

Summary of Stakeholder Comments in Response to the Draft 2 Version 6.0 ENERGY STAR Displays Test Method (Distributed September 20, 2011)

Topic No.	Document	Topic	Comment	ENERGY STAR Response
1	Test Method - Draft 2	ABC Testing	One stakeholder recommended using the same language as found in the Draft 1 Version 6.0 ENERGY STAR Televisions Test Method, section 6.1.D, which states; "If ABC cannot be disabled, luminance measurements shall be performed with light entering directly into the television's ambient light sensor at greater than or equal to 300 lux". Of course, the word "display" should be substituted for "television". The stakeholder also stated that using the Televisions Test Method's section 6.1.D instruction will result in a more repeatable measurement and that it is difficult to obtain uniform room illumination such that the light at the display's ambient light sensor is guaranteed to be a given value. Therefore, it is more repeatable to simply require that the light entering directly into the display's ambient light sensor is 300 lux or greater.	DOE and EPA agree with the stakeholder comment and have recommended in Draft 3 that for products in which ABC cannot be disabled, luminance shall be measured perpendicular to the screen with light entering directly into the light sensor. However, DOE and EPA clarified that the light level should be greater than or equal to 500 lux since 500 lux is a more accurate light sensor saturation point.
2	Test Method - Draft 2	ABC Testing	<p>The most important issue regarding Automatic Brightness Control (ABC) is the selection and weighting of the various ambient illumination levels required during the power measurements. The IEC 62087 committee chose 0 lux and 300 lux (or greater) as extreme values, which would be easy to supply to the ABC ambient light sensor while ensuring the display provided in a repeatable manner the minimum and maximum display brightness respectively.</p> <p>Different third party laboratories must be able to supply the identical ambient illumination to the ABC sensor such that the measured power is reproducible. This is a major reason why the IEC 62087 committee chose the 0 lux and 300 lux (or greater) values. Intricate setup and measurement procedures are not needed with the IEC values since it easy to achieve 0 lux by covering the ABC sensor, and 300 lux (or greater) can be achieved by increasing the illumination source until the ABC sensor becomes saturated thus providing the maximum brightness.</p>	While DOE and EPA understand the need for repeatable testing, DOE and EPA believe that 0 lux and 300 lux are not representative of typical room lighting conditions, and use of only these values provides opportunities for circumventing the test method. In the Draft 3 ENERGY STAR Displays Test Method, DOE is working to minimize the creation of an exceptionally dark screen in the low brightness condition. As such, DOE and EPA recommend in Draft 3 to test On Mode power for ABC enabled devices at room illuminance levels of 10, 100, 300 and 500 lux. DOE and EPA believe that these lighting levels are representative of the conditions in which these products are generally used, such as in home and office settings, and commercial environments.
3	Test Method - Draft 2	ABC Testing	<p>If ENERGY STAR Displays Version 6.0 specifies absolute illuminance values for testing ABC, it will also be necessary to provide a detailed measurement procedure. This procedure should take into account at minimum the following items:</p> <ol style="list-style-type: none"> 1) The illumination source collimation and direction 2) The illumination source frequency spectrum 3) The illumination source stability over time 4) The meter used to measure the illumination source 5) The ABC sensor location 6) The ABC sensor collection angle 7) The test room wall reflectivity 	In the Draft 3 Version 6.0 ENERGY STAR Displays Test Method, DOE and EPA propose that On Mode power for ABC enabled products be tested with the illuminance levels specified in comment 2. In addition, DOE and EPA have specified room conditions and measuring guidelines.
