XP Power

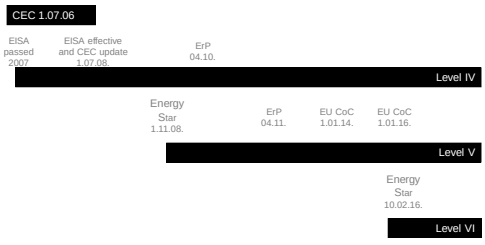
Energy Efficiency Legislation

October 2014

Applicable Standards and Legislation

- Four main standards and legislation related to external power supplies
  - Energy Star - voluntary
  - California Energy Commission (CEC) - mandatory
  - EU Energy Related Products (ErP) – mandatory (sales greater than 200000)
  - Energy Independence and Security Act (EISA) - mandatory
- Items are related, but each has their own limits to meet

Timeline



EISA

- Applicable in United States
- ONLY applicable to consumer products
- Follows the same limits as the July 1st, 2008 CEC limits
- Enforced by US Department of Energy
- Four exceptions
  - Power supplies for medical devices
  - Charger for a detachable battery pack, or a product is primarily motor operated
  - Spares for a product manufactured before 1st July 2008
  - Exported product

Summary Of Limits – Level VI

- Energy Star (10th Feb 2016 limits)

No load power limits	
Rated power	No load consumption
0 W to ≤1 W	≤0.1 W
>1 W to ≤49 W	≤0.1 W
>49 W to ≤250 W	≤0.21 W
>250 W	≤0.5 W

Active mode power limits, O/P < 6 V	
Rated power	Average efficiency
0 W to ≤1 W	≥0.517 x Pout + 0.087
>1 W to ≤49 W	≥0.0834 x Ln (Pout) - 0.0014 x Pout + 0.609
>49 W to ≤250 W	≥0.87
>250 W	≥0.875

Active mode power limits, O/P ≥ 6 V	
Rated power	Average efficiency
0 W to ≤1 W	≥0.5 x Pout + 0.16
>1 W to ≤49 W	≥[0.071 x Ln (Pout) - 0.0014 x Pout] + 0.67
>49 W to ≤250 W	≥0.88
>250 W	≥0.875

Power Supplies with an input power of 100W or more must have >0.9 Power Factor @ 115VAC, 60Hz

Summary Of Limits – Level V

- EU Code of Conduct (1st January 2014 and 1st January 2016 limits)

No load power limits		
Rated power	No load consumption	
	Tier 1 (1st Jan 2014)	Tier 2 (1st Jan 2016)
0 W to ≤1 W	≤0.15 W	≤0.075 W
>1 W to ≤49 W	≤0.15 W	≤0.075 W
>49 W to ≤250 W	≤0.25 W	≤0.15 W

Active mode power limits, O/P < 6 V		
Rated power	Average efficiency	
	Tier 1 (1st Jan 2014)	Tier 2 (1st Jan 2016)
0 W to ≤1 W	≥0.51 x Pout + 0.085	≥0.517 x Pout + 0.087
>1 W to ≤49 W	≥[0.0755 x Ln (Pout)] + 0.585	≥0.0834 x Ln (Pout) - 0.0014 x Pout + 0.609
49 W to ≤250 W	≥0.86	≥0.88

Active mode power limits, O/P ≥ 6 V		
Rated power	Average efficiency	
	Tier 1 (1st Jan 2014)	Tier 2 (1st Jan 2016)
0 W to ≤1 W	≥0.5 x Pout + 0.145	≥0.5 x Pout + 0.16
>1 W to ≤49 W	≥[0.0826 x Ln (Pout)] + 0.648	≥[0.07 x Ln (Pout) 0.0014 x Pout] + 0.67
49 W to ≤250 W	≥0.859	≥0.88

