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Cover Story
Opening doors
A strategic relationship with a distributor is helping an access
control company to face the future with confidence

Automotive Electronics
Yes we CAN!
How CAN partial networking is set to help automotive
manufacturers to improve fuel efficiency

Directives & Standards
One scheme fits all
A product testing passport is set to give electronic device
manufacturers access to almost all global markets

Board Level Technology
Know your limits
As high speed interfaces at the board level push towards
10Gbit/s, signal integrity issues become critical

Processors
Serving a different purpose
As the server market changes, can ARM based processors
challenge the incumbents?

System Power
Up before the bench
Pure linear regulation still has its place; particularly for users
who require stability and the lowest output noise

Marketwatch
New Electronics' monthly round up of component pricing
POWER MADE SIMPLE, MADE SMARTER

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The dram market is a volatile place where only the brave and the foolish venture. Companies need to use the latest processes in order to minimise the cost per bit, while supply and demand issues can see prices collapse. In the past, devices have been sold for less than they cost to make and, over the years, various competition authorities have looked at the market with interest.

Even so, at some point, all leading semiconductor companies have tried to address the dram market, but few remain engaged. Some, such as NEC, saw the writing on the wall and exited gracefully by selling their interests to more enthusiastic companies. Others, like Infineon’s Qimonda subsidiary, soldiered on, only to fail, despite being a technology leader.

Despite the culls, the dram market remains extremely competitive. While revenues have recently started increasing, this follows a sustained period of steep price decline.

It’s a business tough enough that even Elpida, the fourth largest dram company, appears to be in near terminal financial difficulties and may be a takeover target. Rumour has it that Micron and Elpida will join forces, creating a company large enough to challenge Samsung, which currently holds more than 50% of the market and is believed to be the only profitable dram maker.

If the merger does happen, two large companies with substantially different cultures will have to come together. That’s a tall order at the best of times and there are many examples of where such mergers have been attempted, but without success.

However, there is a complicating factor. The electronics industry often – some would say almost always – appears to defy the logic of economics and there’s no guarantee that, even if what would be the second largest dram company can be created, the new body will bring the benefits the architects of the move envisage.

Graham Pitcher, Group Editor [gpitcher@findlay.co.uk]

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Untangling Quantum Memories

Seven US universities are collaborating on a five year project to determine the best approach for generating quantum memories based on interaction between light and matter.

The researchers will look at three ways to create entangled quantum memories for use in securing long distance transmission of secure information. The work will be led by Georgia Tech, with researchers from Columbia University, Harvard University, MIT, the University of Michigan, Stanford University and the University of Wisconsin.

Alex Kuzmich, a professor in Georgia Tech’s School of Physics and project’s principal investigator, said: “The three basic capabilities will be: storing quantum information for longer periods; converting information to light; and transmitting information over long distances.”

Drop in for Advice

Premier EDA Solutions and the Institute for Product Design and Manufacture have opened an Altium sponsored drop in centre in Scotland.

Situated at the Alba Business Park in Livingston, the facility will feature workstations equipped with Altium Designer software and will be accessible to Scottish SMEs and individuals who have an idea for a new technological product or are developing an existing one.

For more, go to www.eda.co.uk

Improving Military Communications

Cambridge Consultants has developed ModStar, a software defined radio architecture that is said to offer higher rf performance, lower power consumption and smaller, more flexible military radios.

The design is simplified through the use of an open loop polar modulator with non continuous time feedback and software predistortion. Nujira’s Coolteq envelope tracking technology is also used to boost performance.

Silicon Labs makes its first foray into the 32bit MCU market. Graham Pitcher reports.

Having previously based its microcontroller products on the 8bit 8051 core, Silicon Labs has launched a 32bit MCU range based on the ARM Cortex-M3 core. The move, announced by the company at Embedded World in Nuremberg, is said to bring ‘unprecedented design flexibility’ to the 32bit market.

The Precision32 family includes 32 footprint compatible devices, with USB as an option. The parts are being targeted at a range of applications, including portable medical devices and home automation systems.

“We’ve engineered the Precision32 family to give embedded developers a better 32bit alternative, with superior design flexibility, peripheral integration, analogue performance and ultra low power – all at very competitive prices,” said Mike Salas, general manager of Silicon Labs’ MCU products.

Responding to what it sees as a lack of architectural flexibility in 32bit MCUs, particularly for pinout and peripheral placement, Silicon Labs has developed a dual crossbar technology and a drag and drop GUI. Using these, developers can choose their analogue and digital peripherals and their pin locations.

“We also support developers with a highly integrated and comprehensive hardware and software ecosystem with free software tools,” said Salas.

Silicon Labs has also applied its low power design technology to the devices. As a result, active current consumption is 22mA at 80MHz, equivalent to 275µA/MHz, and sleep current is said to be two orders of magnitude less than that of other 32bit devices – 0.35µA with the real time clock enabled and 4kbyte of ram supported.

The devices, available in production quantities, feature from 32 to 256kbyte of flash memory and can be supplied in five leaded and leadless packages. www.silabs.com

Taking the plunge

Five trends highlighted in whitepaper

National Instruments has released its 2012 Embedded Systems Outlook, which lays out its view of how the embedded systems market will develop.

The report lists five technology and business level trends that impact the development of next generation embedded systems. The trends are: Embedded Platforms; Reconfigurable Computing; Mobile Devices and the Cloud; Innovating With Smaller Teams; and Future Proofing Through Software, suggesting design teams need to adopt a ‘software first’ mindset when upgrading products. To download the report, go to www.ni.com/eso.

Meanwhile, National Instruments has announced four single board RIO devices, each featuring a Spartan-6 FPGA, analogue and digital I/O and peripherals for embedded control and monitoring applications. The boards offer a range of flash and ram combinations, with expansion capability via mezzanine cards.

Wonder Geckos mean ‘no battery powered compromises’

Energy Micro is extending its EFM32 Gecko MCU range with the addition of 60 products based on the ARM Cortex-M4F core. The company now offers more than 240 parts in its portfolio.

Called the Wonder Gecko range, the MCUs are claimed to offer a blend of control and signal processing functionality, along with technology to minimise energy consumption.

Andreas Koller, vp of worldwide sales and marketing, said: “It’s the most energy friendly M4 based MCU available. By combining DSP and floating point functionality with our low power technology, designers won’t have to make compromises when developing battery powered devices.”

With up to 256kbyte of flash memory and up to 32kbyte of ram, the Wonder Gecko devices boast an active mode current consumption of 180µA/MHz. A deep sleep mode consumes 400nA with the real time clock running, while a shut off mode draws 20nA, with a wake up time of 2µs.

According to the supplier, Wonder Gecko processors will sample in Q3 of 2012.

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**News**

**Quantum Computing**

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**Tabula to use Intel's 22nm fabs**

In a move which it hopes will give it the ability to address high performance system designs, programmable logic developer Tabula has signed a deal that will see its 3pld devices manufactured on Intel's 22nm process. The move is thought by the company to give it a "head start of several years".

The 3pld family is based on Tabula's Spacetime architecture and the company believes this, combined with Intel's process, will result in high performance devices that require significantly less silicon than those implemented with traditional fpga fabrics.