4	Test Method - Draft 2	ABC Testing	<p>The Draft 2 ENERGY STAR Displays Test Method section 4.G.3 specifies an ambient light (lux) tolerance of +/- 10%. One stakeholder estimated that this may result in a 6 to 8 percent variation of the measured power consumption with the ABC active. This is an example of how sensitive the power is to the ABC measurement conditions.</p> <p>Given the complexity, time required, and associated accumulative error of making measurements at multiple absolute illumination values, it is recommended that the measurements be taken at 0 lux and 300 lux and perhaps one intermediate value. As noted above, the 0 and 300 lux values were selected for ease and repeatability of the measurement.</p> <p>Any ABC test method should have the brightness tested at a limited number of points (two) to keep testing complexity low. In order to avoid gaming, the test method should prevent an exceptional reward for a product with an exceptionally dark screen in the low brightness condition. The dark condition should not be as low as zero lux in order to ensure that the low light condition is somewhat likely to be engaged. One manufacturer recommended 15 lux for the low light condition and 300 lux for the high light condition since it should be adequate to saturate the ABC circuit.</p>	<p>DOE and EPA agree that +/-10% tolerance on the ambient light (lux) may result in a variation of the measured power consumption. As such, DOE and EPA propose modified tolerance levels in the Draft 3 ENERGY STAR Displays Test Method as listed below:</p> <ul style="list-style-type: none"> +/- 1 lux for 10 lux measurement +/- 5 lux for 100 lux measurements +/- 9 lux for 300 and 500 lux measurements <p>Since these tolerance levels are slightly greater than the accuracy of the Light Measuring Device proposed in the Draft 3 ENERGY STAR Displays Test Method, DOE and EPA believe that these tolerance levels are achievable.</p>

5	Test Method - Draft 2	ABC Testing	<p>Automatic Brightness Control (ABC) is no more difficult to implement in signage displays than it is in televisions. The reward for ABC, however, should be smaller than it is for televisions for the following reasons:</p> <ul style="list-style-type: none"> - Signage displays are generally professionally installed. While TV consumers generally do not adjust their TV settings, installers generally adjust the signage. - Many locations have consistent lighting throughout their operating hours; however, there can be exceptions, like the dual-purpose restaurant example. 	DOE and EPA welcome additional information on lighting environments where signage displays are used, given that their behavior may differ from a display in a residential or office setting.
6	Test Method - Draft 2	ABC Testing	<p>One stakeholder noted that they understand that the method of testing the Automatic Brightness Control (ABC) is to be determined. At this time CEA is undertaking an effort to collect typical illuminance conditions encountered by users viewing televisions in their homes. This information should also be relevant for display viewing since displays are often used for viewing similar dynamic video content as televisions and used in similar environments. Although it may be premature to comment on ABC testing, we would like to reiterate that the accuracy and repeatability of this testing is of concern.</p> <p>Another stakeholder encouraged EPA to monitor changes to the TV test procedure on Auto Brightness Control for incorporation in the next revision of the Display specification.</p>	In the Draft 3 ENERGY STAR Displays Test Method, DOE and EPA have specified ambient conditions which EPA and DOE believe are more representative of the environment in which the product will be used when compared to how products with ABC enabled were tested under Version 5.1.
7	Test Method - Draft 2	Luminance	<p>Various stakeholders expressed support for the proposal to test the On Mode of displays with diagonals of 30-inches or more at a luminance greater than or equal to 65% of the maximum luminance. This will best approximate the actual power experienced by the end users and will harmonize with the ENERGY STAR Television specification. However, one stakeholder noted that these requirements are different from the Televisions specification which tests the On Mode power in the as-shipped luminance condition (or Home mode if a forced menu is employed) and also requires the as-shipped (or Home mode) luminance to be greater than or equal to 65% of the "retail" (or brightest-selectable) preset picture mode. Another stakeholder appreciated the flexibility of the proposed approach, given the great variance of professional display end-use applications and customer requirements. Also, the ability to ship the display with a luminance less than 65% of the maximum luminance could potentially provide added benefit where end users seek product for darker room conditions and thus required products that are less bright, thus reducing power consumption.</p> <p>Another stakeholder recommended that in order to ensure the repeatability and verification of this On Mode power measurement, it is necessary for the luminance value used during the measurement to be reported. This value may be different than the as-shipped luminance which is also reported as required by section 3.6.1 of the Eligibility Criteria. Finally, one stakeholder recommended using the same procedure supplied by section 8.1 in the Test Method in order to measure both the as-shipped luminance (or Home mode) and the luminance used to measure the On Mode power, if different. The only difference in the detailed procedure would be that the labels would change. The "default as-shipped luminance value or 'Home' picture mode, Lhome" would be substituted with the equivalent of "luminance value used to measure On Mode power, Lon mode" in both sections 8.1.E.1 and 8.1.E.4.