

Proposal for Addressing ABC in the Version 6.0 ENERGY STAR Televisions Specification

The U.S. Environmental Protection Agency (EPA), in close collaboration with stakeholders, has made significant progress on the development of the Version 6.0 ENERGY STAR Televisions (TV) eligibility criteria. EPA proposed and received consistent support for the efficiency requirements in the Draft 2 Version 6.0 TV specification. During this specification development process, the U.S. Department of Energy (DOE) has also been developing a Federal test procedure for measuring TV energy use, which includes proposed changes to the existing ENERGY STAR requirements for testing televisions with the Automatic Brightness Control (ABC) feature. Upon completion of DOE's test procedure rulemaking, EPA has indicated that it will harmonize with the forthcoming DOE Test Procedure for Television Sets.

EPA initiated the revision of the ENERGY STAR Televisions requirements with the explicit intention of addressing anticipated high qualification rates under Version 5. While these high rates are a reflection of the continued strides manufacturers are making in energy efficiency, they also indicate the need to finalize this specification revision so that new requirements can take effect in time for ENERGY STAR to be a meaningful differentiator of 2013 TV models. As such, EPA intends to complete the development of the Version 6.0 requirements by mid-July 2012, where the new specification would take effect April 2013.

In order to meet that timeline, EPA will reference DOE's proposed test procedure for television sets (77 FR 2830, January 19, 2012) as the final ENERGY STAR test method in Version 6.0 (coupled with an addendum to the NOPR that addresses how products should be tested with network connectivity in Standby-Active, Low Mode). While most aspects of the DOE test procedure mirror existing, well-vetted, and accepted testing protocols, DOE has introduced and continues to evaluate testing criteria in response to comments received on the proposed test procedure notice, including those proposals surrounding ABC-enabled TVs.

In an effort to ensure the ENERGY STAR specification has meaning in the TV market and to provide manufacturers with certainty regarding treatment of the ABC function by the ENERGY STAR program, EPA proposes the following approach for feedback in advance of finalizing the Version 6.0 requirements for televisions. EPA is implementing a two-step approach for televisions with ABC enabled by default, which will be phased in as the DOE rulemaking process is completed:

Proposal for Comment:

Provisional Requirement for the Calculation of On Mode Power for Products with ABC Enabled by Default Until the DOE Final Test Procedure for Television Sets is Published:

Once DOE publishes its final test procedure for televisions sets, DOE and EPA plan to migrate the testing criteria for the ENERGY STAR program to the DOE regulatory test procedure and will work with DOE and stakeholders to ensure a smooth transition. Before this time, manufacturers of TVs with ABC enabled by default should disable the ABC sensor and test the product according to the DOE proposed test procedure for On Mode Power (P_{ON}) when ABC is not offered or is not enabled by default. The On Mode power limit for products with ABC enabled by default will be calculated as follows:

Provisional Calculation of Maximum On Mode Power for Products with ABC Enabled by Default:

$$P_{ON_MAX_ABC} = 1.1 * P_{ON_MAX}$$

Where:

- P_{ON_MAX} is the maximum allowable On Mode Power consumption, in watts, as expressed by the equation below, and
- $P_{ON_MAX_ABC}$ is the maximum allowable On Mode Power consumption for products with ABC enabled by default, in watts

$$P_{ON_MAX} = 100 * \tanh(0.00085 * (A - 140) + 0.052) + 14.1$$

Where:

- P_{ON_MAX} is the maximum allowable On Mode Power consumption, in watts,
- A is the viewable screen area of the product, in square inches, and
- \tanh is the function that defines the specification line

Products that qualify to the Version 6.0 Televisions specification under this provisional requirement will not need to be retested once the DOE final test procedure for televisions is adopted.

Calculation of On Mode Power for Products with ABC Enabled by Default After the DOE Final Test Procedure for Televisions is Published:

Once the DOE TV Test Procedure is published, televisions with ABC enabled by default must test this function according to the final DOE TV Test Procedure.

