 V +/-1%.