</p>	<p>DOE and EPA understand that displays 30" or greater, namely signage displays, are usually configured specifically to meet the requirements of the end user. Therefore, DOE and EPA propose that 65% of the maximum luminance will best approximate the brightness level set and the power experienced by the end user for signage displays and also account for products used in bright settings, namely commercial spaces.</p> <p>DOE and EPA believe that maximum luminance value, specified by manufacturers, may vary depending on the test signal and ambient conditions set by the manufacturer. As such, for signage displays over 30 inches, DOE and EPA recommend testing and reporting the maximum measured display luminance to demonstrate the differences when compared to the manufacturer-reported maximum luminance. Based on stakeholder feedback that the maximum measured luminance can vary across the same product models and thus impact verification of products, DOE and EPA propose to keep the requirement, for qualification purposes, that signage products be tested with luminance set at a value greater than or equal to 65% of the manufacturer-reported maximum luminance. DOE and EPA request stakeholder feedback on this approach and also on the extent to which maximum measured luminance can vary across the same product models.</p>
8	Test Method - Draft 2	Luminance	<p>However, a different stakeholder noted that a display with a relatively low peak brightness is more likely to be adjusted to the maximum brightness level, even without calibration equipment. A display with a high peak brightness is less likely to be adjusted to the peak brightness level, especially if the default brightness is reasonable, but below the peak. For this reason, the stakeholder believes that the 65% proposal does not match likely behavior of the installers and recommends that signage display testing be done at 650 cd/m2 or the default setting, whichever is brighter. For signage displays that cannot attain 650 cd/m2, they should be tested at their maximum brightness setting.</p>	Based on stakeholder feedback and further analysis of EPA's dataset, EPA found that for computer monitors, namely display products with a viewable screen size of less than 30 inches, most products shipped with an average luminance of approximately 200 cd/m2. Therefore, in order to allow for comparability among computer monitors, DOE and EPA propose to retain testing at a fixed luminance, which often corresponds with how products are shipped. This approach for computer monitors remains consistent with the approach in Version 5.1. Conversely, EPA did not find from looking at its dataset that signage displays ship at a specific luminance or a narrow range of luminances.

9	Test Method - Draft 2	Luminance	<p>We believe the following suggestions will help clarify the intent of the On Mode power measurement conditions and ensure repeatability. Modify sections 5.1A.1 and 5.1.A.2 in the Displays Test Method:</p> <p>Both sections 5.1A.1 and 5.1.A.2 require the testing to be performed in either the as-shipped or Home mode conditions. Since there is no requirement in the Test Method for the as-shipped or Home mode luminance to be greater than 65% of the maximum luminance, then these sections would conflict with section 8.2.A.2 in the case where a display of 30 inches or more has an as-shipped or Home mode luminance less than 65% of the maximum luminance. These sections also conflict with the requirement in section 8.2.A.1 to set the luminance of displays less than 30 inches to a value of 200 cd/m2. A note should be added to both sections 5.1.A.1 and 5.1.A.2 stating that picture level adjustments are allowed in order to achieve the luminance requirements of section 8.2.A.</p> <p>One stakeholder noted that the following text should also remain since it is more general and refers to "all user-configurable options" and also allows for exceptions as specified in the Test Method:</p> <p>A. Testing at Factory Default Settings: Power measurements shall be performed with the product in its as-shipped condition for the duration of Sleep Mode and On Mode testing, with all user-configurable options set to factory defaults, except as otherwise specified by this test method.</p>	<p>In the Draft 3 ENERGY STAR Test Method, DOE and EPA indicate that, "Power measurements shall be performed with the product in its as-shipped condition for the duration of Sleep Mode and On Mode testing, with all user-configurable options set to factory defaults, except as otherwise specified by this test method." This implies all picture changes made shall be consistent with the ones proposed in the DOE NOPR.</p> <p>In addition, picture level adjustments are to be made in Section 8.2.A to meet the luminance testing requirements. Until that point in the Test Method, the UUT should be in its as-shipped condition, per the language above, including in Sections 5.1.A.1 and 5.1.A.2, as well as in Section 8.1.D.</p>
10	Test Method - Draft 2	IEC 62087	<p>One stakeholder was pleased to see that the Draft 2 took into account many of the comments on Draft 1 from the various stakeholders, especially the adoption of a single test material - the IEC 62087 Dynamic Broadcast Content video signal for displays of all sizes, which will allow harmonization with other relevant standards including ENERGY STAR Televisions. The stakeholder agreed that it was not necessary to duplicate testing using the Internet Content video signal which is comprised of static web pages since the rapid growth of video streaming sites indicates that the viewing of dynamic video on displays is becoming more prevalent.