Tabula signed a similar foundry agreement with programmable logic developer Achronix in November 2010.

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**DSP core upgraded**

Silicon IP licensing company CEVA has announced the CEVA-XC4000 architecture, which delivers five times the performance of its XC323 DSP core, while consuming 50% less power. The architecture is available as six fully programmable dsp cores, offering developers a range of performance points. The combination of code compatible cores, optimised software libraries and a single tool chain, is expected to allow customers to reduce their software development costs.

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**LSI adds to Axxia**

LSI has added the AXM2500 to its Axxia communication processor family. The device, which blends network processor and multiservice processor functionality, is based on the PowerPC 476FP processor and is LSI's first 28nm product.

Richard Benson, senior product line manager, said the explosion in data was pushing intelligence towards the edge of the network. "The edge was once dsp focused, now there's the need for more cpus."

The AXM2500 is one of a range of software compatible devices in the Axxia range. While those for use towards the edge of the network are more likely to be PowerPC based, those at the core are featuring up to 32 ARM cores as operators push for higher compute density.

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**Single atom transistor created**

**Australian team develops working transistor with one atom.**

**Chris Shaw reports.**

Researchers at the University of New South Wales have developed a working transistor consisting of a single atom placed precisely in a silicon crystal. The move is believed to pave the way for future quantum computers.

To develop the device, physicists from the University of New South Wales used one phosphorus atom patterned between atomic scale electrodes and electrostatic control gates as an active component. According to the researchers, this is the first time anyone has shown control of a single atom in a substrate with this level of precision.

The device has visible markers etched onto its surface, so metal contacts can be connected and a voltage applied. UNSW researcher Dr Martin Fuechsle said: "Our group has proved that it is really possible to position one phosphorus atom in a silicon environment – exactly as we need it – with near atomic precision and, at the same time, register gates."

A scanning tunnelling microscope (stm) was used to manipulate atoms at the surface of the crystal. Using a lithographic process, phosphorus atoms were patterned into functional devices on the crystal and then covered with a non reactive layer of hydrogen. Hydrogen atoms were removed selectively in precisely defined regions with the stm’s metal tip and a chemical reaction then incorporated phosphorus atoms into the silicon surface. The structure was then encapsulated with a silicon layer and the device contacted electrically.

According to the researchers, the device’s electronic properties were in ‘excellent agreement’ with theoretical predictions for a single phosphorus atom transistor. [www.unsw.edu.au](http://www.unsw.edu.au)

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**Scopes upgraded to 1GHz**

Agilent Technologies has added four 1GHz models to its InfiniVision 3000 X-Series oscilloscope range. According to the company, the move addresses the most popular customer request for the family. The 1GHz scopes are available in DS0 and MS0 formats and with two or four channels. Agilent has also added a three digit voltmeter and a five digit counter, both using regular oscilloscope probes. Peter Kasenbacher, EMEA product line manager for high volume oscilloscopes, said that a 1GHz scope was once an advanced product. "Now, it’s available in a bench top device."

In addition, Agilent has unveiled a new 1GHz active probe. The N2795A probe is designed to match the performance needs of 3000 X-Series scopes, but at a price comparable to equivalent bandwidth passive probes and without impedance trade offs. [www.agilent.com](http://www.agilent.com)

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**Scope includes JTAG functionality**

XJTAG and Pico Technology have developed the first integrated boundary scan and oscilloscope solution. XJTAG Expert features a high speed USB 2.0 to Jtag controller, as well as digital oscilloscope, spectrum analyser, waveform and function generator and serial protocol analyser functionality.

Simon Payne, XJTAG’s ceo, said: "As board designs have become more densely populated, restricted access to devices such as bgas means oscilloscopes have to evolve. XJTAG Expert is the next logical step."

Alan Tong, Pico’s managing director, added: "The PicoScope software is well suited to this system as it’s a Windows program that can run alongside the XJTAG software on a pc without modification."

[www.xjtag.com](http://www.xjtag.com)  [www.picotech.com](http://www.picotech.com)

*For more on pc instrumentation, see the 13 March issue of New Electronics*
Real-time control of safety-critical applications has been a long-time challenge for engineers. Application functions are becoming more complex and industry standards require more sophisticated functional safety methodologies in both the automotive and industrial markets.

EBV and Freescale, as leading solutions providers, help customers address these complex and stringent functional IEC/ISO safety requirements based on current & upcoming international standards.

System designers can count on EBV’s design support based on Freescale’s SafeAssure™ program. SafeAssure solutions stand up to rugged conditions and are supported by the necessary documentation and safety expertise, reducing the time required to develop safety systems.

For more information and application know-how, please talk to your local partners of EBV Elektronik, Freescale’s leading specialist in EMEA semiconductor distribution.

More Information is also available online at: www.ebv.com/freescalesafety.
Setting new standards

BEEAs winning technology to improve mineral recovery: Chris Shaw reports.

BEEAs winner e2v technologies is to work with international mining group Rio Tinto to develop its ProWave microwave and radio frequency generators to improve the efficiency of mineral recovery from previously discarded ore. According to e2v, the machinery will set a new standard in mineral recovery.

The companies will collaborate to build microwave generators on a scale not previously seen that are safe, reliable and which can be deployed commercially. One of the first trials is expected to be at Kennecott Utah Copper in the US later this year.

Rio Tinto’s head of innovation John McGagh said: “[Our goal is] to recover ore from previously mined material that would normally have been discarded. If we can commercialise this technology at scale, it will be akin to tapping into a new ore body.”

e2v recently won a £6.25 million grant from the Regional Growth Fund and will use this to develop its ProWave industrial processing systems.

• Meanwhile, e2v has recently delivered one of its award winning ProWave vermiculite processing systems to Silvaperl for a commercial field trial. The trial has identified the need for some improvements, which will be completed within six months.

IP infringement claimed

Peregrine Semiconductor has sued RF Micro Devices and Motorola Mobility, claiming they have infringed its patents relating to silicon on insulator technology for rf ics.

Peregrine’s CEO Jim Cable said: “Our innovative products are ... the result of more than 20 years of intensive R&D and the investment of approximately $200 million. We intend to vigorously protect our IP”.

Responding, RF Micro Devices said it respects the IP rights of others and takes care to avoid infringements.

Aerospace actuator project

Microsemi is joining a multidisciplinary consortium funded by the European Union’s Seventh Framework Programme (FP7), which is looking to develop standard electromechanical actuators for aerospace applications. The three year integrated project, called Actuation 2015, brings together more than 50 partners to address a range of actuators in all types of aircraft.

Microsemi will take part in the development of the specification and subsequent design, manufacture and test of a standardised power module.

Funding new space initiatives

More than 20 UK companies will share £2.5 million of government support to enable them to develop commercial products and services using space technology or space derived data.

The funding – from the UK Space Agency, the Technology Strategy Board and the South East England Development Agency – will support 28 fast track R&D projects, each lasting between six and nine months. Projects range from novel propulsion for cubesats to technology to exploit the Galileo navigation satellite system.

