HARMAN MUSIC GROUP

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April 24, 2006

Jackalyne Pfannenstiel
Vice Chair
Presiding Member, Efficiency Committee
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Arthur H. Rosenfeld
Commissioner
Associate Member, Efficiency Committee
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: **Rulemaking on Appliance Efficiency Regulations (DOCKET NO. 06-AAER-1); Response to Recent NRDC Comments**

Dear Commissioners Pfannenstiel and Rosenfeld:

Harman Music Group (HMG) would like to take this opportunity to respond to comments which were dated April 10, 2006 and again on April 17, 2006 and submitted to the California Energy Commission by the National Resources Defense Council (NRDC).

NRDC – April 10, 2006
"Over the past two weeks we have collected extensive information on the current state of the external power supply market…"
HMG –April 24, 2006, Response
How can checking the status of four EPS manufactures be considered extensive?

NRDC – April 10, 2006
"Numerous power supply manufacturers already manufacturer energy efficient EPS that already meet the CEC requirements while also complying with UL safety and FCC interference requirements."
HMG –April 24, 2006, Response
We have been looking for AC / AC type EPS's and have yet to find a readily available supply, let alone one that complies with the UL Audio / Video Safety Standard.

NRDC – April 10, 2006
"Much to our surprise we have heard several OEMs (original equipment manufacturers) testify that they are unable to find samples or sufficient quantities of qualifying EPS for purchase."
HMG –April 24, 2006, Response
Current EPS's on market do not meet our requirements in the AC / AC type with power ratings of 18 and 35 watts. In addition, they are not certified to the Audio / Video Standard.

NRDC – April 10, 2006
"In the various hearings and testimony, we have repeatedly heard the OEMs complain about the large incremental costs they will face by moving to the more efficient EPS. We frequently have heard incremental costs of $2 to $5 mentioned by the OEMs, without any supporting documentation."
HMG –April 24, 2006, Response
Pricing and Quotes are usually considered to be confidential between the two parties. This is the reason they are usually not made public. If the CEC is willing to sign a non-disclosure agreement and keep such information from becoming public record, HMG is will to disclose current pricing and provide other quotes which we have in our possession. Yes, $2 to $5 dollar increments are factual to our findings when comparing efficient CEC EPS's to the Linear type.

NRDC – April 10, 2006
" To put the pricing issue into better perspective, we were able to obtain a general price quote from Ten Pao International (see attached). In their Feb 8, 2006 letter they provide price quotes (not incremental costs, but actual costs) of $1.20 to $2.10 for 2W and 5W CEC compliant EPS."
HMG –April 24, 2006, Response
The mentioned pricing is for a 2W to 5W range. We use 18W and 35W. The higher the wattage, the higher the price separation. This is akin to purchasing a 100W audio amplifier as compared to a 400W amplifier, one would expect to pay a much higher price for the 400W unit.

NRDC – April 10, 2006
"One should also note, that as this document is intended for a public audience it does not reflect the lower prices that individual customers would likely negotiate with Ten Pao."
HMG –April 24, 2006, Response
This is exactly why pricing and quotes are considered to be, and are kept confidential.

NRDC – April 10, 2006
"Given this pricing information, it is hard to understand where the multi-dollar incremental cost projections are coming from. We understand the incremental costs from moving from inefficient linear EPS to more efficient switching EPS technologies to be on the order of 25 to 50 cents."
HMG –April 24, 2006, Response
These are general numbers which are unsubstantiated. Show me a price quote comparing an 18W and 35W Linear vs. Switch Mode.

NRDC – April 10, 2006
• CEC compliant linears are also available from multiple high volume sources.
HMG –April 24, 2006, Response
We have received a response from two of three manufacturers which were recommended to us by the CEC. One flat out said they cannot produce AC / AC type EPS. The other said they do not have any CEC EPS's that will meet our requirements. We reiterate, they are not readily available in the supply chain.

NRDC – April 10, 2006
"In the most recent hearings there were claims made about the difficulty of: a) designing an AM/FM radio that would include a CEC compliant EPS and not interfere with sound quality, and b) using CEC compliant EPS due to the interference they cause in various audio products in the home.
In response to these claims, we provide the following:
• **AM/FM radios already use switching EPS**
– Noise issues are easily solvable with standard filtering techniques
• **Many other products already use internal switching power supplies in close proximity to tuners, even in the same box**
– Conventional TVs, LCD TVs, Plasma TVs, Set-top boxes
• **Homes already have many switching EPS close to AM/FM receivers that do not interfere**
– FCC specs prevent interference between products through the power line and through radiation
• **The noise conducted through the low voltage cable to the product can be filtered in the same way**
– Additional components are likely to cost only $0.05 to $0.10 extra. "

HMG –April 24, 2006, Response

- ***Noise issues cannot be solved as simply as stated. It takes space on the printed circuit boards in order to add additional components. This means a new circuit board design. Does the larger board now fit in the original chassis? Will a new chassis have to be designed? What of its product box? What of the artwork on the product box , the larger chassis and its dimensions along with photographs of the item on the box, they are now incorrect. What of testing for Safety, EMI, and ESD? This may as well be a brand new design. However we are talking about retrofitting existing products, this turns out to be a massive undertaking.***
- ***Products which use internal switching power supplies where designed with that in mind. However, who do you retrofit an existing product without incurring the daunting task of all the redesign requirements and additional testing?***
- ***Again, if designed from the onset, it is doable. How do you retrofit…it takes a new design!***
- ***Components cost are probably the only accurate item, however that assumes that they were included in the original design. This brings us back to my first bullet point above.***

