Jack Pouchet
Director, Energy Initiatives
Emerson Network Power
35 Parker
Irvine, CA 92618

T (949) 457 3907
M (949) 351 8142
F (949) 457 3788
E jack.pouchet@emerson.com

TO: EPA
From: Emerson Network Power
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RE: Energy Star, Draft 4 for Computer Servers

Let me start with an expression of our deepest appreciation for the effort the US EPA has made in pushing forward this new ENERGY STAR® for Servers specification. We were thankful for the opportunity to assist in the process along the way and hope that our frequent public support for the inclusion of Idle Performance was effective. We hope that the Idle Performance metrics will remain in as we move to Tier-II perhaps be augmented with new end-to-end system metrics that further reduce system power in wait/idle states.

This letter is to provide feedback to the EPA on the subject Specification, with respect to the testing of DC input Server Power Supplies and the Power Factor range for AC Input Power Supplies. The specification does a very good job in promoting an overall increase in efficiency in a critical and growing energy usage segment of our overall infrastructure. The inclusion of DC input products is a laudable addition, as it recognizes the increasing use of DC distribution type system in the data processing universe. The issues that we would like to draw your attention to is the selection of a test voltage for the evaluation of servers that are operated from a DC power buss and the potential for overall data center system performance degradation when subjected to an excessive leading power factor.

The use of a “48Vdc” distribution buss is a common practice and is an outgrowth of the 48Vdc systems used in the modern Telecommunications network. The issue is that there is in realty no true “48Vdc” voltage buss. The term “48Vdc” is often used as a short hand description of a DC system with battery back-up. In such systems, commonly a 24 cell battery string is used to provide the back-up buss for fail safe operation in the presence of AC grid failures. The term “48” comes from the fact that the open circuit voltage of lead-acid cells is near 2V and consequently a 24 cell string will show 48V. In the real world, however, the individual cell voltage is typically maintained at 2.25Vdc per cell. This then yields a string voltage of 54V. This voltage is the true voltage presented to the network 98% of time. The only time during the life of the system that the buss voltage is lower is during actual discharge, which in most Data Center applications is measured in minutes.

The input structure of most DC/DC power supplies is typically designed optimized for a specific input voltage. Movement way from that voltage in either a positive or negative direction usually results in a lower operating efficiency. Thus, the announcement that the test point for these supplies is 48Vdc will encourage the design and development of power supplies optimized for operation at something other than the real operation point that the product will see in the field. This will potentially "cost" this application space a great deal in lost real world efficiency due to sub-optimization.
Below are listed several industry standards that correctly deal with the true DC bus levels that can be expected in what is commonly referred to as a 48Vdc system. We would strongly encourage a re-evaluation of this test point voltage determination.

- ANSI ATIS-0600315-2007 defines the typical voltage as 53.0, with the following footnote: The value is a compromise between equipment operating with VRLA and flooded technology battery.
- Verizon VZ-TPR-9205 (http://www.verizonnebs.com/TPRs/VZ-TPR-9205.pdf#page=9) defines the voltage as -53.0 +/- 0.25V to be used when measuring energy efficiency.
- The -53 +/- 0.25V value was used in early drafts of the ATIS energy efficiency standard, but that was later widened to -53.0 +/- 1V. This is now reflected in the ANSI family of standards for telecom energy efficiency (ATIS-0600015.2009, ATIS-0600015.01.2009, etc.); see https://www.atis.org/docstore/product.aspx?id=24547 and https://www.atis.org/docstore/product.aspx?id=24548.
- AT&T's energy efficiency requirements are to follow the ANSI/ATIS requirements; this is indicated in AT&T's TP-76200 document (https://ebiznet.sbc.com/sbcnebs/Documents/ATT-TP-76200.pdf#page=99), which indicates the -53V +/-1V test condition.

With regards to the Power Factor for AC Power Supplies we would like to recommend a change from the 0.9 lagging to 0.9 leading rating to one that more closely approaches a unity power factor rating. Emerson Network Power, who through our embedded power group brands of Astec and Artysen are the market leader in OEM AC-DC power supplies for computer servers, would like to see the ENERGY STAR rating reserved for those power supplies that achieve an input power factor within 0.9 lagging to 0.95 leading.

We appreciate the move to tighten the input power factor criteria and believe the utility companies and emergency generator manufactures will greatly benefit from this change. However there remains room for improvement on the leading power factor side. It is generally accepted within the utility industry that Unity power factor is the ideal state. The utilities have built up the infrastructure and our national grid is optimized to deal with lagging power factors. Leading power factors create a host of problems from excessive KVAR to the inability for engine generators to synch and re-synch with utility transfer when tied to leading power factor devices.

Though Emerson works closely with engine generator manufactures through our Leroy-Somer business and has plenty of expertise in this area we encourage the US EPA to obtain input on the power factor rating from leaders within the utility industry, NERC/FERC, EPRI, and the emergency power engine generator industry. They can best attest to the issues surrounding the potential problems of excessive input leading power factors.

One final note on power factor, the assumption that a UPS plant will shield the utility from poor power factor devices is not valid. UPS units are put on bypass all the time for maintenance. Plus in a fault condition the UPS plant will default to bypass, placing the full impact of the leading power factor devices on the utility and/or emergency engine generators. Therefore we encourage the adoption of a tighter specification on leading input power factor to 0.95 leading.

In closing we are very pleased with the progress towards an ENERGY STAR for Computer Servers and strongly support the idle performance criteria. We thank you for your consideration of the two above technical points – test of 48Vdc “nominal” power supplies and a change to the leading/lagging power factor specification.

Thank you and best regards.

Jack Pouchet