Dr David Williams, chief executive of the UK Space Agency, said: “The space industry is one of the fastest growing sectors of the UK’s economy, contributing £7.5 billion annually. The National Space Technology Programme will help us further this success by providing an opportunity for promising UK space technologies and applications to be developed to meet their full potential.”

Will you be a winner this year?

The ProWave system won Green Product of the Year at last year’s British Engineering Excellence Awards. For more on this year’s event, go to www.beeas.co.uk.
NXP and EBV: The Heart of Cortex

NXP and EBV make your Cortex dreams come true.

The NXP ARM® Cortex™-M portfolio – one of the largest in the industry – covers the entire spectrum of embedded applications. Cortex-M0 devices are ready to replace traditional 8/16-bit architectures. Cortex-M3 offers best-in-class bandwidth and connectivity, and the new Cortex-M4 products provide high performance signal processing capabilities within reach of the typical MCU programmer.

All Cortex-M devices build on an optimized ARM core to deliver higher performance, consume less power, and offer more peripherals. Designers can choose from the many tools available in the ARM ecosystem, or use a single, comprehensive tool chain to support all Cortex-M devices.

NXP’s state-of-the-art ARM technology combined with the design and application know-how of EBVs ARM specialists transform your design ideas into real products.

Feel the beat of “The Heart of Cortex” and contact your local EBV partner or check at: www.ebv.com/heartbeat.
Technology Watch

Modern cryptography
Examining the benefits and the pitfalls of modern cryptography
24/01/12
http://tinyurl.com/7zxbk6e

Power saving with more accurate ac motor control
According to a 2002 report, more than half of the electricity produced in the US flows through motors
22/02/11
http://tinyurl.com/7jaosfs

Videos

28Gbit/s retimer technology preview
A preview of TI’s 25 - 28 Gb/s retimer technology
01/02/12
http://tinyurl.com/6m8t9y

Getting started with the MSP430 5xx experimenter’s board – intro
Introduction to a series of workshops
01/02/12
http://tinyurl.com/7jsfk3x

SimpleLink introduction
Introduction to SimpleLink wireless connectivity solutions
10/01/12
http://tinyurl.com/8b2pje

Modding project
Transforming an iPhone into a handheld gaming device
09/01/12
http://tinyurl.com/757p72v

Forum

CAD for electrical drawings
Which is the best CAD software for electrical drawings (automation, PLC)?
http://tinyurl.com/6rnvjsxg

www.neweelectronics.co.uk/forum

News

1 Graphene to enable molecular electronics? 10/02/12

2. NXP announces world’s first dual supply voltage ARM Cortex-M0 mcus 14/02/12
http://tinyurl.com/7zaag4a

3. Adaptor board adds peripherals to ARM mbed system 09/02/12
http://tinyurl.com/6qke79c

4. Freescale processor achieves highest ever CoreMark 09/02/12
http://tinyurl.com/8y2sazq

5. Fujitsu launching more than 200 ARM based mcus 13/02/12
http://tinyurl.com/74chaos

6. UK supercomputers enable groundbreaking research 14/02/12
http://tinyurl.com/6qve6o

7. Single layer graphene 14/02/12
http://tinyurl.com/80h3amu

8. Reset chips address problem of frozen gadgets 20/02/12
http://tinyurl.com/7q726nl

9. Counterfeit components quadruple since 2009. 15/02/12
http://tinyurl.com/6uq6ab

10. Analog Devices tool simplifies rf design 15/02/12
http://tinyurl.com/6x8aq4e

Blogs

28nm chips
Making 28nm chips isn’t easy, who would have guessed? 14/02/12
http://tinyurl.com/89wzvm5

DRAM leaders rumoured to be merging
Will Micron and Elpida join forces? 20/02/12
http://tinyurl.com/75owz9t

Archive: New Electronics 1982
From the pages of New Electronics 30 years ago this week 27/01/12
http://tinyurl.com/7fyna8e

Fundamental research
IBM continues to do the fundamental research that others have abandoned 24/01/12
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Technology

Haptics
Will haptics transform the way in which we interface with electronic devices? 14/02/12
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FPGA-PCB codesign
A 21st Century approach to integrating fpgas into the pcb design process 14/02/12
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Powering developments
Power management in battery powered medical devices 14/02/12
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Opening a new chapter
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Vicor gives power system architects the flexibility to choose from modular, plug-and-play components, ranging from bricks to semiconductor-centric solutions with seamless integration across all power distribution architectures. From the wall plug to the point of load.

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Opening doors

A strategic relationship with an electronic component distributor is helping an access control developer to face the future with confidence. By Graham Pitcher.

The trend amongst electronics companies is to outsource manufacture of their products and the larger the projected sales volume, the further away the contract manufacturer tends to be from where the product has been designed.

Yet a Brighton based company has decided to go against the flow: it has brought pcb manufacture back from a West Midlands subcontractor into a purpose built factory. Along the way, it has forged a strategic relationship with an electronic components distributor. Now, the company is poised to take advantage of both moves to address the future with growing confidence.

Paxton Access, a leading manufacturer of electronic access control systems, was established in 1985 to design and manufacture intelligent and innovative products that are fit for purpose.

The market which Paxton addresses is large, but it has the advantage of being one of only a handful of companies selling access control systems on the UK market. Currently, 80% of revenues come from sales through UK distributors, including some well known names, but that is set to change as Paxton looks to enter a new growth phase by targeting the export market.

Paul Rawlinson, Paxton’s joint managing director, whose responsibilities include R&D and manufacturing, said the company is looking to grow sales by 25% in 2012. “We have just launched our first new product for five years and will be following that with another in the next few weeks. Developing both products required substantial financial investment and it’s an exciting time for Paxton.”

The latest product is Net2 PaxLock, a battery powered access control unit contained in a slimline door handle. It communicates with a server over a wireless link. Said to be simple to use and fit, the system is suitable for use with internal doors.
Meanwhile, Paxton has been on a growth curve for the last couple of years and, according to technical procurement manager Timon Mutter, this has been strong over the last decade. “The company has shown an average growth in sales of 19% a year for the last 10 years. Even last year, our sales grew by 15%.”

But success brings with it some challenges. Mutter explained: “We have invested around £1 million to create a surface mount/through hole pcb manufacturing facility in Eastbourne. All of a sudden, we have found ourselves needing to buy significant quantities of components. We needed the right partner – both technically and commercially – and Future Electronics has filled the gap. Future is now Paxton’s number one supplier and it’s a strategic relationship which is beneficial to both sides.”

Rawlinson expanded. “We decided to bring manufacturing in house, but had to look at the cash flow and what Paxton could achieve. We talked with Future, with whom we were spending a relatively small amount. The result has been better control and better prototypes.

“One of the problems of using a subcontractor is that we couldn’t tell them to use a particular supplier and that meant we didn’t have as much control over quality as we would have liked.”

While Future brings obvious benefits to Paxton when it comes to component supply, it is also providing unexpected benefits through technical support.

Mutter said: “Future is helping us when we’re looking at developing new products. While our engineers will take a spec and work on an architecture for the idea, we also need to know what’s out there; for example, processor choices. Should we be looking at an ARM based device, for example, and what are the cost and availabilities?”