16% Efficiency Requirement <6 V		
Rated power	10% Efficiency Requirement	
	Tier 1 (1st Jan 2014)	Tier 2 (1st Jan 2016)
0 W to ≤1 W	≥0.5 x Pout	≥0.517 X Pout
>1 W to ≤49 W	≥[0.0755 x Ln (Pout)] + 0.485	≥0.0834 X Ln (Pout) - 0.0014 x Pout + 0.609
49 W to ≤250 W	≥0.78	≥0.78

16% Efficiency Requirement ≥6 V		
Rated power	10% Efficiency Requirement	
	Tier 1 (1st Jan 2014)	Tier 2 (1st Jan 2016)
0 W to ≤1 W	≥0.5 x Pout + 0.045	≥0.5 x Pout + 0.06
>1 W to ≤49 W	≥[0.0826 x Ln (Pout)] + 0.0545	≥[0.071 x Ln (Pout)] - 0.0014 x Pout] + 0.67
49 W to ≤250 W	≥0.78	≥0.78

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Summary Of Limits – Level V

- Energy Star (1st Nov 2008 limits) ErP (April 2011 limits)

No load power limits	
Rated power	No load consumption
0 W to <50 W (≤ 51 W)	0.3 W
≥50 W to 250 W (> 51 W)	0.5 W

Active mode power limits, O/P < 6 V	
Rated power	Average efficiency
0 W to 1 W	≥ 0.497 x rated power+0.067
>1 W to ≤49 W (≤ 51 W)	≥[0.0750 x Ln(Rated power)]+0.561
>49 W (>51 W)	≥ 0.86

Active mode power limits, O/P ≥ 6 V	
Rated power	Average efficiency
0 W to 1 W	≥ 0.48 x rated power+0.14
>1 W to ≤49 W (≤51 W)	≥[0.0626 x Ln(Rated power)]+0.622
>49 W (>51 W)	≥ 0.87

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Summary Of Limits – Level IV

- California Energy Commission (1st July 2008 limits) & EISA (2007 limits) and ErP (April 2010 limit)

No load power limits	
Rated power	No load consumption
All	0.5W

Active mode power limits	
Rated power	Average efficiency
0 W to 1 W (<1 W)	0.5 x Rated power
>1 W to 49 W (≤51 W)	≥[0.09 x Ln(Rated power)] + 0.5
>49 W (>51 W)	≥0.85

U.S. DEPARTMENT OF ENERGY

Measurement Technique

- Defined measurement technique
- Adopted by all agencies
- www.energystar.gov

Marking Requirements

- IV = CEC & EISA
- V = Energy Star & ErP
- VI = Energy Star 10.02.16. limits

External Power Supplies Efficiency Levels

- In the XP Product Selector all our external units have our Green Power logo. Although only AEB70 is level V.
- So broadly speaking all our units meet level V, except most AEB's, which meet level IV (but watch out for specific differences, AEL15US03 is level IV)

XP Power's Strategy

- Laboratory in Singapore is California Energy Commission approved.
- Testing completed in Singapore
- Enables "competent bodies" like UL to approve our products on the basis of our results.
- XP created own Green Power logo to characterise our products for our customers, uses level IV limits
- Also applied to component power supplies

No load power limits	
Rated power	No load consumption
0 W to < 250 W	0.5 W
≥ 250 W	No limit

Active mode power limits	
Rated power	*Average efficiency
0 W to 1 W (< 1 W)	0.5 x Rated power
> 1 W to 49 W (≤ 51 W)	≥ [0.09 x Ln(Rated power)] + 0.5
> 49 W (> 51 W)	≥ 0.85

*Average efficiency is measured at 25, 50, 75 & 100% load.

Component Power Supplies

- No current legislation for energy efficiency
- AC/DC power supply technology has evolved to a point where efficiencies in the 90 - 95% range are available and this yields benefits for designers of the end applications that they are used in
- Eliminating or reducing the need for system fan cooling
- Reducing audible noise
- Reducing the weight and size of the system
- Reducing system internal temperatures and improving reliability
- Reducing overall energy usage and end user operating costs

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