External Power Supply - Energy Efficiency and Stand-by Power

IEEE PSES Taiwan Chapter

Prepared by: Andy Chao
April 25, 2005

Abstract

In order to achieve an environmental friendly society, several agencies started voluntary programs to reduce the waste of natural resources. And in order to reduce the amount of natural resources needed to provide our luxury level, they introduced guidelines on stand-by power consumption and efficiency. All these agencies are growing towards each other, ending up in the same requirements at around 2009.

If home appliances are replaced with Energy Star products; greenhouse gasses will be reduced with the equivalent emissions of 1.5 Million cars.

Annual savings to Non-Energy Star:

Appliances	kWh	Savings
TV, DVD and Stereo	94	US$ 10
Computer and Monitor	420	US$ 45

(Table I)

According to a study in Europe, reduction in stand-by loses (Stand-by power consumption) can save up to 5 TWh per year (500 M Euro / 20 Billion NT$) in Europe only. Increase in efficiency can save 1 – 5 TWh per year.

The following introduction tries to provide information into world-wide green requirements, intentions and timeframe for an external power supply.

Scope for External Power Supplies

The scope of all requirements mentioned in this brief are based on external power supplies only, with a maximum power rating of 250 W for Energy Star and international efficiency level and 150 W for the Code of Conduct.

Internal power supplies (open-frame / built-in type) must comply with the relative end application requirements.

At this moment, there is no country or region that has adopted any regulations on power saving requirements for an external power supplies. The state of California will be the first one. Mid March will be decided if they adopt Energy Star starting from July 1st, 2006.

Energy Star

Tier 1 (January 1, 2005)

Stand-by power

0 to <10 W	≤ 0.5 W
≥10 to ≤250W	≤ 0.75 W

Active mode efficiency

0 to ≤1 W	≥ 0.49 * Pno
>1 to ≤49 W	≥ 0.09*Ln(Pno)+0.49
>40 to ≤250W	≥ 0.84

Tier 2 (July 1, 2006)

Stand-by power

0 to <10 W	≤ 0.3 W
≥10 to ≤250W	≤ 0.5 W

Active Mode Efficiency
(Not decided yet, probably :)

0 to ≤1 W	≥ 0.5 * Pno
>1 to ≤49 W	≥ 0.09*Ln(Pno)+0.5
>40 to ≤250W	≥ 0.85

(Table I)

Code of Conduct

Phase 1 (January 1, 2005)

Stand-by power

0.3 to <15 W	≤ 0.3 W
≥15 to <50W	≤ 0.5 W
≥50 to <60W	≤ 0.75 W
≥60 to <150W	≤ 1 W

Active mode efficiency

0 to <1.5 W	≥ 0.3
≥1.5 to <2.5 W	≥ 0.4
≥2.5 to <4.5 W	≥ 0.5
≥4.5 to <6 W	≥ 0.6
≥6 to <10 W	≥ 0.7
≥10 to <25 W	≥ 0.75
≥25 to <150 W	≥ 0.8

Phase 2 (January 1, 2007)

Stand-by power

0.3 to <60 W	≤ 0.3 W
≥60 to <150W	≤ 0.5 W

Active Mode Efficiency

0 to ≤1 W	≥ 0.49 * Pno
>1 to ≤49 W	≥0.09*Ln (Pno) + 0.49
>40 to ≤150W	≥ 0.84
>75 to ≤150W	≥ 0.8 (When PFC)

(Table II)

International Efficiency Level

Level III

Stand-by power	
0 to <10 W	≤ 0.5 W
≥10 to ≤250W	≤ 0.75 W
Active mode efficiency	
0 to ≤1 W	≥ 0.49 * Pno
>1 to ≤49 W	≥ 0.09*Ln (Pno) + 0.49
>40 to ≤250W	≥ 0.84

Level IV

Stand-by power	
0 to ≤250W	≤ 0.5 W
Active mode efficiency	
0 to ≤1 W	≥ 0.5 * Pno
>1 to ≤49 W	≥ 0.09*Ln (Pno) + 0.5
>40 to ≤250W	≥ 0.85

(Table III)

Marking on External Power Supplies

Energy Star does not allow for marking on the product itself. Logos are allowed on packaging, documentation and advertisements only. Code of conduct does not have any mark or logo. Only International Efficiency Level has a mark to put on the product.

There is no need to become a partner of Energy Star or sign the Code of Conduct in order to mark the power supply with the International Efficiency Level. A partnership with Energy Star must be committed in order to use the Energy Star Label on promotional documentation or complying product documentation.

Only complete appliances can carry the Energy Star Logo. If they have an external power supply, then that power supply needs to come from a Energy Star partner as well.

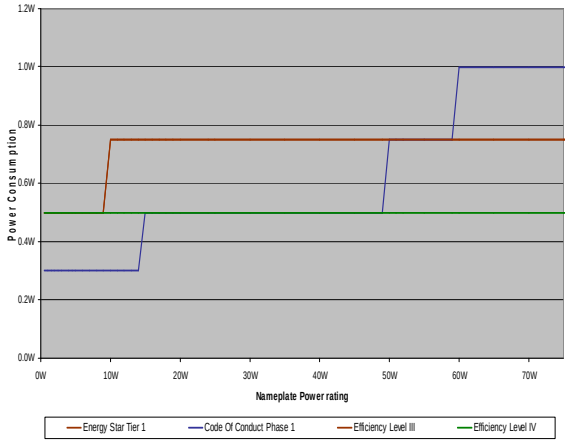
Consequences of Energy Star

If manufacturers want to sign a contract with Energy Star, then they need to have the intention to develop all new power supplies conforming Energy Star regulations or better. And they need to report on quarterly and yearly bases on new models and quantities sold by region.

Consequences of Code of Conduct

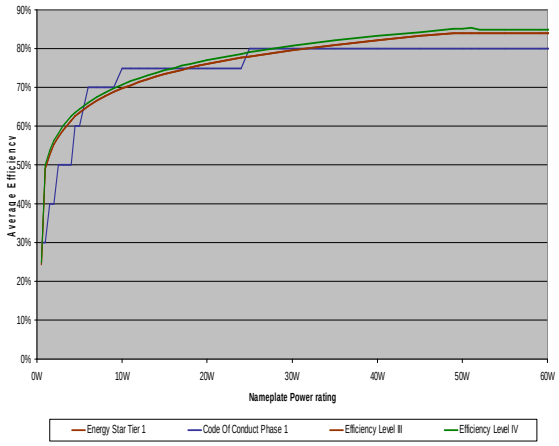
If manufacturers want to sign the Code of Conduct, then they need to have more then 80% of their "new products" in phase 1 to comply. And they need to have more then 90% of their "new products" in phase 2 to comply. They also need to report on a yearly base of new developments and quantities sold by region.

Stand-by power 2005



(Figure 1)

Active-Mode Efficiency 2005



(Figure 2)

References

- Energy Star by EPA. http://www.energystar.gov/
- Code of Conduct by EU. http://energyefficiency.jrc.cec.eu.int/
- Australian Energy Rating http://www.energyrating.gov.au/