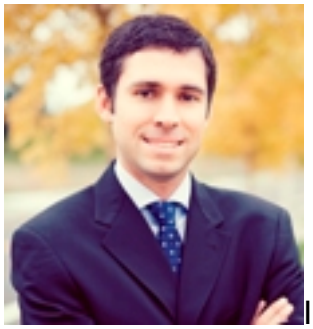
Power Efficiency Devices

How are you responding to the demand for low power/high efficiency devices in the emerging markets?

Jeff Schnabel, VP of Marketing at CUI Inc **[1]:**



In order to address the growing global concerns regarding energy consumption in electronic equipment, the power supply industry has largely focused on improving the operating efficiency of ac-dc power supplies and dc-dc converters. As existing power topologies begin to reach their limit with regards to operating efficiency improvements, a new battle line is being drawn in the quest to reduce overall power consumption. It is estimated that anywhere from 5-10% of the total power consumed in the United States is through “vampire draw,” power lost while electronic equipment is in standby or sleep mode. Governments have already identified that this is a major problem in external power adapters. Agencies such as the California Energy Commission (CEC) and the European Union through their EuP directive have put measures in place to set limits on the standby power consumption in all external ac-dc adapters shipped into their jurisdiction. The strictest standard, currently classified as Level V, sets the no-load limit at 0.3 W for power supplies rated under 50 W and 0.5 W for power supplies rated between 50 and 250 W.

Although standby power consumption regulations do not currently exist for most internal ac-dc power supplies, greater attention is being paid to this measure in the end equipment that incorporate these modules. At CUI, we have been working to address this trend, most recently in the medical and home healthcare industry. The medical electronics market, currently estimated to be $150 billion in size, is expected to grow at a 9% rate or the next 5 years, largely driven by aging Baby Boomers and the growing middle class in emerging markets such as China and India who can now afford improved medical care. As new medical equipment proliferates into the market, greater attention will be paid by customers and regulators to the energy consumption of these designs. In response to this trend, CUI has recently released a line of open frame ac-dc medical power supplies that not only provide operating efficiencies over 91%, but also offer standby power levels as low as 0.3 W. The VMS series is available in power levels of 20, 40, 60, and 100 W, and housed in compact open frame packages.

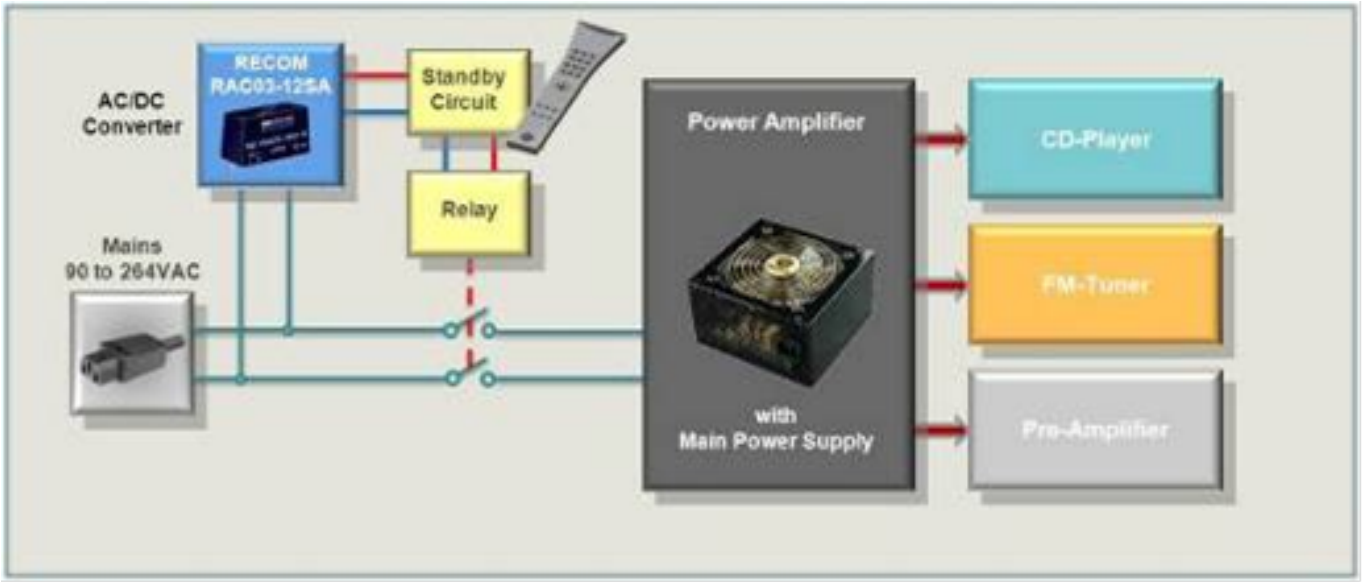
Ken Stead, New Product Development Manager at Molex [2]:

