

## **Comments on Draft 1 Version 2.0 ENERGY STAR External Power Supplies Specification**

### **Submitted by:**

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### **Comments:**

EPA is planning an average efficiency target of 0.87. For a 19.5V output this is no problem, for a 15V or 12V output this is much more challenging. In the excel file, send together with the draft EPS specification, almost all adapters in the power range from 90W to 120 W have a 19V or 20V output.

Suppose we have a 19.5V 90W adapter. Then the output current of this adapter is 4.62A. If we have a 12V 90W adapter, then the output current is 7.5A. This is 1.62 times higher than in an equivalent 19.5V adapter.

In a flyback switch mode power supply the RMS current through the secondary side diodes or mosfet will be 1.5x higher (Approximately 6.64A in a 19.5V model and approximately 10A in a 12V model). As result the RMS losses in the secondary side of the adapter will be  $1.5^2 = 2.25$  times higher than in a comparable 19.5V adapter.

Suppose we use a mosfet at the secondary side of the adapter with on state resistance ( $R_{ds\_on}$ ) of 0.015 ohm, then the losses in this mosfet will be  $6.64^2 \times 0.015 = 0.66W$  in a 19.5V adapter and  $10^2 \times 0.015 = 1.5W$  in a 12V adapter, a difference of 0.84W.

Furthermore the losses in the output cable will be higher. A typical output cable for a 90W adapter has a resistance of 0.03 to 0.04 ohm. The losses in this cable will be  $4.62^2 \times 0.03 = 0.64W$  for a 19.5V adapter and  $7.5^2 \times 0.03 = 1.7W$  for a 12V adapter, a difference of 1.06W.

The total losses in a 12V adapter will be 1.9W higher compared to a 19.5V adapter with same costs / technology. With an efficiency target of 87% the contribution of these additional losses in the efficiency is 1.8%. Sometimes it is very hard to eliminate these losses because it could lead, for example, to an unacceptable wire diameter of the output cable.

To our opinion EPA should collect more data for adapters with a low output voltage in the > 75W input power range before setting final efficiency targets. It could be considered to define efficiency targets based on the output voltage.

Best regards,

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