But while there is help in identifying the right components for future products, Future has also taken a look at existing products. “Future has looked at some of our key products,” Mutter continued, “and came up with a redesigned bill of materials for cost reduction in one of our key products. This process will be completed in the next couple of months.

“We have 25 development engineers addressing the hardware, software and mechanical aspects of our products. There’s only so much resource available, so cost reduction of existing products takes a back seat because we’re looking to develop new products,” he added.

Simon Groat, Future Electronics’ area sales manager, said the redesign started as a commercial transaction, but moved on rapidly. “There was a high value part on the board which Future wasn’t supplying,” he said, “so we asked ourselves what could we do? Future’s engineers had a look at the design and, rather than sourcing the product on Paxton’s behalf, we looked to add value by removing the part altogether. We engaged with another supplier and generated a schematic.”

Since then, Future has taken a look at a Paxton power supply. “While Future didn’t hit our cost target,” Mutter observed, “it’s another example of how we’ve been able to focus on new product development, while Future has done work we didn’t have the opportunity to do.”

Groat pointed out another benefit. “Customers get the benefit of an aggregation of our experience. As a company, we see a lot of examples of how things are done well, but we also see things that aren’t. This allows us to say ‘be careful with this’ and so on.”

An example is helping Paxton with the selection of microcontrollers and

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even arranging for a leading supplier to give an insight into its road map. Mutter said. “There are a number of companies supplying ARM based microcontrollers. One may offer a cheaper product, but that might not have all the features we’re looking for. So we need a cost benefit analysis; we need to know the pricing is right and we need to know the product will be available when we need it.”

Groat explained the relationship with Paxton. “We’ve gone a step further with this strategic relationship. We’re trying to link all parts of the supply chain, so when Paxton has an idea for a new product, we can start engaging with manufacturers to feed in their requirements.”

Although Future and Paxton have a strategic relationship, it’s not exclusive; Paxton still deals with other distributors. Prototyping is one example. Mutter said that, if Paxton’s engineers wanted something straight away, “you can’t beat the likes of Digi-Key”. “We might also go to a supplier like Future in order to get the part as soon as possible. But our relationship is such that we should already be engaged in the process and have ideas about parts and availability – and part of that process is the supply of samples.”

Groat reinforced the concept. “The best use of Future is to bring us in as early as possible in the design cycle – and that can be as early as when someone comes up with an idea.”

engineers are working on longer term projects. Groat said the relationship between the two companies also played well here. “We can interact on a number of levels – from the ‘here and now’ all the way to ‘blue sky thinking’. That requires different levels of expertise and there has to be connected thinking; Timon helps us to connect.”

While design is one element; managing the manufacturing process is another challenge. Instead of calling off boards from a supplier, Paxton is now charged with organising its own requirements. “One of our challenges,” Mutter conceded, “is the ability to forecast demand with confidence. Alongside strong growth in demand, we also experience ‘spike orders’. This has required Future to make an investment in stock; as we have a lean manufacturing operation, we need to be able to call for components at short notice.”

Looking at the relationship from his position as joint managing director, Rawlinson is pleased. “Our engineers now know who to talk to; they didn’t before and mistakes were made. Now, we’re getting good results.”

But he also realises that Paxton is now a somewhat different business. “We have always been a manufacturer, but it was basic assembly. Now, we’re an engineering company and we’re doing the difficult stuff. Future gives us the ways and means to do it. Good clear communications might sound like a little thing, but we’ve never had it before.”

Mutter underlined the view. “Future has good knowledge and carries a large inventory, but the critical thing for us is that it understands what our engineers are thinking.”

Working closely with Future appears to have allowed Paxton to face the future with confidence. Rawlinson concluded: “We have been worrying about cash flow since 2007; using a subcontractor was affecting our time to cash. The relationship with Future has helped us to concentrate on the road ahead. We wanted to go forward with a distributor who would work with us to meet the challenges of growth, but we wanted to do things our way. Even so, we have had to make an effort to make the relationship with our chosen distributor work.”

The Net2 PaxLock can be operated using a token or by an rfid card reader

New distribution approach makes big company benefits more widely available

Chris McAneny, pictured, director of strategic business development for Future Electronics EMEA, says the UK’s industrial landscape looks very different today. “Instead of major electronics companies, there is an abundance of vibrant and creative small and medium OEMs – and most are consumers of electronic components.

“It is very common that a distributor like Future will play an integral part within their customer’s business, via such activities as design support – as part of a make or buy decision – and supply chain management.

“Working capital is another pressure point for SMEs. Here, companies like Future can offer significant support by funding the cost of inventory holding and by offering extended credit terms.”

McAneny believes a well designed business model that leverages the core competencies of a company and its distributor will have significant advantages. But he points out that “one size does not fit all.” “Each customer has individual requirements and distributors need to use proven building blocks of competence and experience to develop a solution that delivers tangible benefits to both parties.”

Looking to play a greater role in this market, Future has created FAI Electronics to offer a range of services that have generally been available only to larger companies. FAI is looking to build business relationships and to accelerate customers’ time to market. Included are such services as: guaranteed availability of stock; enhanced credit terms; local language telephone technical support; and lower than standard minimum quantities for online orders.

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NI TestStand

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Yes we CAN!

How CAN partial networking is set to improve fuel efficiency.
By Graham Pitcher.

Efforts to make cars more environmentally friendly have focused on the internal combustion engine for obvious reasons. The work dates back to the 1960s, when the California Air Resources Board set standards which car makers had to meet. Europe has followed with a succession of emission standards. For instance, US regulations require an average fuel consumption of 37.8mpg by 2016 and 50.6mpg by 2025. In Europe, the EURO 4 and 5 requirements are kicking in and China is following suit.

Alongside those efforts, manufacturers have looked at the use of lighter materials and the replacement of the heavy cable harness as ways to improve fuel efficiency.

While these efforts have made significant contributions to the 'greening' of the car, a recent initiative is looking to boost efficiency by another couple of percentage points by targeting the in car networking system.

Alessandro Campailla is market development manager, car body electronics, for STMicroelectronics. “The power consumption of electronics is going in the opposite direction to improved efficiency – and one of the things which is using more energy is the microcontroller. There are more of them and systems are becoming more complicated.”

With tops of the range cars now integrating probably 100 or more electronic control units (ecu) to handle everything from the antilock braking system to opening the sunroof, communications has become a central part of car design (see fig 1). These control systems are linked by a range of communications networks, ranging from LIN for applications like electric windows, to Ethernet, for linking control modules. But much in car communication is still accomplished using CAN – the controller area network.

CAN is a child of the 1980s, with the first devices introduced by Intel and Philips [now NXP] in 1987. It takes the form of a multimaster broadcast serial bus. Each node on a CAN network can send and receive messages, but not simultaneously. A message is transmitted serially on the bus and is sensed by all nodes. That aspect is being addressed with the introduction of CAN partial networking, because in current CAN networks, every ecu wakes up each time it sees a message, even if the message is nothing to do with it. And waking up burns energy.

