External Power Supply Efficiency Regulation Introduction Level VI vs V

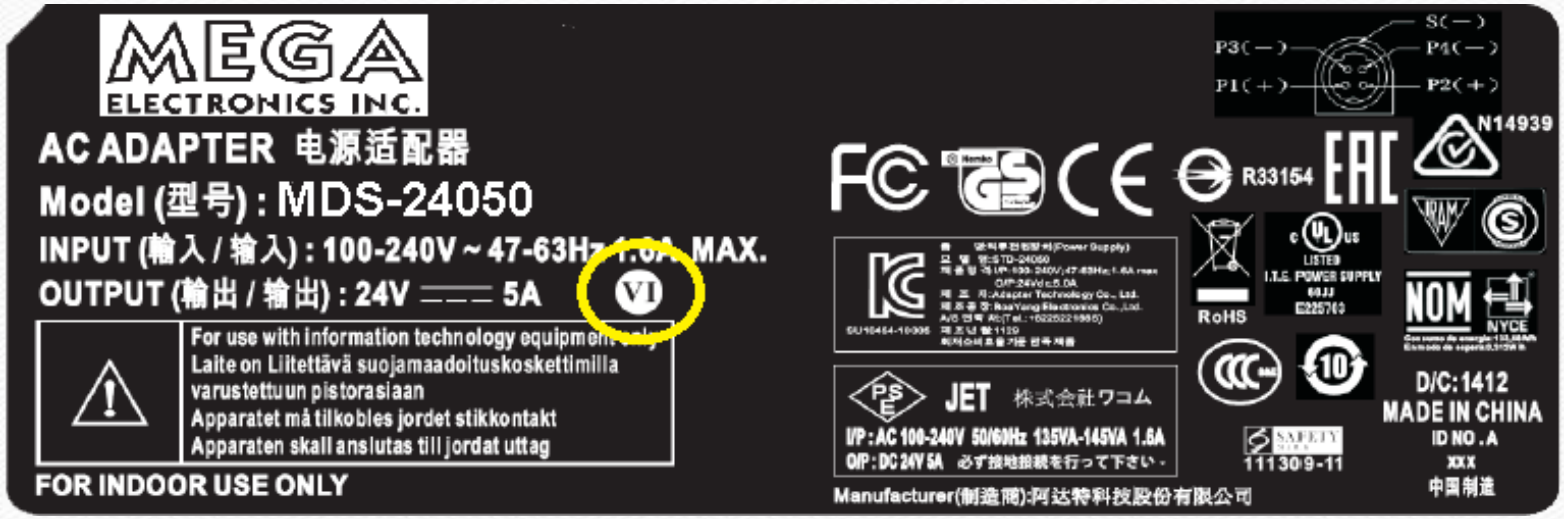
Megaelectronics.com

MEGA ELECTRONICS INC.

Powering Your Products

What is International Efficiency Marking Protocol?

- It is a system for manufacturers to designate the efficiency performance of External Power Supply.
- Identified using Roman Numerals: I, II, III, IV, V, VI