</p> <p>Another stakeholder recommended that the Internet-content video signal (clause 11.7) be included when measuring power. If this signal is not feasible, the white level video signal (11.5.3) or the three bar video signal (11.5.5) should be included as a component of the test. As shown in Annex C.3, the dynamic broadcast-content video signal is modeled on television programming, which is relatively dark. By contrast, many signage applications display text and images on a white background, similar to this very document. As shown in Figure C.1, there is virtually no white background content in the broadcast loop. The Internet-content video signal was developed specifically to address this shortcoming. With no bright background signal in the test set, the test method would favor emissive displays over backlit displays, creating an uneven playing field. A bright signal test pattern should contribute to 25 to 33% of the power measurement.</p> <p>Another stakeholder encouraged EPA to harmonize the specification requirements between displays and televisions, where appropriate. Adopting IEC 62087 for testing On Mode Power for displays 12 to 30 inches will continue to further these goals.</p>	<p>Considering the growth in video streaming, and to reduce testing burden, DOE and EPA continue to recommend testing Displays with only the Dynamic Broadcast Content Video of the IEC 62087 standards in the Draft 3 Displays Test Method. However, where certain products are not able to be tested with the IEC 62087 signals due to lack of compatibility, DOE and EPA propose testing these products with the VESA FPM2 signal.</p>
11	Test Method - Draft 2	IEC 62087	<p>Another stakeholder supported the use of IEC 62087 for testing of On Mode Power and encouraged EPA to harmonize the specification requirements between displays and televisions, where possible. Adopting IEC 62087 for testing On Mode Power for displays 12 to 30 inches will continue to further these goals.</p>	<p>Where applicable and appropriate, DOE and EPA are working to harmonize relevant aspects of the ENERGY STAR Version 6.0 Test Method and the Draft Television's test method, which is DOE's TV Test Procedure Notice of Proposed Rulemaking (NOPR), based on IEC 62087. Should DOE's final test procedure include displays in its scope and/or should elements of the TV NOPR that are harmonized with the Displays Test Method change, depending on the timing of the changes and if they impact qualification, DOE and EPA will issue a modification to the Displays test method or address any changes in a future revision to the Displays specification and test method.</p>
12	Test Method - Draft 2	Low-Voltage Dc-Powered Products	<p>One stakeholder noted that the formula for DC power products should comply by their DC consumptions, and stated that these products eventually will be powered by electricity from the AC grids and that there will be a conversion loss involved in providing the DC power. Therefore, the stakeholder recommended using a standard conversion efficiency, when calculating the Pon to ensure fair comparison with the AC powered product. The conversion efficiency could follow the EU Ecodesign requirements e.g. 0.87 corresponding to P larger than 51 W.</p>	<p>In the Draft 3 ENERGY STAR Displays Test Method, DOE and EPA recommend that products powered by low-voltage dc shall be configured with an ac source of the dc power for testing (e.g., USB hubs). DOE and EPA also specified USB HUB power adapter ratings to ensure greater measurement repeatability. The Draft 3 test method accounts for the conversion efficiency of the USB hub.</p>

13	Test Method - Draft 2	Data/Networking Connection	One stakeholder expressed concern that the test method is unclear as to what is considered a "USB hub" and what the "bridging" requirement is limited to. While "USB hub" is generally understood as a port expansion device, evolution of product designs can further complicate this understanding. The stakeholder is concerned with the networking and bridging connection requirements based on the fact that any time an external device, whether or not if it is as simple as a hub or router, is connected to the UUT during testing, there is significant risk of variances in measured power consumption.	In the Draft 3 ENERGY STAR Displays Test Method, DOE and EPA specified USB hub power ratings, requiring that the network/data port be connected, but with no actual data transfer, hence the power consumed is not expected to significantly vary based on the external device connected.
14	Test Method - Draft 2	Data/Networking Connection	One stakeholder urged DOE and EPA to consider the design of a display as a docking station and the complexities involved when setting up this up for testing. The multitude of connectivity options available provides significant possibilities for variance in power consumption and interpretation among test engineers.	DOE and EPA have specified a priority for network, data and signal interface connections in the Draft 3 ENERGY STAR Test Method and recommend that these be followed while testing. Both DOE and EPA intend to continue reviewing the available network, data and signal interface connections and account for any new technologies in a future revision to the Displays specification.
15	Test Method - Draft 2	Data/Networking Connection	According to the Test Method, it seems that a product with Thunderbolt and other data/networking connections would need to be connected via Thunderbolt as well as another connection, such as Ethernet. But Thunderbolt is already a networking and data connection in itself, as well as a video interface.	<p>DOE and EPA intend for the unit under test (UUT) to have a single connection, either data or network, in addition to the video interface signal connection, during testing. In cases where a single connection can supply video and data/networking transfer, such as Thunderbolt, only that single connection would be necessary.</p> <p>Due to Thunderbolt being a fairly new technology and having low market penetration, DOE and EPA were unable to find specific examples of both video and network connectivity on the same Thunderbolt port. DOE and EPA are interested in further investigating this technology and welcome any additional data or information. Currently, DOE and EPA are not recommending any additional changes to the test procedure with regard to Thunderbolt.</p>