Karsten Penno, marketing director for NXP’s integrated in vehicle networking business, explained the significance of CAN partial networking. “All ecus operate when there are communications on the CAN bus and they consume power, no matter whether they are doing anything or not. Take a seat control module as an example. You might only use it for 1% of the time, but it will draw power. With CAN partial networking, the ecu is off, even though there are communications flowing, and will only wake up if the message is intended for it. That means lower power consumption, lower CO2 emissions and better fuel efficiency.”

Campailla added his example. “When you lock your car from the outside, that module uses CAN and will wake up the engine control unit, the climate control system and so on. With partial networking, when the door is locked, it will only wake up the relevant subsystem.”

The concept has already been well received by some car manufacturers. Riki Hudi, head of electrics/electronics for Audi, said in June 2011: “Audi and Volkswagen have started to introduce partial networking into the next generation of car models.”

Campailla said: “OEMs will start to use partial networking in vehicles with large numbers of mcus. But this requires
new transceivers and will therefore be more expensive. There is demand, but it will probably be a couple of years before it becomes significant.”

Partial networking has benefits to consumers and manufacturers alike, says Penno. “Customers get greener cars,” he said, “with the potential for tax savings as CO2 emissions are lowered. Manufacturers, meanwhile, have been struggling to reduce emissions and this contributes to more efficient cars.”

The approach does, however, require a modification of the existing CAN standards: car manufacturers work to two standards – ISO11898 6 and Autosar RT3 2.1. “There will be the benefit of standardisation,” Penno continued. “Partial networking isn’t a differentiator for manufacturers. Although it’s being driven by German companies, it will be written into a global ISO standard.”

Campailla added: “If you want a device that works across a set of customers, you need to comply with both standards. But it’s likely that we’ll see more Autosar compliant parts.”

ST has launched the L99PM72FPXP, said to be the result of close cooperation with a leading German car maker. The device integrates High Speed CAN and LIN physical layers, providing all the functions needed to build up an ecu for car body applications. It monitors the CAN bus autonomously and activates the module only when a correctly addressed wake up signal is detected.

NXP, meanwhile, has developed the standalone TJA1145 transceiver (see fig 2) and a more integrated device, the UJA1158 system basis chip. Penno explained the approach. “Previous devices featured only an internal power supply and a CAN transceiver. With partial networking, a number of new elements are needed.”

The transceiver now passes information to the CAN protocol decoder, which uses the input from a precision oscillator to track CAN traffic on a bit by bit basis. It outputs information to a message filter, which determines whether or not the associated module should wake up. If it should, the internal supply powers up the mcu.

Configuration also differs from the previous approach. Penno said: "This uses a four wire spi interface with the mcu, rather than the three wires used in the TJA1041.”

Although NXP has designed the TJA1145 to occupy the same footprint as the TJA1041, there is a higher level of complexity, and NXP discussed whether this should be handled by the host mcu. “We decided that savings could be maximised by putting the partial networking functionality into the transceiver,” Penno continued. “There are also coding benefits.”

This approach allows tier 1 manufacturers to prepare for partial networking, even if they don’t intend to implement it immediately. “The devices have the same footprint, so manufacturers can decide when they want to use the CAN partial networking enabled part.”

The UJA1158, meanwhile, offers more functionality. “This adds such functions as a 100mA/5V regulator, a protected 5V sensor supply and a watchdog timer,” Penno noted.

While the immediate focus for CAN partial networking is cars powered by regular fuel, the approach is also likely to have an impact in the emerging electric vehicle/hybrid electric vehicle (EV/HEV) market.

Penno explained: “There will be advantages for ev/hev developers. Every mA saved extends the car’s operating range. So, while manufacturers believe CAN partial networking could save 2.6g of CO2 per km, it is also expected to conserve 100W in EV/HEV applications. This might seem like only a few percentage points, but it will be a key contribution to reducing CO2 emissions.”

While the intention is not for ‘mission critical’ modules – such as ABS – to be disabled, this could happen with EV/HEVs during charging. “When you charge an EV,” Penno said, “the CAN bus is active and power is being consumed. That’s not efficient. In the future, we might be able to switch off such elements as the engine controller and the ABS to bring faster charging.”

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One scheme fits all

A product testing passport gives access to all areas.

By Jean-Louis Evans.

On an increasingly technologically level playing field, brand reputation sets one manufacturer apart from another. A significant part of that reputation comes from a positive user experience, created through safe and reliable products that satisfy the intended use, meet expectations and don’t harm anyone. Yet, because CE marking relies on a manufacturer’s declaration that the product complies with the relevant European legislation, there is no guarantee that a product is safe. It is increasingly common for less scrupulous manufacturers to simply affix the CE marking, sign the declaration of conformity and not bother testing products.

For those manufacturers wary of the pitfalls of CE marking self declaration and who are looking to ensure their products are deemed safe, the CB Scheme offers something beyond wider access to international markets.

CE marking remains an EU requirement for imported goods and responsible manufacturers will want to ensure their products meet the legislation. The good news is the CB Scheme encompasses all of the requirements of CE marking regulations, delivering to manufacturers the evidence they need to declare and prove CE marking compliance.

The CB scheme is gaining in popularity because it is more regulated and is controlled by the IEC System for Conformity testing and Certification of Electrotechnical Equipment and Components (IECEE).

The CB Scheme is the first international system for the mutual acceptance of test reports and certificates for electrical and electronic components, equipment and products. It offers a single test, covering electrical safety and emc, that gives manufacturers access to international markets for their electronic products. It encompasses 22 product categories, ranging from entertainment equipment and toys to portable tools and medical equipment. Most certificates issued covering IT/office equipment, domestic white goods and domestic audio/video products.

The main objective of the CB Scheme is to facilitate trade by promoting the harmonisation of individual national standards with international ones, and to bring manufacturers a step closer to the utopian ideal of ‘one test, one market’. This multilateral agreement, which reduces the need for duplicate testing significantly, is operational in more than 50 countries and is being used by more than 15,000 manufacturers. It is also widely accepted beyond the countries that participate in the scheme.

The CB Scheme offers a single test that gives manufacturers access to international markets for their electronic products.
While the CB Scheme is gaining popularity, many companies still seem reluctant to take advantage. Instead, they continue to apply for testing and certificates with a plethora of certification bodies to gain access to individual export markets. By not taking the CB Scheme route, development costs are higher and time to market for new products is slowed significantly, potentially making products more expensive and less competitive once they do hit the market.

Under the CB Scheme, the National Committee of each member country designates a National Certification Body (NCB) or Bodies, which are responsible for issuing CB Test Certificates. The testing is conducted by CB Test Laboratories (CBTLs) affiliated to the NCBs. There are currently 75 NCBs and 359 CBTLs worldwide, with more than 170,000 valid CB certificates in circulation. Tests are based on the use of international (IEC/CISPR) standards and the resultant CB Test Certificate proves that a product complies with those standards.

Every three years, these test laboratories are audited to ensure a consistent level of testing standards worldwide. The audits, conducted by competitors to the laboratory being reviewed, help to create a mutual sense of trust within the CB Scheme and to encourage international acceptance of testing.

Tak ing the import green channel
Before the CB Scheme, the only option for a manufacturer was to have their products tested and certified by many different national testing laboratories/certification bodies: a difficult, time consuming and expensive process.