USA

2006/7/1 Energy Star Voluntary

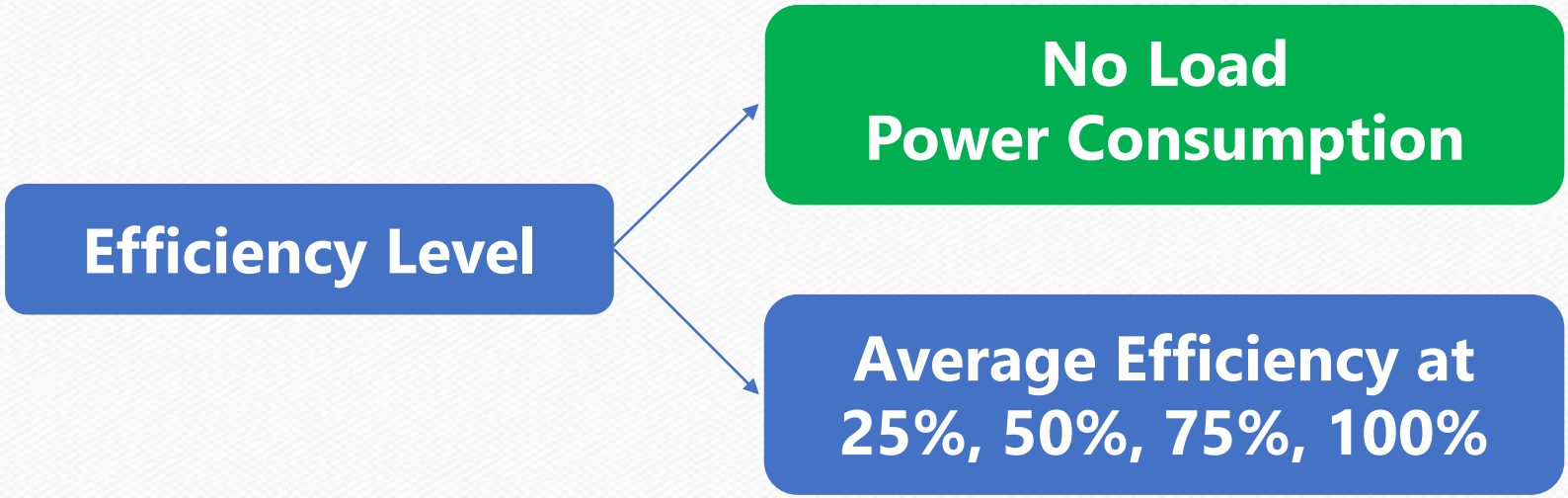
2008/7/1
CEC Mandatory

2008/11/1
Energy Star Voluntary

2010/12/31
Energy Star sunset the programs for EPS

2014/6/10
Department of Energy (DoE) requires manufacturer to meet VI two years after the final rule's date of publication in the Federal Register (2014/2/10)

How to Define Efficiency Level



Limit of No Load at IV / V / VI

Level IV

Output Power on Label	No Load Power Consumption
0 to < 10 Watts	0.3 Watts
≥ 10 to ≤ 250 Watts	0.5 Watts

Level V

Output Power on Label	No Load Power Consumption
0 to < 50 Watts	0.3 Watts
≥ 50 to ≤ 250 Watts	0.5 Watts

Level VI

Output Power on Label	No Load Power Consumption
0 to < 49 Watts	0.1 Watts
≥ 49 to ≤ 250 Watts	0.21 Watts
> 250 Watts	0.5 Watts

Average Efficiency in IV / V / VI

Minimum Average Efficiency in Active Mode

Basic Voltage

	IV	V	VI
1 to ≤ 49W	≥ [0.09 * Ln (Pno)] + 0.49	≥ [0.0626 * Ln (Pno)] + 0.622	≥ 0.071 x ln(P out)- 0.0014 x Pout +0.67
> 49W to ≤ 250W	≥ 0.84	≥ 0.87	≥ 0.88
> 250W			≥ 0.875

(Average of the four values tested at 25%, 50%, 75%, 100% Load)

Average Efficiency in IV / V / VI

Minimum Average Efficiency in Active Mode

Low Voltage

	IV	V	VI
1 to ≤ 49W	Same as basic voltage	≥ [0.0750 * Ln (Pno)] + 0.561	≥ 0.0834 x ln(P out)-0.0014 x Pout +0.609
> 49W to ≤ 250W	Same as basic voltage	≥ 0.86	≥ 0.87
> 250W			≥ 0.875

(Average of the four values tested at 25%, 50%, 75%, 100% Load)

(Low voltage means output voltage less than 6V and output current greater than or equal to 550mA)