For products with ABC enabled by default, On Mode power (P_{ON}), as calculated per Equation 1, shall be less than or equal to the Maximum On Mode Power Requirement (P_{ON_MAX}) as calculated per Equation 2.

Equation 1: Calculation of On Mode Power for Products with ABC Enabled by Default

$$P_{ON} = \text{TBD}$$

Where:

- The contents marked as TBD will be determined by DOE's final TV test procedure.

Equation 2: Calculation of Maximum On Mode Power

$$P_{ON_MAX} = 100 * \tanh(0.00085 * (A - 140) + 0.052) + 14.1$$

Where:

- P_{ON_MAX} is the maximum allowable On Mode Power consumption, in watts,
- A is the viewable screen area of the product, in square inches, and
- \tanh is the function that defines the specification line

For products that do not offer ABC, or for which ABC is not enabled by default, On Mode power (P_{ON}) shall be determined using the DOE proposed test procedure (77 FR 2830, January 19, 2012) and shall be less than or equal to the Maximum On Mode Power Requirement (P_{ON_MAX}), as calculated per Equation 2.

Should the DOE final test procedure result in a significant change in qualification rates, EPA will engage with stakeholders on refinement of the eligibility criteria such that they continue to enable qualification of a good selection of products across a variety of sizes.

EPA Analysis and Rationale for Provisional Proposal

Background – The On Mode power data points for models with ABC enabled by default in EPA's dataset were measured only at ambient light conditions of 0 lux and 300 lux. EPA understands that these data points do not directly correspond to the On Mode power of models without ABC, which is measured at a screen luminance level of at least 65% of maximum luminance without consideration for the ambient light conditions.

It should also be noted that a direct, physical relationship exists between luminance and On Mode power, but the relationship between ambient light conditions and On Mode power may vary based on a product's design of the ABC feature.

Analysis – EPA conducted an analysis on a subset of its dataset for which all three factors are known: ambient light conditions, screen luminance, and On Mode power. As described in the "[Draft 2 Dataset Correction for ABC](#)" document, this subset was used previously to calculate the On Mode power consumption of ABC-enabled models in the dataset according to the four-point ABC equation, based on 10 lux, 50 lux, 100 lux, and 300 lux, proposed in Draft 2. The subset revealed On Mode power corresponding to various measured screen luminance points for seven different television models representing the major television types, major manufacturers, and screen technologies.

For this analysis, the default "home" or "standard" preset mode luminance was compared to the measured luminance points for each model. In cases where the default luminance was at or close to within 10 cd/m² of one of the measured luminance points, the corresponding measured On Mode power was assumed to represent the approximate measured On Mode power of that model if it were tested with ABC disabled at the default luminance level. This "ABC-disabled" On Mode power approximation gives an idea of whether or not ABC-enabled models would continue to qualify under the proposed Version 6.0 On Mode power limits when tested with ABC disabled. In cases where the difference between the default luminance and the measured luminance points was much more than 10 cd/m², the "ABC-disabled" On Mode power approximation was determined by interpolating between the measured luminance points. EPA recognizes that this approach may not provide completely accurate On Mode power measurements, since the relationship between On Mode power and screen luminance is not perfectly linear and varies by model and by manufacturer; however it considers this approach to be appropriate for determining a good approximation for how products perform when ABC is disabled.

Results – Within this subset of the dataset, some models that initially qualified with ABC enabled by default met the On Mode power levels proposed in the Draft 2 Version 6.0 Televisions specification. When comparing the "ABC-disabled" On Mode power approximations of these models to the proposed Draft 2 Version 6.0 On Mode power levels, some models were no longer able to meet the levels.

To continue to incentivize the use of ABC as a way of increasing energy savings, EPA proposes to provide an additional power allowance equal to 10% of the On Mode power limit to products that ship with ABC enabled by default. The value of the allowance was derived by determining the average difference between the proposed On Mode levels and the power consumption of the models in the subset that no longer met the proposed On Mode levels with ABC disabled. The difference, expressed as a percentage of the proposed On Mode power levels, ranged from 1% to 18%, with the average at 9%.