The CB Scheme follows three simple steps:
- Product submitted to CBTL for testing in accordance with International Standards and the National Deviations of target countries.
- Product assessed and CB Test Report and Certificate issued to client.
- Client (or its representative) submits product, CB Test Report and CB Test Certificate to NCBs in target countries to obtain national certification; this confirms that the product conforms to local standards.

Under the CB Scheme, manufacturers now only have to deal with the CBTL of their choice. The CBTL does all the work, including testing to the national differences and country deviations of the product’s destination countries.

Once the manufacturer has the CB Test Report and Certificate, it can use this to obtain national approvals in many other member countries. The manufacturer is required to submit an application and may also be required to submit a product sample in the country of destination. Under the CB Scheme, however, reports and certificates can only be rejected with good technical justification. In fact, many countries will now accept – and may demand – CB Test reports and certificates without the need for local certification. For example, any electrical product exported to South Africa must have a CB test report and certificate.

The CB Scheme should be viewed as a passport which helps a product gain individual country approval. While it does not always eliminate the need for additional ‘in country’ approval or testing, it does get you at least 85% of the way there.

By considering declared national differences as part of the testing process, the CBTL helps the manufacturer to meet the requirements of its target markets. Such differences include ‘country deviations’, which are national characteristics or practices that cannot be changed, including climatic or electrical earthing conditions. ‘Regulatory Requirements’ also cover the differing restrictions, licenses and laws imposed by the government or the national authority. CE marking for the European Union is just one such regulatory requirement the CB Scheme can address.

As an example, let’s take the Information Technology Equipment Safety Standard 60950-1, which carries the prefix EN in Europe, UL in the US and IEC for the rest of the world. The CB Scheme covers all the ‘harmonised’ requirements of these standards and the associated national differences, meaning that only one set of tests needs to be done and one test report delivered. The report is made up of several parts, the first covering the common requirements across all the standards, and the others comprising report annexes showing tests for the specific country differences such as mains supply voltage.

Seamless process
Relative to the alternative of embarking on the lengthy and expensive approach of conducting multiple tests to satisfy multiple countries, the CB Scheme is seamless. It offers obvious advantages and is the only initiative of its kind that has succeeded where others have failed. For the countries that do recognise it, it would seem that testing utopia for international exports does exist.

The ability to carry out one test programme to gain access to many international markets, more quickly and at a lower cost surely means more manufacturers should be taking advantage of it.

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As high speed interfaces at the board level push towards 10Gbit/s, signal integrity issues need to be addressed properly. By Patrick Carrier.

The ever increasing bus speeds in modern electronics means engineers are now required to have a thorough understanding of issues associated with high speed design.

With serdes bus speeds approaching 10Gbit/s and becoming commonplace in many designs – as well as wider, parallel buses, such as DDR3/4, entering the GHz realm – it is more important than ever that signal integrity issues are addressed properly. Analysing these buses – including comprehensive loss modelling of traces, assessment of via performance using 3d modelling and the inclusion of system timing – is vital to meeting time to market and ensuring design success.

Larger ic packages, along with the increased speed of signal edge rates, make it impossible to measure signals in a typical lab environment; the signal at the die will look nothing like the signal at the pin. As such, it has become even more crucial to rely on comprehensive signal integrity simulation to provide an accurate characterisation of system margins. For serdes buses operating in the multiGHz realm, such as PCI Express and Serial ATA, this means the inclusion of all loss factors and impedance changes.

Most of the losses in pcb designs can be ascribed to copper and dielectrics. Copper losses include the skin effect, which increases with frequency and becomes more severe around 5GHz when the surface roughness of the copper starts to exacerbate the issue. But dielectric loss is normally the dominant factor and is determined by the dielectric material used in the stackup. The best way to minimise these losses is to use shorter traces, but using wider traces and lower loss dielectrics will also help.

Signal degradation can also be caused by impedance discontinuities, the most notable of which can be caused by vias. Vias can be designed to match the trace impedance for differential signals, but a good via solver will be needed for this. Also, at higher pigahertz frequencies, a 3d field solver should be used to capture the appropriate electrical characteristics of the via structures. In addition to having a different ‘characteristic impedance’, vias can also have stubs which severely degrade their performance at higher frequencies. Figure 1 shows an example of a 10Gbit/s serdes channel simulation using a 3d via model to solve for the effect of via stubs. Such simulations can be used to identify the need for certain design changes such as the use of blind vias or backdrilling.

Vias are often characterised by a 3d field solver as scattering, or S-parameters – frequency domain models of the vias. Other components of a serdes channel, such as connectors and cables, can also be characterised using S-parameters and this approach can be used to describe the entire interconnect, including connectors, vias and
traces, and then compared against a predetermined loss budget to determine the bandwidth of the interconnect itself, without including the driver and receiver.

In all cases, it is important for a simulator to be able to handle these S-parameters robustly. S-parameters should be able to be converted to allow for appropriate concatenation, enforcement of passivity and causality and, most importantly, to be simulated in the time domain. Even though the interconnect can be analysed as an S-parameter, doing so does not allow for inclusion of the effects of pre-emphasis and equalisation, which are crucial to many faster serdes channels.

The inclusion of signal conditioning techniques such as pre-emphasis and equalisation is yet another reason why simulation is being relied upon to characterise serdes channels, as it is impossible to measure this in a normal lab set up. The need for signal conditioning has also spawned indirectly a number of developments in the analysis of serdes channels. This includes the use of ‘channel analysis’ or other fast eye diagram creation techniques, as well as new modelling standards such as IBIS-AMI. Because of the complexity of serdes drivers and receivers introduced by these signal conditioning techniques, typical I/O buffer modelling methods, such as IBIS models, are insufficient. As such, many designers have fallen back to using SPICE models for this task. Unfortunately, SPICE models are far too detailed to allow for practical system level simulation or the very long simulations needed to characterise channels to bit error rates (BERs) of 10^-10 or 10^-12. However, SPICE models can be used in conjunction with channel analysis techniques, such as Mentor’s FastEye, to verify channels to these BERs in a reasonable amount of time.

Channel analysis techniques, such as FastEye (see fig 2), use pulse and step responses to characterise an entire serdes channel, including the driver and receiver, and to build eye diagrams and bathtub curves based upon those responses. This allows for these channels to be characterised to very low BERs and for the effects of all deterministic and random jitter to be taken into account. That just isn’t possible when performing a bit by bit simulation with a SPICE model.

This type of analysis is also the basis for an emerging serdes modelling standard called IBIS-AMI. IBIS-AMI models contain an analogue buffer model, which is used for generating the step response of the channel, as well as a compiled .dll for modelling the pre emphasis and equalisation. A comprehensive serdes simulation not only includes an accurate and complete model of the interconnect, but also models the complete driver and receiver behaviour to the target BER.

But it is not only serdes buses that have driven advancements in signal simulation; other buses are also pushing the boundaries of system margins and DDR3 is an excellent example.

DDR3 (and DDR2) goes beyond the typical VIL and VIH voltage threshold method for determining timing – VIH is the maximum voltage recognised as a logic low, while VIL is the minimum voltage for a logic high – to use an approach called slew rate derating. Here, a series of tables based on edge rate is used to determine more accurately when the input gate will actually switch – something which is crucial to the system timing. DDR3 also includes write levelling, which is a per byte deskew necessitated by the daisy chain architecture of the address bus routing.