The connector is a critical part of the heat loss (also called I^2rR/ power lost) equation which compromises system power and efficiency. For connector manufacturers, we are looking at material properties, plating and contact designs to reduce overall resistance values. Copper alloys are being introduced with higher conductivity while simultaneously managing stress relaxation which occurs when contacts are exposed to heat over time under load stress. These newer alloys allow for higher conductivity yet have spring properties that prevent power terminals from taking a permanent set. It is important to take this into account; a “permanent set” will negatively impact the electrical performance as the material no longer springs back to create the required normal force to ensure reliable interface. Also, understanding the mating cycle requirements is key. Many of today’s hand held devices require constant recharging so connectors and/or batteries are mated and un-mated one or more times daily. Contact designs must be robust enough to withstand high mate cycles without degrading the interface which could lead to higher interface resistances and impact battery life. Considering the migration to 4G systems and the resulting increased power consumptions, batteries will be further challenged along with the associated interconnects.

Erick Young, Field Applications Engineer at RECOM Power Incorporated [3]:

In many new markets, and old, you hear today about the concern of ghost consumption, or the power that is required to hold a device or system in “standby” for the moment it is brought into action whether via a remote, a radio signal or satellite. Many of these systems in alternative energy, lighting, or remote controlled applications are already being implemented to save energy both by companies or municipalities looking to save money, or by government regulation. However, that savings and efficiency can be lost due to a main power supply holding the system in standby. But by implementing a standby circuit that controls a relay, powered by a small AC/DC converter such as RECOM’s RAC01 this can be avoided and the standby power consumption can be as low as 30mW!

For instance, an electronic unit that consumes 50 watts when switched on can only meet the EU-limits, if the standby function is powered via its own small power supply. These small supplies remain continuously active, whilst the main power supply is switched off via a relay, much the same as in the older days when an OFF-switch really meant that the unit was “OFF”.



The AC/DC-Converter RAC03 feeds the standby circuit of a HIFI-system and consumes 80mW -- substantially less than the 500mW demanded by the second step of the EuP-Directive 2013.

As an example the above schematic illustrates the concept of a modern HIFI-System. The individual systems components do not have their own power supply. The old days, when various plug-in power supplies acted as energy guzzlers, are definitely gone. The main power supply`s sole role is to furnish full power for perfect acoustics, but for only as long as the user desires. When activating the “OFF”-button on the remote control, the main power supply is switched off via a relay. Depending on the model, only around 100mW is now required to keep the system in standby

In the past there was hardly a market for miniature AC/DC-power modules – now there is a new market segment. RECOM extends its current AC/DC-converter offering with units for 1W, 2W, 3W and 6W, to offer an efficient solution for many applications. The RAC01 has a no-load consumption of only 30mW and is therefore lower by a factor 16 than specified by the EU. The 6W-module also is significantly below the standard consuming only 250mW.

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