



ENERGY STAR® Program Requirements Product Specification for Telephony

Draft 3 Test Method Rev. May-2013

1 OVERVIEW

The following test method shall be used for determining product compliance with requirements in the ENERGY STAR Eligibility Criteria for Telephony.

2 APPLICABILITY

ENERGY STAR test requirements are dependent upon the features of the product under evaluation. The following guidelines shall be used to determine the applicability of each section of this document:

- The test procedures in Section 6.2 shall be performed on all products.
- The test procedures in Section 6.3 shall be performed on all products that are capable of entering Off Mode.

Table 1. Test Procedure Applicability

Product Configuration	Test Procedure Section	
	6.2 Partial On Mode	6.3 Off Mode*
Corded Telephone	X	* Off Mode shall be tested when available.
Cordless Telephone	X	
Conference Telephone	X	
Additional Handset	X	
WiFi Telephone	X	

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3 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions contained in the ENERGY STAR Product Specification for Telephony.

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4 TEST SETUP

4.1 Test Setup for All Products

A) Test Setup and Instrumentation: Test setup and instrumentation for all portions of this method shall be in accordance with the requirements of International Electrotechnical Commission (IEC) 62301, Ed. 2.0, "Household Electrical Appliances – Measurement of Standby Power," Section 4, "General Conditions for Measurements" (IEC 62301, Ed. 2.0, 2011), unless otherwise noted in this document. In the event of conflicting requirements, the ENERGY STAR Test Method shall take precedence.

B) Input Power:

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- 24 1) When testing with a Power over Ethernet (PoE) source, the UUT shall be connected to a Power
 25 Sourcing Equipment (PSE) voltage source of 53 ± 2 volts during testing. The PSE voltage source
 26 must be compliant IEEE 802.3-2012.
- 27 a. Lower voltages required for detection and classification of Powered Devices (PD) may be used
 28 prior to testing.
- 29 2) When testing with power from ac mains, the UUT shall be connected to a voltage source
 30 appropriate for the intended market, as specified in Table 2.

31 **Table 2: Input Power Requirements for Ac-Powered Products**

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

- 32 C) Ambient Temperature: Ambient temperature shall remain at $23^{\circ} \text{C} \pm 5^{\circ} \text{C}$, for the duration of the test.
- 33 D) Relative Humidity: Relative humidity shall remain between 10% and 80%, for the duration of the test.
- 34 E) Ac Power Meter: When measuring ac power, power meters shall possess the following attributes:
- 35 1) Crest Factor:
- 36 a. An available current crest factor of 3 or more at its rated range value; and
- 37 b. Lower bound on the current range of 10 mA or less.
- 38 2) Minimum Frequency Response: 3.0 kHz
- 39 3) Minimum Resolution:
- 40 a. 0.01 W for measurement values less than 10 W;
- 41 b. 0.1 W for measurement values from 10 W to 100 W; and
- 42 c. 1.0 W for measurement values greater than 100 W.
- 43 4) Measurement Accuracy:
- 44 a. Power measurements with a value greater than or equal to 0.5 W shall be made with an
 45 uncertainty of less than or equal to 2% at the 95% confidence level.
- 46 b. Power measurements with a value of less than 0.5 W shall be made with an uncertainty of
 47 less than or equal to 0.01 W at the 95% confidence level.
- 48 F) PoE Power Meter: When measuring a PoE PD, power meters shall possess the following attributes:
- 49 1) Cable Compatibility: Capable of measuring Power over Ethernet connections directly from the
 50 Category 5 (enhanced) or 6 (CAT 5e/6) cable, regardless of the PoE method (PD operating
 51 modes) as specified by IEEE 802.3-2012.

52 **Note:** Stakeholders commented that the test method should not specify which methods defined by IEEE
53 802.3-2012 are valid as doing so could cause confusion regarding what is a compliant method. DOE
54 intends to allow any implementation that conforms to IEEE 802.3-2012 as a valid implementation of PoE.
55 As such, DOE has updated the Draft 3 Test Method to allow the use of any PoE method specified by
56 IEEE 802.3-2012 during testing.

