

Tuesday, April 1, 2008

## Benefits of Environmentally Friendly Power Supplies

Increasingly, Lambda's customers are asking for and receiving Environmentally Friendly (EF) or "Green" power supplies. What constitutes an EF/Green power supply? There are a number of factors which contribute to a power supply being considered EF/Green. These include: RoHS compliance, electrical noise (EMI) suppression, high efficiency and power factor correction (PFC).

**RoHS Compliance:** Lead, mercury and other "hazardous" elements and chemicals used in the production of electronic devices have been identified, and by-law (since July 2006), have been banned or severely limited to their content in these devices, by the European Union (EU). These limitations are spelled out in what is called the RoHS Directives (Restriction of Hazardous Substances). Currently, all products sold to the countries within the EU must comply with the RoHS Directives. Many of the States here in America have adopted similar restrictions. Lambda has been a leader in providing RoHS-compliant power supplies even to their US customers who may not currently require them. This represents Lambda's dedication to making the earth a greener and cleaner place to live. Over 99% of Lambda's power products are RoHS-compliant with a few exceptions being for those industries that are RoHS-exempt such as specific military applications.

**EMI Suppression:** All electrical devices contribute in some way to the electrical noise that "pollutes" our power lines and airways in the form of unwanted noise spikes and radio interference. These unwanted noise generators are restricted to the amount of EMI (Electro-Magnetic Interference) they are allowed to emit by strict standards that are produced and maintained by the FCC and international organizations (e.g., IEC, EN). Power supplies are among the electrical devices that have an inherent electrical noise problem (both conducted and radiated) which must be addressed by the power supply designer and manufacturer. Without properly designed internal EMI filters and RF shielding, power supplies would become huge polluters of our electrical and electronic environment. Lambda power supplies comply with the most rigorous EMI suppression standards. For example, the very restrictive FCC Class-B EMI compliance is available, as standard, on many Lambda power supplies.

**High Efficiency:** The efficiency rating of a power supply is measured by comparing the AC power going into the power supply divided by the DC power coming out of the supply. For example, if 100 watts of AC power is used by a power supply for it to provide 90 watt of DC output power, the efficiency of the supply is calculated by dividing 90W by 100W, which equals 0.90 or 90% efficiency. When comparing a 75% to a 90% efficient power supply, the savings in electricity usage and wasted energy (in the form of heat) is quite significant.

**Power Factor Correction (PFC):** Modern switchmode power supplies should include active Power Factor Correction circuits in order to maximize the AC power that is used by the supply. The Power Factor of a power supply is technically the ratio of the real power consumed to the apparent power (Volts-rms x Amps-rms) and is a decimal number between 0 and 1.0. If left uncorrected the Power Factor (PF) of switchmode supplies will generally be around 0.65 or less. With active PFC, switchmode power supplies can achieve power factors from 0.96 to 0.99. Without PFC, switchmode supplies would draw their AC line current in the form of spikes or pulses, instead as a clean sinewave; the net result being that the AC power wires, circuit breakers and power generating plants need to be sized larger than if they are driving products that contain PFC power supplies.

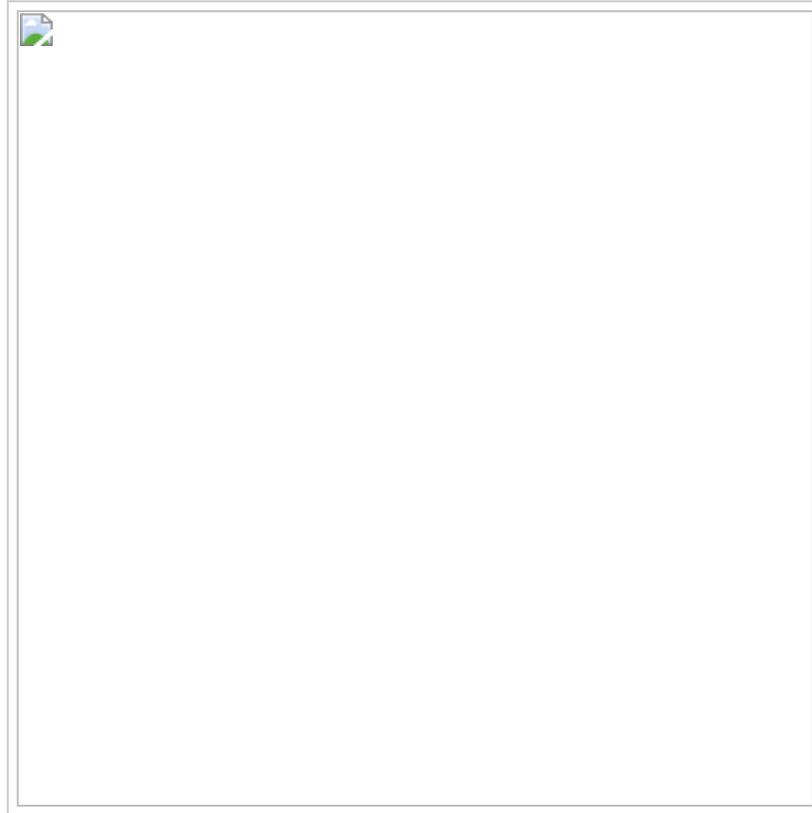
### So what does High Efficiency and PFC mean relative to being Environmentally Friendly?

Most electricity used within the USA is generated by burning fossil fuels such as oil, natural gas or coal. It has been shown that there is a green-house-effect that is increasing at an alarming rate due to the large amount of carbon dioxide that power generation plants produce. So, whenever we can reduce the amount of electricity used, we are contributing to a cleaner environment, a reduction of CO<sub>2</sub> in the atmosphere and our dependence on, and the transportation costs of foreign oil from the OPEC countries (the oil tankers burn diesel fuel, which further adds to the pollution).

In addition, there can be significant money savings to the power supply user. Basically the savings of just 1-watt dissipated in the power supply = 365 days x 24 hrs x 1W = 8.76kW/hrs per year. If electricity costs \$0.30 per kW/hr, that would amount to \$2.63/year per each watt saved. If we boost the efficiency of a power supply by only 5% on a 150W unit from 85% to 90%, that saves 7.5W [(150W x 0.15 = 22.5W) - (150 x 0.10 = 15W) = 7.5W]. That translates to \$19.73 per year savings (7.5W x \$2.63/year =

\$19.73/year), which is more than the purchase price of the power supply over its typical lifespan (4 to 5 years), plus, we have reduced the amount of carbon dioxide in the air. If we consider an OEM who uses a 90% efficient power supply (instead of 85%) in their end product and produces 100,000 units/year, the "total electric power savings" would amount to 100,000 units x 7.5W = 750,000 watts per hour, a significant power savings.

Furthermore, the higher the efficiency of the power supply, the less power is wasted in the supply and the less energy is needed to remove that wasted energy (in the form of heat), by cooling the supply or the room in which the equipment is used (via use of electromechanical fans, blowers, air conditioning, etc). The combination of high efficiency and PFC in power supplies allows the use of smaller gauge power distribution wires, lower-rated circuit breakers and fewer power generating plants (air polluters).



Lambda's HWS Series, 1000-Watt Switchmode Power Supply is fully RoHS-Compliant, Meets FCC Class B EMI, has integral active PFC (Power Factor =0.98) and has a typical operating Efficiency of 88%.

In Summary: As mentioned above, there are many factors that comprise an "environmentally friendly/green" power supply. And, the benefits to the end-user are significant. Lambda is a leader in the provision of these advanced power devices and our international presence insures that we will continue to be at the forefront of these "Green & Clean" power products.

Posted by [Power Guy](#)