

January 3, 2012

California Energy Commission
Docket No. 11-AAER-2
Docket Unit
1516 Ninth Street, Mail Station 4
Sacramento, CA 95814-5504

DOCKET

11-AAER-2

DATE Jan 03 2012

RECD. Jan 05 2012

Sent via E-Mail: docket@energy.state.ca.us; hsingh@energy.state.ca.us

Re: Docket Number: 11-AAER-2 (Proposed Amendments to Appliance Efficiency Regulations, 15-Day Language)

Dear Sir or Madam:

Bose Corporation is a U.S.-based engineering, manufacturing, and retail distributor of electronics and audio equipment with approximately 3,400 employees in operations in Framingham and Stow, Massachusetts; Columbia, South Carolina; and Yuma, Arizona. Bose Corporation appreciates this opportunity to provide its comments on the Proposed Amendments to Appliance Efficiency Regulations, 15-Day Language, dated December 14, 2011. As a producer of electronic devices that will be impacted by this proposed rule, Bose Corporation is providing these comments to the California Energy Commission ("CEC") in the hope that the CEC will continue to work to make the rule more workable, especially for companies that produce products that are already subject to existing CEC Appliance Standards and where additional regulation of battery charger systems ("BCSs") will create duplication and redundant requirements. Bose is committed to designing its products to be energy efficient; however regulators need to ensure that such limits do not undermine functionality and consumer choice in the marketplace.

Bose Corporation Continues to Urge the CEC to Develop a Test Procedure for Small Battery Chargers that Addresses, Instead of Ignores, the Complexities Inherent in Multi-Function Devices

- ☞ As stated in its previous comments, Bose Corporation strongly requests that the CEC facilitate and support efforts to refine the small battery charger test procedure to fully address "multi-function devices" with integrated BCS functions.
- ☞ A revised test procedure must be developed to prevent the unintended outcome where a device that contains a compliant BCS is unable to meet the proposed limits simply because the test procedure fails to consider and allow for the power consumption of non-BCS functions that cannot be shut off during testing.

- ☞ **Non-BCS functions in multifunction devices can add 10-40% additional power to the total power measurement – even when *in the lowest power consuming mode*. Unless addressed in the test procedure and proposed limits, this will likely result in a situation where a product that contains an efficient and compliant BCS will fail the proposed BCS limits.**
- ☞ **It is unfair to penalize producers of multi-function products in this manner. If the CEC is truly working to make BCSs energy efficient, it should work to isolate the BCS in the test procedure and ensure that the proposed limits are directed exclusively toward the BCS.**

Discussion: Bose Corporation reiterates its previously-stated objection (raised in its May 24th and its November 22nd comments to the CEC) to the use of a test procedure that ignores the real-world issue of accurately measuring the required BCS parameters in a highly integrated “multi-function” consumer device. This is the primary issue also presented at the October 24, 2011 workshop by Henry Wong of Intel on behalf of ITI. In addition, the public comments on 45-day language from ITI and Panasonic reiterated this.

In many devices, the non-BCS functions cannot be simply “switched off” as indicated in the DOE test procedure. Furthermore, while these functions are in a “lowest power consuming mode” when in standby mode, the power consumption may still be significant when added to the total power being measured at the AC mains power for BCS certification testing.

This leads to the very real scenario where the proposed BCS limits will be exceeded – not because of an inefficient BCS, but rather because of other functions that are operating in their lowest power consuming mode but which cannot be isolated and shut off during testing. The result will be a product that may fail BCS certification even though, if only the BCS functions were tested, the product would be compliant.

To illuminate this issue more fully, please find below a block diagram representative of several Bose audio products which will be covered by the proposed BCS regulation. While these products are primarily battery-operated portable equipment, their typical usage model also includes connection to AC main powers and operation *in situ* for a significant portion of their life cycle. This block diagram, description of the power consuming components, and usage model is similar to other portable multi-function audio products produced by other manufacturers.

Sources of BCS related power consumption:

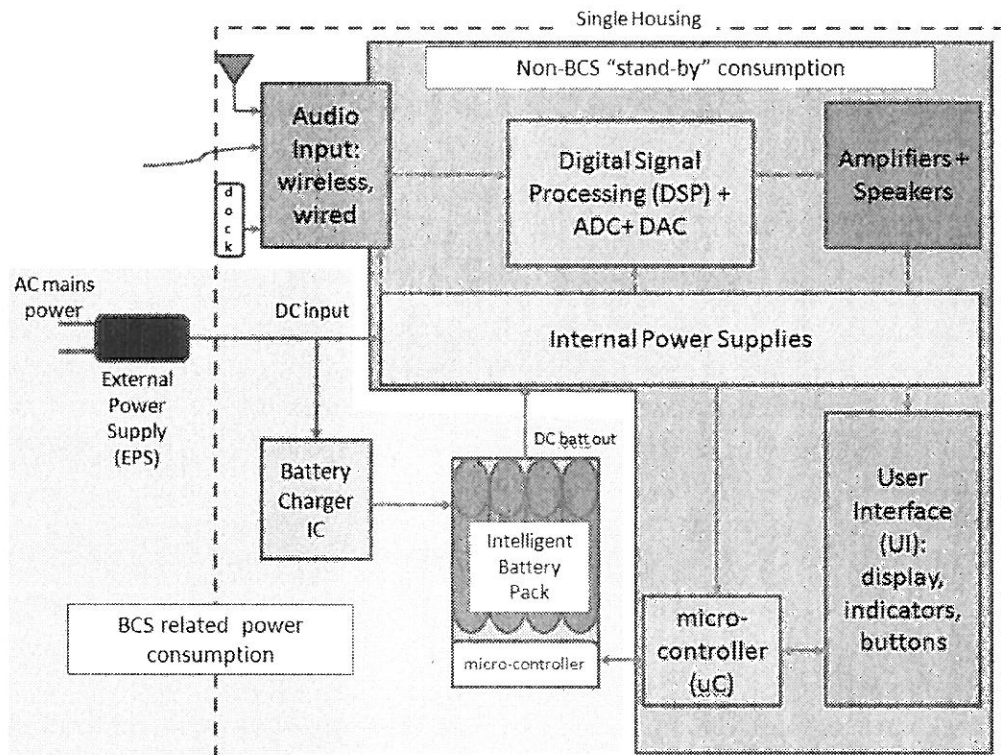
- ☞ This encompasses the external power supply (EPS) supplying the DC voltage from AC mains power, the integrated battery charger circuit, and the “intelligent” (micro-controller based) battery pack. The latter two being integrated in a common housing and often sharing printed circuit board (PCB) space with non-BCS functions such as internal power supplies, micro-controllers (uC) or audio amplifiers. If removable at all – some are not - the battery pack requires common tools to remove.