NRDC – April 17, 2006
"Image 4 – During the last hearing, it was alleged that one can not produce a AC to DC power supply for use with a guitar effects pedal due to the interference it would produce. This image shows a copy of an advertised product in the Musician's Friend Catalogue called the "1 Spot" from Visual Sounds Company. The highlighted text notes " No transformer, so forget about the 60 Hz hum", which is a reference to the unwanted noise distortion that a linear power supply might provide.
While this particular model does not meet the CEC EPS requirements, simple product modifications could quickly bring it into compliance"

HMG –April 24, 2006, Response
During the last hearing, I stated that most of our products use an AC / AC type EPS due to the fact that we need the positive and negative voltages in order to provide optimum power to the operational amplifier circuitry. These are circuit designs which we have been using for many, many years. We cannot in an arbitrary fashion change to a switch mode type supply which has a DC output. Our circuit design is not setup to operate in this manner. To change to an efficient switch mode supply with a DC output will require a complete redesign of our products. As previously stated, this will be extremely burdensome, costly and time consuming

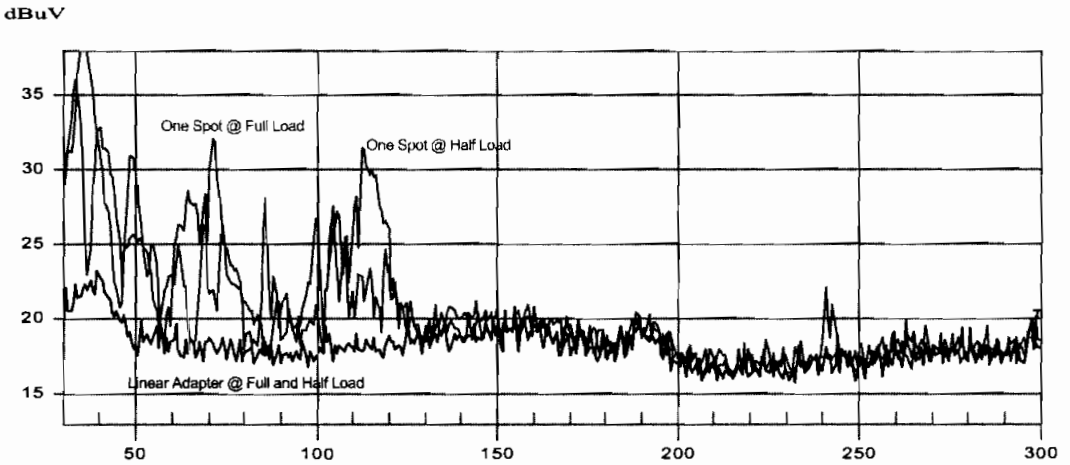
As for the "1 Spot" from Visual Sound, yes, it is possible that there is no 60Hz hum as it is not a transformer. However it is connected to the Mains Lines which is at 60Hz and the 60Hz could be induced or leaked onto the rest of the unit.

HMG has maintained that the Switch Mode EPS's are inherently noisy and that they have the ability to inject unwanted noise into the audio path and can also product Electromagnetic Interference (EMI) problems. The graph below is a comparison of the EMI characteristics of the "1 Spot" vs. a Linear EPS, both units having a DC output.

Both of the units were operated at full and at half load in order to simulate different products being powered by the EPS.
As you can see, the graph line of the Linear EPS is virtually flat under full and half load. The '1 Spot' on the other hand, indicates several peaks of potential interference across a wide range of frequencies.
It is also important to note that there is a shift and reshaping of spikes depending on whether it is under full or half load. If the load changes to a different load point, the shift will again take place to a different location on the graph. That is to say, the 'shift' of potential interference is highly dependant upon the load to which the EPS is subjected to.

Each 'product / 1 Spot' combination constitutes a different load point thus the signature for each combination will be different. All of this unwanted energy has a potential to cause interference as the energy from the '1 Spot' can heterodyne with frequencies and energy from our digital clock sources thus producing unwanted signals.

It is due to the multitude of unique signature combinations that every single product / EPS combination would have to be tested and verified before a switch mode EPS can even begin to be considered. This only reference to EMI, not yet having checked Safety aspects, Electrostatic Discharge (ESD), along with other critical specifications and parameters.



4/20/06 12:10:58 PM (Start = 30.00, Stop = 300.00) MHz

Frequency MHz	Peak dBuV	D: Pk Dt to Av Lim dB	D: Av Dt to Av Lim dB	D: QP Dt to Av Lim dB

Lastly, I have made mention that it is difficult to have a simple 'drop-in' replacement. The following photo indicates one of our products with the current used Linear EPS within the pocket of the product box. Included in the photo is the product box of the '1 Spot'. As is plainly visible, even if the '1 Spot' was capable of meeting the CEC requirements, it does not 'drop-in' in form, fit and function. The product box of the '1 Spot' by itself is about one-third the size of our whole packaging scheme.

Can adjustments be made to make things fit, possibly? However, as we have mentioned before and reiterate again, it takes redesign efforts which are costly and time consuming and very burdensome.

In closing, I would like to thank the commission for all their time and effort as it pertains to the EPS's and their very complex issues.

Sincerely,

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