

Supply and demand

Smaller, more efficient and cooler: the trends in system power. By **Graham Pitcher**.

While there has been extensive discussion about power consumption trends in portable devices, there has been less heard about the trends when it comes to systems.

Portable power consumption trends are well known: users want the batteries in their devices to last for longer between charges while supporting more power hungry features. That challenge has largely been addressed by semiconductor manufacturers, who have taken advantage of the scaling benefits driven by Moore's Law.

But what of the system? What are customers looking for and how are suppliers to the market meeting those demands?

Martin Southam is European marketing director for TDK-Lambda. He said the main trend is towards more 'eco friendly' design. "It's a buzzword," he admitted, "but it's an important topic, because most of the system power market is not covered by environmental legislation. Even so, there's an awareness amongst users that they need to select products which offer them higher efficiencies and lower power consumption."

Southam noted that some of this awareness had been driven by the development of such standards as EnergyStar and the EU's Energy Using Products Directive. "While much of the content of these measures is consumer related," Southam continued, "industrial users are aware of the measures and are looking to implement some of the requirements."

But it's not just a matter of efficiency per se, Southam noted. "What we are seeing more of is the user paying more attention to working efficiency. They are asking what power supply efficiency is like at the load their system will run at, rather than looking at the headline figure on a datasheet."

In turn, that is focusing customers' attention



on what Southam says is 'usable efficiency'. "For our part, we're pushing digital control as one way to help to achieve some of these ambitions."

Nevertheless, while customers pay greater attention to efficiency, they maintain an eagle eye on price. "It is often the case that customers will ask how much this will cost them. We can provide the higher efficiencies they are looking for by building more silicon into the design. But it does come down to the customer being able to balance between what they want to achieve and whether they are prepared to pay that extra bit to get the performance."

Different end users have different views of

their goals. Data centres have higher efficiency at the top of their list. "If they can get it, they want it," Southam observed. But companies designing and selling smaller items of kit might not be so interested in efficiency, he added.

Power supply manufacturers have, for some time, been able to improve the power density of their products by a combination of good design and appropriate use of silicon technology. But this has been a gradual process. "I can't see a step function increase in power density coming," Southam commented. "But, by going to digital control, we have found that we can save a lot of components. This helps with the volume aspect

of the power supply and therefore increases power density. Any changes in the future are likely to be evolutionary," he cautioned, "rather than revolutionary."

Higher power densities, while good in themselves, can create problems as well as solving them. "Heat is an issue," Southam agreed. "It's a balance. The smaller you make a power supply, the more difficult it becomes to maintain the device at a suitable temperature."

The problem is compounded by customers, in general, turning their backs on fans. "Increasingly," Southam pointed out, "customers are worried about noise issues. So we have to develop more effective ways of using convection cooling." For the moment, TDK Lambda is finding that it can realise products at a reasonable size, even though these are convection cooled.

TDK Lambda is also able to reduce product size because users aren't looking for as much complexity when it comes to output voltages. "We're seeing less demand for high current, low voltage systems than we have previously," Southam noted. "But there are always some exceptions. In general, customers are looking to 12, 24 or 48V outputs and to use these with onboard down conversion products. Point of load converters are now cheap, so it makes sense to use them. Today, we don't usually supply devices with outputs of less than 12V, whereas in the past, we used to feature parts with outputs of 3.3V and upwards."

Another benefit of this is that power supply internals don't need to be so heavy duty.

One trend Southam has noted is that customers are increasingly looking to rack mount devices, with profiles getting thinner. "Some customers are pushing for 1U deep products and that means they are trying to get more and more kit into a smaller space. This can push power requirements up," he believed.

Meanwhile, Unipower is responding to a perceived trend for power supplies that can be used pretty much out of the box.

It's just launched the Gravitas Sabre series of pure sine wave inverters (pictured bottom), featuring devices that have been preconfigured for use in a range of applications, particularly in telecom systems, network equipment and industrial systems. There are just three external



connections – dc standby or battery, load and utility – required for 'out of the box' operation.

"These preconfigured systems provide users with an efficient, eco friendly and easy to use smart inverter ac back up system capable of providing up to 18kVA" says Nigel Frey, Unipower's European sales and marketing director.

The devices support hot swap and feature full N+1 redundancy. Outputs of either 120 or 230V ac can be supplied, scalable up to 18kVA, from an input range of 40 to 58V dc, with efficiencies of around 90%.

Initially, Unipower has announced 10 standard 'ship from stock' packages, all of which include a static transfer switch module and a controller module for intelligent remote and local communications.

For its part, XP Power has recently unveiled the GFR1K5 (pictured top), a 1500W ac/dc power supply series aimed at industrial and communications applications that require bulk power within a 1U enclosure. There are four single output models, with output voltages of 12, 24, 48 or 56V dc, and an optional rack mount enclosure (pictured middle) allows up to four units to be mounted side by side.

The mechanical design includes a number of innovations, such as using only two pcbs to help airflow. Meanwhile, a dual stage power factor correction circuit and synchronous rectification techniques contribute to a power efficiency in excess of 90%.

Even though the product has been designed to improve airflow, it still requires some assistance when it comes to cooling. To provide this, the supply includes two load dependant variable speed fans.

And Southam sees the combination of a 1U chassis and higher power providing design problems for the future. "A 1U chassis with electronics is getting towards the top end of thermal management abilities, unless you start to think about water cooling," he concluded. "It's probably the practical limit for a fan cooled chassis."

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