- 57 2) Enables Ethernet link and packet traffic flow to the Unit Under Test (UUT) from a link partner at all
58 network speeds at which the UUT is capable.
- 59 3) Acts as a PSE or allows another PSE to source power to the UUT.
- 60 4) Minimum Resolution:
- 61 a. 0.01 W for measurement values less than 10 W;
- 62 b. 0.1 W for measurement values from 10 W to 100 W; and
- 63 c. 1.0 W for measurement values greater than 100 W.
- 64 5) Measurement Accuracy:
- 65 a. Power measurements shall have an accuracy of less than or equal to $\pm (2\% + 0.1 \text{ W})$.
- 66 6) Cable Length: A one meter CAT 5e/6 cable shall be used between the power meter and the UUT
67 for all testing.

68 **5 TEST CONDUCT**

69 **5.1 Test Conduct for All Products**

- 70 A) As-shipped Condition: The UUT shall be tested in its “as-shipped” condition including, but not limited
71 to, display brightness settings, unless otherwise specified by this test method.
- 72 B) Battery-powered Products: If the UUT contains rechargeable batteries, or can be integrated with
73 another device that contains rechargeable batteries, all batteries shall be fully charged prior to the
74 start of testing and shall remain in place for the duration of testing.
- 75 C) Accessories: All UUTs shipped with accessories shall be tested with all accessories set up as
76 specified in the manufacturer instructions.
- 77 D) UUTs sold with Additional Handsets: UUTs sold with Additional Handsets as part of a multi-handset
78 system shall be tested with all Additional Handsets connected and set up in their default
79 configuration.
- 80 1) Additional Handsets and the UUT shall be placed at least 1.2 meters above the floor. Additional
81 Handsets shall be placed 3 ± 0.1 meters from the UUT with a direct line of sight between the
82 Additional Handset and UUT.
- 83 2) Additional Handsets set up for testing shall remain in Partial On Mode for the duration of testing.
- 84 3) When testing a UUT with Additional Handsets set up, only the power consumption of the UUT
85 should be measured.
- 86 4) The model name and number of all Additional Handsets and accessories used during testing
87 shall be reported.

88 **Note:** In the Draft 2 Test Method used for the stakeholder data call, DOE required that all UUTs sold with
89 Additional Handsets and accessories be tested both with and without Additional Handsets and
90 accessories set up in their default configurations. Based on stakeholder data, DOE has determined that
91 Additional Handsets and accessories impact the power consumption of the UUT and has updated the
92 Draft 3 Test Method to require that UUTs be tested with all Additional Handsets and accessories set up.

93 E) VoIP Server: Any standard configuration and/or equipment for creating a VoIP network is permitted.
94 The UUT shall have a dial tone and be capable of receiving and making a phone call within the local
95 VoIP network. A valid VoIP route to outside the local VoIP server is not required.

96 1) The VoIP Server and all other network equipment shall be able to support the highest network
97 speed at which the UUT is capable of operating.

98 F) Energy Efficient Networking Protocols:

99 1) If the UUT supports IEEE 802.3az protocol, all connected devices must support IEEE 802.3az.

100 2) If the UUT supports Link Layer Discovery Protocol (LLDP)¹ for 802.3az, all connected devices
101 must support LLDP for 802.3az.

102 **Note:** DOE has updated the Draft 3 Test Method to specify that all connected devices must support IEEE
103 802.3az protocol and LLDP for 802.3az if the UUT supports them to ensure that all of the UUT's
104 capabilities are utilized during testing.