Sources of non-BCS power consumption:

- Although the Digital Signal Processing (DSP) function is in a low power state during the product's standby mode, it does remain powered to facilitate a "quick on" experience which the consumer demands.

The micro-controller (uC) remains powered as it is responsible for monitoring user inputs and wake functions from the user interface (UI) in addition to monitoring the battery pack's micro-controller for status indicators, such as charge state and battery faults. Because these elements are powered during the product's standby power state, various internal power supplies are also "on" with resultant efficiency losses and power consumption in those internal power supplies.

The non-BCS portion of the product design is always focused on being energy efficient for two simple reasons: (1) maximizing battery life is paramount so balancing the user expectations of "quick on" against minimizing power consumption when in standby mode is a priority; and (2) many of these products are subject to strict standby regulations such as European Union's Energy related Products Directive and Natural Resources Canada energy efficiency regulations. As a result, these products are designed for overall standby power energy efficiency, which motivates Bose to design all functions to be as energy efficient as possible.





Through laboratory measurements and analysis, we have observed that the non-BCS power consumption can be 10-40% of the BCS related power consumption. These non-BCS functions represent *a significant power consumption adder to the BCS measurements being taken at the AC mains power and likely will cause unintended non-compliance to the BCS limits simply because they are not considered, isolated, and addressed in the test procedure.*

If the objective of the CEC proposal is to improve the energy efficiency of battery chargers, the CEC needs to address the fact that, as currently written, the proposal overreaches and also encompasses non-BCS functions. This unfairly penalizes producers of complex, multi-function products that have to meet the same limits that are set for simple, non-sophisticated products. The rule, if finalized, may have the unintended effect of providing a design incentive for products that lack functions and features, such as smart grid interaction, that could result in larger overall energy efficiency gains. Bose Corporation urges the CEC to address this issue so that the rule is focused on the BCS portion of multi-function devices.

Bose Corporation Continues to Urge the CEC to Partition Battery Capacities Ranges and Modify Limits to Better Align with Real-World Operating Conditions - Both Present and Future

- ☞ Bose Corporation supports the ITI submission of October 24, 2011, which was presented at the recent workshop, and its proposed partitioning of the Eb (battery capacity) range into devices $\leq 50\text{Whr}$ and $50\text{Whr} < \text{devices} \leq 100\text{Whr}$; with resulting modifications to the 24-hour charge and maintenance energy limit. In addition, we support increasing the maintenance + no-battery mode power limits for batteries where $E_b \leq 100\text{Whr}$.

Discussion: Bose Corporation's interest is in battery capacities where $E_b \leq 100\text{Whr}$ for portable multifunction audio devices. Within that range, our primary area of interest is those battery capacities where $E_b \leq 50\text{Whr}$. Given the nature of our products, the number of charger ports (N) is equal to 1.

As such, we concur with the recommendations presented at the October 24, 2011 workshop by Henry Wong of Intel on behalf of ITI. In addition, the public comments on 45-day language from ITI, TechAmerica, and Toshiba reiterated this.

While our highly integrated multi-function consumer devices are intended for a different market segment than the computer products covered in the ITI response, we agree with the observation that those with battery $E_b \leq 50\text{Whr}$ have more fixed losses and the regulatory equations should be modified to recognize this fact.



In summary, Bose Corporation supports the ITI proposal captured in this table below. ***We recognize and accept that there are other variants of these equations and limits that will achieve the same end goal.***

Test	Limit	Comments
<i>50Whr < Devices ≤ 100Whr</i>		
24 hr test	$(12 * N) + 1.6Eb$	Eb=battery capacity; N=ports
Maintenance + Off	1.20	
<i>Devices ≤ 50Whr</i>		
24 hr test	$20 + 1.6Eb$	fixed loss
Maintenance + Off	1.20	fixed loss/advantages low Eb

In closing, Bose Corporation urges the CEC to work in partnership with the US Department of Energy to develop a federal rule and test procedure that will achieve the CEC's stated goal of improving BCS efficiency in a cost effective and feasible manner. The test procedure must be modified to isolate the BCS function and the limits should be increased to reflect real-world operating conditions. Thank you for your consideration of these comments. Please let us know if you have any further questions.

Sincerely,

BOSE CORPORATION

Kathryn Jackson

Assistant General Counsel &

Assistant Secretary