These complicated timing relationships can be difficult to analyse. Having a simulation tool, such as the DDRx Wizard in HyperLynx, can allow an entire bus to be simulated at once and for the complicated timing relationships in the bus to be reduced to a set of simple pass/fail criteria.

Fast single ended buses like DDR3 [see fig 3] also generate other issues which can be difficult to analyse. While via modelling is important for these buses, a more important aspect is to understand how the vias are bypassed and how they interact with the power distribution network. Other power integrity issues, such as voltage drop and ensuring adequate decoupling capacitors, are come to the forefront because of the high speeds, high currents and low operating voltages used by these buses.

Having a comprehensive suite of simulation tools to address these issues will be essential in the future for anyone undertaking high speed PCB design.

Author profile: Patrick Carrier is a technical marketing engineer for Mentor Graphics’ high speed PCB analysis tools (www.mentor.com).
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Serving a different purpose

As the server market changes, can ARM challenge the incumbents? By Roy Rubenstein.

A confluence of events is enabling the ARM microprocessor core to gain a foothold in the server market; until now, the preserve of AMD and Intel.

Data centre operators want to reduce the power consumption and cost of servers, especially the larger ones, such as Google, Yahoo and Facebook, where tasks are not split across a traditional server’s two or four processors, but across hundreds or thousands of processors (see NE, 9 August 2011).

These trends have led to an opening for ARM, said Andrew Feldman, ceo of server start up SeaMicro. “It is also the part of the market that is growing like crazy.” That explains the entrance of companies such as Marvell, Calxeda and AppliedMicro with ARM based server chips.

“In the compute world, everyone has always been beaten from below,” said Feldman. “ARM has looked at the history of small beating big and sees this as a rare opportunity. AMD and Intel are fully aware of this trend. “The server market is extraordinarily important to them,” he continued. “They see this coming; this is the new battleground.”

Marvell is shipping the Armada XP, while server cluster condenses multiple processors and associated interconnect into one box.

“Instead of a customer cobbling together 1U and 2U [rack unit] servers with a couple of Ethernet ports and a top of rack switch, you will see that entire infrastructure condensed within a single box – a 2U or 4U chassis, with the cluster being a platform,” said Karl Freund, Calxeda’s vp of marketing.

SeaMicro’s SM10000 server is an example cluster architecture which it claims consumes a quarter of the power and takes a sixth of the space of traditional servers. Its SM10000-64HD combines up to 384 64bit Intel Atom N570 dual core processors.

SeaMicro adapted the Atom for its lower power, but has just launched a SM10000 product that uses Intel’s Xeon. “Our approach to date is with an x86 processor, but our architecture was designed to support any processor,” said Feldman.

Calxeda’s EnergyCore is a 32bit ARM Cortex-A9 quad core processor, clocked between 1.1 and 1.4GHz. “You have to go to an A15 [the 64bit Cortex architecture] to get more than four cores [per chip], and an A15 was not sufficiently mature during our design cycle,” said Freund.

The chip implements a node, running one operating system. It has six ports – five gigabit Ethernet interfaces that can operate at 1 or 10Gbit/s, and a separate 16bit Ethernet interface. “If someone needs just a 16bit Ethernet connection, they can turn off all the 10GBE connectors,” said Freund. The Ethernet ports are typically used for internode communications. The first EnergyCore also includes a memory controller, an 80bit switch.
ARM cores, a Level 3 cache, a non blocking terabyte fabric, memory controllers, 1 and 10 Gbit/s interfaces, storage ports and PCI Express lanes.

“Each chip can connect to three companion chips to create a cache-coherent system,” said Jim Johnston, product marketing director at AppliedMicro. This ‘socket’ looks, from a software perspective, like a 128 core processor. “This implies that a 32 core chip is in the roadmap,” said Johnston.

The cpu core is superscalar – it has four ALUs such that, on any given clock cycle, it can execute, out of order, up to four instructions. In a four chip meshed server node, each chip is linked to the other three. Since each is 100Gbit/s, each chip has a 300Gbit/s dedicated interchip interface capacity.

The device also features another cpu on chip for system management and offload. Dubbed multi-Slim, this comprises four simpler 32bit ARM cores and can perform a variety of tasks, including power management or a secure boot.

The multi-Slim provides flexible power management because, for web server applications, the device can be idle for up to 80% of the time, said Johnston. In power down mode, the chip consumes less than 300mW, with all cpus powered off, except multi-Slim.

As for products, Calxeda is working with HP for the server vendor’s Redstone design. HP uses a 72 node fabric in a butterfly fat tree configuration, with the fabric then connected to a top of rack switch using a 10Gbit/s Ethernet link. Each HP system has four trays, each with 18 slots and each slot holds a four node EnergyCard. Local storage cards can also be added. Freund says the architecture allows up to 4096 nodes per tree.

HP’s system will be available in the second quarter of 2012, with volume production of the chips in the second half of the year. Meanwhile, Calxeda expects to announce six more customers in the coming months. The device will be generally available in the second half of the year. Calxeda says it will follow ARM’s own roadmap. “Clearly for us, our focus is to get to 64bit,” says Freund.

AppliedMicro has yet to detailed design wins, but says that first silicon will be implemented in a 40nm cmos process, followed quickly by 28nm. Its design has yet to be taped out, but first X-Gene devices will be available by year end.

The company has a Linux development card that implements a dual core X-Gene design with the full fabric. Developers can use the card to verify a design and for software development. The system card will be available to early customers this quarter.

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Fig 2: AppliedMicro’s ARM based server on a chip

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Up before the bench

Bench power supplies: the evolution of laboratory power. By Mark Edwards

While digitally oriented switch mode technology is the norm in most areas of the power supply market, pure linear regulation still has its place – particularly for users requiring the lowest output noise, the best transient response and the most benign stability characteristics when driving complex loads. But linear units are larger and heavier for a given output power and generate more heat.

Traditionally, bench power supplies (PSUs) – also known as laboratory power supplies, despite widespread use elsewhere – have offered a fixed maximum voltage and maximum current for each power rating. In this type of unit, the maximum power output decreases in direct proportion to decreasing output voltage. The disadvantage is that users need to specify their voltage/current requirements exactly to match each application, with the result that manufacturers had to offer many models within each power range.

Over the past two decades, however, improved switch mode techniques have seen the introduction of PSUs with a semi constant power characteristic. This enables higher current to be provided at lower output voltages, thus providing a degree of flexibility to meet varying applications. This technique, although simple in principle, is difficult to apply to a laboratory PSU, which must be able to operate down to zero voltage and zero power output and to perform correctly under all load conditions.

Typically, a linear final regulator is an integral part of the design in order to achieve the required minimum power performance as well as ensuring low noise and good dynamic response. Early units that used this approach, known as PowerFlex, were limited to a maximum current capability of twice that available at the maximum voltage. Later products increased the range to 3:1 and beyond, but difficulties remained in retaining the required performance characteristics over very wide voltage and current ranges.