105 G) Hybrid Telephones: Hybrid Telephones shall be tested as VoIP Telephones.

106 H) PoE Telephones: All Telephones that can be powered using PoE shall be tested as PoE powered
107 units.

108 **Note:** In the Draft 2 Test Method, DOE specified that Hybrid Telephones shipped with an External Power
109 Supply (EPS) shall be tested as an ac powered unit. Stakeholders commented that some Hybrid
110 Telephones are shipped with a 1-port midspan that is used to provide PoE to the unit. One stakeholder
111 requested that Hybrid Telephones shipped with a 1-port midspan be tested as an ac powered unit. DOE
112 understands that some Telephones are installed using an EPS or 1-port midspan; however, DOE is
113 interested in measuring the power consumption of the Telephone using PoE. As such, DOE has updated
114 the Draft 3 Test Method to state that all Telephones capable of being powered by PoE shall be tested
115 using PoE. This change also ensures that all PoE Telephones are tested in the same manner.

116 6 TEST PROCEDURES FOR ALL PRODUCTS

117 6.1 UUT Preparation

118 A) Set up the UUT in accordance with the manufacturer instructions, except where these conflict with the
119 requirements of this test method. If no instructions for use are available, then the as-shipped settings
120 shall be used.

121 B) PoE Powered Units:

122 1) Connect the UUT to the PoE power meter and connect the PoE power meter to a port on a suitable
123 Switch. A suitable Switch is defined as a Switch that:

124 a. Supports the maximum network speed of the UUT's network connection.

125 b. Supports all PoE modes that the Telephone can support, unless PoE power is supplied by the
126 PoE power meter.

127 2) Units that can utilize an alternate power source, as well as PoE, shall be tested using the PoE
128 connection.

129 3) Set up the Switch according to manufacturer instructions and connect it to the VoIP Server.

¹ LLDP as defined in IEEE 802.1ab.

- 130 4) Configure the VoIP Server and Telephone to prepare for making and receiving calls locally to the
131 VoIP Server and the VoIP system the server implements.
- 132 a. Record the manufacturer and model number of the VoIP Server.
- 133 b. Set the network speed to the UUT's highest supported speed.
- 134 c. In the event that a VoIP Server setting does not have a default and is not specified in this test
135 method, the setting shall be set according to the tester's discretion and recorded.

136 C) Ac Powered Units:

- 137 1) Set up the UUT in its standard configuration, utilizing any included EPSs, if applicable. Connect
138 an approved power meter to an ac line set to the appropriate voltage and frequency as specified
139 in Table 2.
- 140 2) Plug the UUT into the measurement outlet on the power meter. No power strips or uninterruptible
141 power supply (UPS) units shall be connected between the UUT and the meter.
- 142 3) Connect the UUT to a suitable external telephone jack for Analog Telephones or a suitable VoIP
143 Server for Hybrid and WiFi Telephones.
- 144 a. When testing Additional Handsets, the UUT shall be connected to a multi-handset Telephone
145 system and be capable of making calls.
- 146 b. In the case that a working telephone line is not available, a Ringdown Simulator may be used
147 as a replacement. Another Telephone must be connected to the Ringdown Simulator.
- 148 c. For WiFi Telephones, set up a WiFi network according to manufacturer instructions and
149 connect the UUT to the WiFi network. The WiFi network shall be connected to a VoIP Server.
- 150 4) The UUT shall be capable of making a call across either the Public Switched Telephone Network
151 (PSTN), a Ringdown Simulator, or a VoIP network, for WiFi Telephones and Hybrid Telephones.

152 D) For VoIP and Hybrid Telephones with Data Switch Ports:

- 153 1) Connect a personal computer to the UUT Data Switch Port. Ensure that the computer is on and
154 that this is the computer's only network connection. Ensure that the computer recognizes this
155 connection.

156 **Note:** In the Draft 2 Test Method used for the stakeholder data call, DOE required that all UUTs with a
157 Data Switch Port should be tested both with and without the port connected. Based on stakeholder data,
158 DOE has determined that connecting the Data Switch Port does impact the power consumption of the
159 UUT and has updated the Draft 3 Test Method to require that UUTs with Data Switch Ports be tested with
160 them connected. DOE is interested in stakeholder feedback regarding how often computers are
161 connected to switch ports.