Europe

2010/4/27
European Council
ErP Stage 1 Mandatory

2011/4/27
European Council
ErP Stage 2 Mandatory

Code of Conduct
(Voluntary) Release a new requirement of efficiency regulation

Effective Dates:
Tier 1: 1 January 2014
Tier 2: 1 January 2016

CE = LVD + EMC + ErP + RoHS

USA vs. Europe

1. Maximum Power in No Load Mode

No Load Power Consumption

	USA Level VI	Europe (CoC Tier 2)
1 to ≤ 49W	0.1 Watt	0.075 Watt
>49 to ≤ 250W	0.21 Watt	0.15 Watt

Average Efficiency

	USA Level VI	Europe (CoC Tier 2)	
	Average Efficiency	**Average Efficiency**	**10% Load**
1 to ≤ 49W	≥ 0.071 x ln(P out)-0.0014 x Pout +0.67	≥ 0.071 x ln(P out)-0.00115 x Pout +0.67	≥ 0.071 x ln(P out)-0.0014 x Pout +0.57
> 49W to ≤ 250W	≥ 0.88	≥ 0.89	≥ 0.79
> 250W	≥ 0.875	N/A	NA

Chronology Efficiency Standards

In the early 1990s, it was estimated that there were more than 1 billion external power supplies active in the United States alone. The efficiency of these power supplies, mainly utilizing linear technology, could be as low as 50% and still draw power when the application was turned off or not even connected to the power supply (referred to as "no-load" condition).

Experts calculated that without efforts to increase efficiencies and reduce "no-load" power consumption, external power supplies would account for around 30% of total energy consumption in less than 20 years. In 1992, the U.S. Environmental Protection Agency started a voluntary program to promote energy efficiency and reduce pollution that eventually became the Energy Star program. However, the first mandatory regulation dictating efficiency and no-load power draw minimums wasn't put in place until 2004. The following section traces the path from the CEC's 2004 regulation up to the current standards that are in place today

Chronology Efficiency Standards *Continued*

April 2009

Europe enacted ErP Directive 2009/125/EC (Energy Related Products) with scheduled stages of implementation for efficiency and no-load requirements equivalent to Level IV and Level V standards. The schedule defined that the EU would harmonize with Level IV efficiency standards by April 2010 and Level V efficiency standards by April 2011.

April 2011

EISA 2007, CEC Tier 3, and ErP Phase 2 took effect in full harmony of their standards leaving us with what is now simply known as the "Level V Efficiency" standard, designated by the Roman numeral V surrounded by a circle

Power supply manufacturers indicate compliance by placing a Roman numeral V on the power supply label. Level V is enforced by the agencies all over the world except by UL in USA. However California requires also Level V.

April 2014

US Department of Energy (DOE) issued a pre-publication Federal Register final rule against the Notice of Proposed Rulemaking published in 2012. The new rule applies to all direct and indirect operation external power supplies (EPS), which are categorised into eight product classes. It not only increases the minimum energy efficiency requirement of EPS from level IV to level VI, but also extends their scope to encompass lower voltage AC- or DC-output EPS, multiple-voltage EPS and EPS with nameplate output power exceeding 250 watts.

10 February 2016

"Level VI" efficiency standard mandate takes effect. No-load efficiencies move down to 0.1 W for external power supplies ranging from 1 W to approximately 49 W, boost mandatory average efficiency by about 1%, and set standards for models with power ratings above 250 W for the first time.

The EPA estimates that external power supply efficiency regulations implemented over the past decade have reduced energy consumption by 32 billion kW, saving $2.5 billion annually and reducing CO2 emissions by more than 24 million tons per year. Moving beyond the mandated government regulations, many OEMs are now starting to demand "greener" power supplies as a way to differentiate their end products, driving efficiencies continually higher and even pushing the implementation of control technologies that in some cases eliminate no-load power consumption altogether.

For More Information

Contact: MEGA Electronics Inc at 732-249-2656 sales@megaelectronics.com

Download the MEGA catalog