However, dsp based control techniques have become available which can maintain stability over a wider parametric range. Power supplies using this technique can achieve an output current to voltage ratio in excess of 6:1. These techniques can also offer faster step load response and better power efficiency. It has also become possible to achieve very low noise and good dynamic recovery performance without the need for a linear final regulator.

Although cost and absolute efficiency considerations still favour fixed maximum voltage and current type PSUs, the flexibility offered by the semi constant approach is proving increasingly popular with users whose requirements extend beyond a single application.

Analogue or digital controls?
A recent survey among users of bench power supplies produced by Aim-TTi found that, while most users understood the benefits of digital
control, many saw it as unnecessarily complicated for adjusting the basic parameters of voltage and current. Traditional analogue controls were seen as simpler, quicker and better fitted for the job.

To solve this dilemma, a hybrid system has been developed which combines true analogue control knobs with internal digital circuitry. For the user, the PSU operates in a manner identical to a traditional analogue controlled unit. However, if the user wants the benefits of digital control, they are available at the press of a button in the form of functions known as ‘S-lock’ and ‘V-span’.

The S-lock function enables voltage and current settings to be locked, transferring control of voltage and current from the analogue controls to internal digital circuitry. This not only offers security, but also stability: each setting is controlled by a high resolution instrumentation quality d/a converter.

The V-span function allows the user to redefine the end stop values to create a specific voltage range. When working with any particular piece of equipment, engineers often require a voltage source variable over only a narrow range. V-Span enables the 360° rotation of the voltage control to cover whatever voltage range the user requires.

Consider, for example, an engineer working on a circuit that will operate from four NiMh cells. In this situation, V-Span can be used to set a maximum voltage of 5.8V (to prevent over voltage damage) and a minimum voltage of 3.6V (to ensure the circuit does not reset). The result is a PSU which provides high resolution analogue control over the exact voltage range the user requires: an ideal solution for those requiring a linear regulated precision bench power supply with conventional analogue controls.

Another important feature is the use of on/off switches for the main outputs. This enables voltage and current settings to be viewed before the load is connected and for multiple outputs to be controlled individually. Equally important on multiple output supplies is the ability to switch all outputs on and off simultaneously: critical where lockups and device damage can occur if some rails are not applied correctly.

Remote sensing
Most engineers are aware of the need to make remote sense connections between a PSU and the device under test (DUT) in order to achieve good regulation. However, they are often less aware of the practical effects of omitting this and the benefits to be gained from correct use of remote sense.

This lack of awareness is partly created by the published specifications for some laboratory PSUs which, despite their lack of remote sense facilities, boast regulation and voltage accuracy figures which will not be achieved in practical situations.

For example, load regulation is commonly quoted as around 0.01%. Consider a DUT operating at 5V, drawing 3A, and connected via a 1m length of 24/0.2 wire. Typically 24/0.2 wire has a resistance of 26mΩ/m, so the pair of connection leads will total more than 50mΩ. This results in a full current load regulation of 3%, a far cry from the 0.01% of the PSU itself.

Of greater concern is the error between the voltage indicated on the PSU and the voltage being applied to the DUT. In the above example, the error between the two would be 0.15V – for a PSU setting of 5V, the DUT voltage is only 4.85V. Before the advent of the digitally metered PSU, the engineer would probably have set the power supply up by measuring the DUT voltage with a separate voltmeter. With the PSU now featuring a high accuracy meter it, they are likely to accept that reading as correct.

With remote sense connected, both problems are removed. Regulation is improve from 3% to the 0.01% of the PSU itself and the voltage at the DUT equals that shown on the PSU’s voltmeter.

A dc power supply operating in constant voltage mode uses a control loop to compare a ‘sensed’ voltage with a reference voltage. In modern high quality laboratory PSUs, the voltage to be sensed can be either at the output terminals of the power supply (local sense) or at the device to which it is connected (remote sense). Using local sense does not compensate for the voltage drop caused by the resistance of the connecting leads, resulting in poor regulation. With remote sense connected, the control loop monitors the voltage at the DUT and maintains it at a constant level, allowing the voltage at the output terminals to rise to compensate for the drop in the connecting leads. This results in near perfect regulation at the DUT.

Author profile:
Mark Edwards is sales director for Aim-TTI (www.aimtti.com).
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### Marketwatch Component Prices

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**Analysis**

#### Amplifiers/Comparators

According to IHS iSuppli, there are signs the market is at or near the bottom of the cycle, with leading suppliers reporting improvements in their book to bill ratio in January. IHS iSuppli expects price corrections in Q2 and Q3.

#### Ceramic capacitors

Demand is flat and capacity is abundant, which means prices will continue to erode for the first half of 2012. Lead times will continue to drop through the first half of 2012.

#### Connectors

Demand issues aside, leading connector suppliers raised prices on some of their most commonly designed in products by a small percentage in January in an effort to improve profit margins. Lead times are expected to remain stable.

#### Filters

Leading SAW filter suppliers cut prices of selected parts by up to 5% at the end of 2011 in order to stimulate demand. A moderate increase in book to bill has resulted, but overall demand is significantly off forecasts.

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**Data courtesy of IHS iSuppli**

Component prices were reset at zero in September 2009 and show percentage changes per month. Increasing prices are highlighted in red.

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Connectors

A new product line of heatsinks has been launched by Harwin, the leading high service distributor and during the first year, sales have grown at an unsurpassed rate all around the world. Commented Damien de Ladis, Harwin’s President. “Our new heatsinks are designed to meet the needs of the industrial market and are ideal for applications such as medical, instrumentation, automotive, industrial controls and power distribution.”

Detectors

Maxim Integrated Products’ complete port-detection devices are compliant with the USB Battery Charging Specification and work with virtually any proprietary power adapters.

New Heatsink Solutions

ABL Components has introduced two new product ranges targeted at serving all the heatsink market needs.

Inductors

AVX Corporation, a leading manufacturer of passive components and interconnect solutions, has developed a multilayer organic RF inductor in a 0402 case size that offers tight tolerance in a small footprint. Providing high Q and high self-resonance, the RoHS compliant ML0402 Series inductor features an inductance range of 1nH to 32nH. "Based on its patented multilayer low loss organic (MLO) technology, the new ML0402 Series inductor represents a paradigm shift from traditional ceramic and thin film passive SMD components," said Larry Eisenberger, product manager at AVX. "Since Gogger Organic Inductors (COIs) are polymer-based and use high conductivity copper interconnects in a multilayer fashion, the ability to fabricate these components on large area substrates and in laser-direct imaging allow for improved cost and tolerance control."

Transistors

SemiSouth Laboratories, Inc., the leading manufacturer of silicon carbide (SiC) transistor technology for high-power, high-efficiency, harsh-environment power management and conversion applications, today launched the SDP120830J, a normally on SiC trench JFET that, when compared with silicon MOSFETs, enables higher switching speeds and substantially lower losses. Rated at 100V with a maximum on-state resistance of 340 mΩ (typical RDS(on) of 270 mΩ), these new devices feature a positive temperature coefficient for ease of paralleling and offer direct alternatives for recently ‘obsoleted’ parts.

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