162 **6.2 Partial On Mode Measurement**

163 A) For UUTs with Cordless Telephones, Additional Handsets, and WiFi Telephones:

- 164 1) Place the handset with a fully charged battery in the cradle at least 2 hours prior to the beginning
165 of testing.
- 166 2) Ensure the UUT is in the Partial On Mode.
- 167 3) If the UUT can be placed in Call Origination Mode while the handset is in the cradle:
- 168 a. Place the UUT in Call Origination Mode for less than 1 minute.
- 169 b. Confirm the presence of a dial tone.
- 170 c. Return the UUT to Partial On Mode.
- 171 4) If the UUT cannot be placed in Call Origination Mode while the handset is in the cradle:

- 172 a. Remove the handset from the cradle.
173 b. Confirm the presence of a dial tone.
174 c. Place the handset back into the cradle, within one minute of removing it, and return the UUT
175 to Partial On Mode.
176 d. Wait 10 minutes.
177 5) Measure and record the ac input voltage and frequency.
178 6) Set the meter to begin accumulating true power values at a rate greater than or equal to 1 reading
179 per second. Accumulate power values for 2 hours and record the average (arithmetic mean) value.
180 B) For all other UUTs:
181 1) Ensure that the UUT is in the Partial On Mode.
182 2) Verify that there is a dial tone, then return the Telephone to the “on the hook” configuration.
183 3) Wait 10 minutes.
184 4) Measure and record the ac input voltage and frequency.
185 5) Set the meter to begin accumulating true power values at a rate greater than or equal to 1 reading
186 per second. Accumulate power values for 10 minutes and record the average (arithmetic mean)
187 value.

188 **Note:** Based on data received from stakeholders, DOE and EPA determined that testing in Active Mode,
189 as specified in the Draft 2 Test Method, did not have a noticeable affect on a unit’s power consumption.
190 As such, EPA has decided not to include a specification level for Active Mode, and DOE has removed the
191 Active Mode Test from the Draft 3 Test Method to reduce test burden. DOE and EPA are interested in
192 stakeholder feedback regarding the Active Mode testing.

193 **6.3 Off Mode Measurement**

- 194 A) Perform the following test on any Telephone capable of entering Off Mode:
195 1) Place the UUT in Partial On Mode.
196 2) Place the UUT in Off Mode, as instructed in the product’s user manual. All physical connections (e.g.,
197 data or power cabling) required for Partial On Mode must remain connected during Off Mode testing.
198 a. The method used to place the UUT in Off Mode shall be reported.
199 3) Wait 10 minutes.
200 4) Measure and record the ac input voltage and frequency.
201 5) Set the meter to begin accumulating true power values at a rate greater than or equal to 1 reading
202 per second. Accumulate power values for 10 minutes and record the average (arithmetic mean)
203 value.

204 **Note:** In order to account for any lower power modes that manufacturers may implement, DOE and EPA
205 have included a test for Off Mode. DOE and EPA are interested in stakeholder feedback regarding
206 Telephones currently available or in development that are capable of entering Off Mode. In addition, DOE
207 and EPA are interested in feedback regarding how these Telephones both enter and return from Off
208 Mode (e.g., a button on the Telephone, an internal timer, or a command sent via the VoIP server).

209 **7 REFERENCES**

- 210 A) IEC 62301:2011. Household Electrical Appliances – Measurement of Standby Power. Ed. 2.0.

- 211 B) IEEE 802.3-2012. IEEE Standard for Information technology-Specific requirements - Part 3: Carrier
212 Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer
213 Specifications .
- 214 C) IEEE 802.11-2012. IEEE Standard for Information technology--Telecommunications and information
215 exchange between systems Local and metropolitan area networks--Specific requirements Part 11:
216 Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications.