DATAWEEK
ELECTRONICS & COMMUNICATIONS TECHNOLOGY

27 March 2019

FEATURING:
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Manufacturers of Printed Circuit Boards

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For more than 20 years, TraX Interconnect has been fabricating printed circuit boards for companies throughout South Africa. From simple single-sided boards to complex multi-layered boards, the company strives to provide the highest levels of service and value throughout its entire production process. The team at TraX regularly works with clients in the defence, data acquisition, music, telecommunications and security industries to deliver high-quality and reliable printed circuit boards.

For more information contact TraX Interconnect, +27 21 712 5011, daniel@trax.co.za.
Engineering as art

There is a common perception that engineers are all purely analytical creatures without a sense of creativity. In truth, I think this boils down to a general tendency to conflate the ideas of ‘creativity’ and ‘art’. Yes, it is the architect rather than the civil engineer who performs the artistry of designing a beautiful building, but that doesn’t mean the engineer is not required to think creatively to solve the challenges of bringing that design to life.

Now I don’t look at a transistor or capacitor as a work of art, but as an engineer of the electronics discipline I can appreciate the creativity of a particularly elegant circuit design, or an especially cleverly written piece of code. The mind-set inherent to engineering certainly means that a design must be broken down into the sum of its parts, but it’s the way those parts are put together where the creativity lies.

The purpose of engineering can be described as the application of science to solve real-world problems. This regularly requires thinking ‘outside the box’. Perhaps the discipline that most clearly brings art and science together is Industrial Design (ID), a field that spans the realms of applied art and applied science by marrying a product’s usability with its aesthetics.

A sculptor by the name of Theo Kamecke took a literal approach to combining art and printed circuit boards in the 1980s. He started collecting vintage circuit boards, which in those days were often handmade and therefore unique and interesting to him.

The creations Kamecke made from those unconventional building blocks range from the quirky to the truly astonishing, combining the archaic with the modern to create artworks with titles such as ‘Quetzalcoatl’, ‘Icarus’ and ‘Eye of Horus’. Although he died in 2017, his website, www.thoekamecke.com, is still active and shows a large volume of his work. Other artists have followed in his footsteps, and an eclectic collection of their works can be found at https://insteading.com/blog/circuit-board-art/.

In my experience, most engineers do have an appreciation for artistic endeavours, and in many cases actively pursue them, particularly in music. There are several famous people who started a career in engineering before turning to music, acting or other artforms, such as Rowan Atkinson, Ashton Kutcher and Scott Adams, the creator of the Dilbert cartoons.

If you’re still not convinced that an engineer can also be an artist, go and look up the name Leonardo da Vinci.

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South Africa

Electronic Industry Supplies has gained the South African distribution agency for Stannol, a German company specialising in products for the electronics manufacturing market. Stannol’s product range includes solder wires, solder pastes, flux, solder bars, soldering equipment, measurement and testing equipment, conformal coatings and various accessories.

The Council for Scientific and Industrial Research (CSIR) has partnered with Right ePharmacy, a company that dispenses, distributes and collects medication, to develop an innovative pharmacy automation robot for medicine dispensing. The AVA34 robot works like an ATM, using robotic technology to label and dispense chronic medication. It can pick up to 900 sachets, serve up to 10 pharmacists, label up to 550 sachets, and load up to 120 different medicine items, all within an hour. This cuts the waiting periods at clinics and hospitals, relieving pressure on the public healthcare system.

Minister of Communications, Ms Stella Ndabeni-Abrahams, teamed up with Nokia to host a Fourth Industrial Revolution (4IR) Innovation Day at the multinational’s corporate office park in Centurion on 15 March 2019. The event saw government officials, young people who are beneficiaries of the TechnoGirl programme and students at the Leadership in Motion Academy (LIMA), exposed to technological innovations that improve the quality of learning, conservation, transportation and fashion, amongst others. The minister is the TechnoGirl brand ambassador, an innovative job-shadowing programme for girls, with a particular bias towards science, technology, engineering and mathematics (STEM) careers.

Department of Trade and Industry (DTI) minister Rob Davies has highlighted the benefits of the newly launched Atlantis Special Economic Zone (SEZ). A combined R1,8 billion is expected to be invested in the SEZ by 2022, with the creation of 1 200 direct jobs. A total of 24 000 full-time equivalent jobs are also expected to be created over the SEZ’s 20-year lifespan. This is in line with the department’s industrial policy and will contribute towards the objectives of the National Development Plan (NDP).

Overseas

Business

Sierra Wireless reported results for its fourth quarter and fiscal year ended 31 December 2018. For the fourth quarter, revenue was $201,4 million (up 9,7% from the fourth quarter of 2017) and EPS (earnings per share) was a $0,11 loss. Revenue for the full year totalled $793,6 million (up 14,9% from 2017) and EPS was a $0,68 loss.

Industry

The Semiconductor Industry Association (SIA) announced that worldwide sales of semiconductors reached $35,5 billion for the month of January 2019, a decrease of 5,7% from the January 2018 total of $37,6 billion and 7,2% less than the December 2018 total of $38,2 billion. Regionally, year-to-year sales increased slightly in Europe (0,2%), but fell in the Americas (-15,3%), Asia Pacific/All Other (-3,8%), China (-3,2%) and Japan (-1,5%).

For 2019, a steep 24% drop in the memory market is forecast by IC Insights to pull the total semiconductor market down by 7%. With 83% of Samsung’s semiconductor sales being memory devices last year, the memory market downturn is expected to drag the company’s total semiconductor sales down by 20% this year. Although Intel’s semiconductor sales are forecast to be relatively flat in 2019, the company is poised to regain the number 1 semiconductor supplier ranking this year, a position it held from 1993 through 2016.
The event gave delegates the opportunity to learn about some of the latest technologies available from Avnet and its suppliers, and to network with representatives of the company and with each other.

Divided into five sessions each day and split across four lecture rooms, a strong focus for this year’s event was the Internet of Things (IoT), including not only the devices but also the broader ecosystem enabling the deployment of IoT projects.

This included presentations such as iSert on local and international certification requirements, Digi International with its XBee solution, a demonstration of Nordic Semiconductor’s Bluetooth Low Energy stack implementation, Microsoft’s Azure and IoT central cloud solution, a Sigfox overview from Sqwidnet and Sigfox implementation from STMicroelectronics, NB-IoT covered by Vodacom and Telit, and future-proofing a GSM design by Quectel.

Also presenting were Infineon Technologies on MOSFETs, Panasonic on MLCC replacement, Avnet Abacus on battery trends and technologies, Maxim Integrated Products on security and authentication, as well as several others.

According to Brandon Kuhn, Avnet South Africa’s technical director and Cape Town branch manager, the seminar was a successful way of bringing the company’s suppliers and customers together. “I would like to thank all the speakers, both local and from abroad, for giving their time to educate our customers on the latest products and technologies in their respective stables. To our customers, I would like to say thank you for making the event a success and we look forward to hosting you all again in two years’ time,” he said.

For more information contact Avnet South Africa, +27 11 319 8600, sales@avnet.co.za.
Building sustainability through local manufacturing

There is enormous potential for southern African manufacturers to increase their market share both locally and internationally. The driving force behind capturing this growth opportunity is the South African Capital Equipment Export Council (SACEEC).

According to Eric Bruggeman, CEO at the SACEEC, there is enormous potential for southern African manufacturers to increase their market share both locally and internationally.

Part of the Council’s mandate is to organise outward selling and inward buying missions. “We identified a need to showcase the offerings of the SADC region’s local manufacturers in an interactive manner,” Bruggeman says. “The result is the inaugural Local Southern African Manufacturing Expo (LME) being held at the Expo Centre, Nasrec from 21 to 23 May 2019.

“It is critical for the sustainability of local manufacturing operations that they aggressively pursue opportunities to increase their market share. Not only is this relevant to their increased permeation of the overseas market, but furthermore, they need to capture market share that is currently being monopolised by importers. Recent statistics indicate that South Africa currently imports products to the value of a staggering $83.2 billion. If we were able to shift this demand to the local manufacturing sector, we could realistically create 1,329 million jobs. ”

“Endorsed by the Premier of Gauteng, David Makhura, we believe that the exhibition will enable exhibitors to meet with top decision makers from the inward buying missions already committed to the event. As Industry 4.0 continues to transform the way that manufacturers do business, LME 2019 will provide them with an opportunity to grow their customer base, with the knock-on potential for fostering job creation,” says Charlene Hefer, portfolio director for Specialised Exhibitions Montgomery.

LME 2019 will give local manufacturers from South Africa and other SADC regions a chance to not only display their capabilities and capacities to a captive audience, but furthermore it creates a forum for the exhibitors to network with their peers. “We are excited about the prospect that local manufacturing operations have to evolve and expand by interacting with the inward buying mission representatives. Added to this are the benefits derived by the support of SACEEC, together with AREI (Association of Representatives for the Electronics Industry) and the DTI (Department of Trade and Industry). We urge local manufacturing companies throughout southern Africa to capitalise on the unique marketing opportunities of exhibiting at LME 2019,” says Hefer.

To book a stand at LME 2019 or to find out more information about the exhibition, visit the website at www.localmanufacturingexpo.co.za.
Locally developed automatic pool cleaning system

An innovative automatic pool cleaning system has been launched by South African company Pro Automation, after attracting interest through its Indiegogo campaign as well as funding from other sources.

Targeting an estimated South African market of around 900 000 domestic swimming pools, the device, called PoolSense, floats in a pool and regularly samples and transmits the quality of the water and delivers simple dosing instructions to an app on the user’s phone.

According to Dave Wibberley, founder and advisor to Pro Automation and a well-known professional in the industrial automation marketplace, Internet of Things (IoT) technologies played a big part in the development of PoolSense. “The Internet of Things, combined with low-power networks like Sigfox, has enabled this development,” he states.

“We could finally get to a price point that makes a device like PoolSense available to everyone who owns a pool. PoolSense will not be a ‘nice-to-have’ device for techies but we believe every pool owner will have one floating in their pool over the next five years, because it will pay for itself and take out the hassle of manually measuring and the guesswork of just how much, of what chemical, to add to maintain a perfect pool all year round.”

The device continuously measures temperature, pH, oxidation reduction potential (ORP) and conductivity, and regularly transmits this data to the cloud. From there the data is continuously run through a self-learning algorithm that effectively understands how a pool responds to the addition of chemicals as requested by the app. Thus the system becomes better and better at making intelligent decisions around optimising just how much acid and chlorine the user needs to add.

Heinrich Heeson, managing director of Pro Automation, continues, “I am a technical guy and joining forces with Dave brought a big thinking marketing aspect to the business. We share a common vision of where we want this business to be in five years and are actively going ahead. The technology seems simple but pool chemistry is not a science as much as a dark art, and combining engineering principles with big data has allowed us to deliver a practical solution to a large, common problem: maintaining your pool at the correct balance of pH and chlorine levels.”

The company also believes PoolSense will play a part in revitalising local pool shops and maintenance businesses, which can use it to rebuild and reconnect with their customers by offering chemical restocking, calibration and even proactive maintenance services.

A maintenance company can install and monitor, and then structure their visits based on the condition of customers’ pools, from their phone or from a PC. Multiple PoolSense devices can be loaded and the view can be sorted automatically by the worst in the list to

in order to better understand the power requirements. The unit needed to last at least two years autonomously in a sealed unit, as the life of the pH probes are only guaranteed for that length of time by the manufacturer.

The team consisted of a technical development team, and a commercialisation team responsible for marketing. All team members are part-timers except for the operations manager, Kevin Herbert, who is full-time employed to ‘pull it all together’.

The technical development made up roughly 50% of the resources required; the balance was on the marketing, sales, money management and fundraising efforts required to pre-sell 150 units through the Indiegogo crowdfunding platform.

The choice to keep the manufacturing local meant that Pro Automation needed to find development partners who could do final board design, manufacture the boards, design and manufacture the complex plastic injection moulds, and produce to world-class standards. “We ended up using partners who helped tremendously in this very difficult phase of the product, and can’t speak more highly of the partners we chose and were extremely encouraged by the level of South African technical ability.”

Commercialisation and funding

After prototyping, a grant was applied for and granted through the Innovation Hub, based in Pretoria. “The Innovation Hub have been fantastic and whilst they are thorough and you need to ensure all the paperwork is in place, they have been a fantastic development agency,” says Wibberley. “They have paid on time and offered legal and commercial support throughout the development process. I can’t stress enough to anyone with a great idea, needing seed funding, that the first stop should be there.”

The second phase of the funding was done through the Indiegogo crowdfunding campaign, where the first 100 units were discounted in order to raise money for production. “We raised enough cash through direct sales and the crowdfunding to pay for the production of the first 150 units that started shipping in mid-March 2019. A lot of international enquiries were received from Europe, Australia and Asia as all of these areas support the Sigfox network,” Wibberley continues.

The product has already won some awards from the Innovation Hub and has made the finals of the 2018 MTN IoT Awards that will take place in September this year.

For more information contact Kevin Herbert, Pro Automation, +27 82 605 8260, kevin@proautomation.co.
JavaScript engine for Bluetooth and Wi-Fi development

In addition to the established u-connectXpress, previously known as u-blox connectivity software, u-blox’ connectivity software offering now also includes u-connectScript.

The extended software series further simplifies wireless Bluetooth and Wi-Fi device development, enabling embedded script applications in the module while reducing complexity.

Comprising over 130 standard and u-blox specific AT commands, u-connectXpress lets developers configure device connectivity without having to write and test complex code. u-connectScript, the second pillar of the u connect series, is based on the JavaScript programming language, widely adopted and with a short learning curve. It uses simple syntax to allow device developers to quickly embed Bluetooth applications right onto the module without requiring extensive experience in embedded systems programming.

Developers write their applications using u-blox’ integrated development environment (IDE) or any other text editor of their choice. u-connectScript leverages the concept of u-connect streams to efficiently manage data flows between wireless and physical interfaces. This ensures that power consumption and performance of the resulting application remain on par with traditionally developed embedded applications, contrary to other script solutions available in the market.

Security is fundamental to all professional applications and is handled behind the scenes when using any member of the u-connect software series. Secure boot ensures that devices only boot up in the presence of original certified software. u-connect further ensures a high level of link and data security with support for Wi-Fi enterprise security (e.g. EAP TLS), IP end-to-end security (e.g. TLS) and LE secure connections for Bluetooth.

Applications developed for u-connectXpress or u-connectScript can be reused across the entire product line and are forward compatible with new product generations.

For more information contact Andrew Hutton, RF Design, +27 21 555 8400, andrew@rfdesign.co.za.

Mini PCIe wireless modules

The BG96 Mini PCIe module series from Quectel offer LTE Cat M1/Cat NB1/EGPRS connectivity in the standard PCI Express Mini Card form factor (Mini PCIe). It offers a maximum data rate of 375 Kbps downlink and 375 Kbps uplink, and features ultra-low-power consumption.

With a cost-effective SMT form factor of 51.0 x 30.0 x 4.9 mm and a high level of integration, the module range enables integrators and developers to easily design their applications and take advantage of the module’s low power consumption and mechanical compactness.

A rich set of Internet protocols, industry-standard interfaces and functionality such as USB drivers for Windows7/8/8.1/10 and Linux, extend the applicability of the module to a wide range of M2M applications such as wireless point-of-sale, smart metering, tracking, etc.

For more information contact iCorp Technologies, +27 11 781 2029, enquiries@icorptechnologies.co.za.
At Mobile World Congress, Libelium presented the integration of NB-IoT connectivity into its wireless sensor platform. To this end, it teamed up with Ericsson to showcase different development IoT kits to enable proofs of concept.

In a market context that demands greater maturity and homogeneity in communication protocols, the integration of NB-IoT technology in Libelium’s sensor platform is part of the company’s new strategy to offer customised projects that require specific configurations. The kits allow developers to easily test this technology thanks to its open source API.

The NB-IoT connectivity, integrated in a module manufactured by Quectel, offers high reliability by including global coverage for all geographies and by its compatibility with three types of network: NB-IoT, LTE-Cat-M, and even current GPRS networks so fall-back is ensured in case NB-IoT coverage is not possible at some point.

Thus, for IoT projects deployed in rural areas where there is still low coverage of the NB-IoT network, this device will allow the use of alternative communication technologies in addition to the possibility of location through the GNSS module included.

For more information contact Renaldo Fibiger, Altron Arrow, +27 11 923 9600, rfibiger@arrow.altech.co.za.

Motor drive evaluation board

Infineon Technologies’ EVAL-M1-IM818-A evaluation board was developed to support customers during their first steps of applications with CIPOS Maxi IPMs (intelligent power modules). In combination with control boards equipped with the M1 20-pin interface connector, like the EVAL-M1-101T or EVAL-M1-099M, it demonstrates Infineon’s CIPOS Maxi IPM technology for motor drives.

The evaluation board features the IM818-MCC, which combines 1200 V Trenchstop IGBTs and emitter controlled diodes with an optimised 6-channel SOI gate driver. It is optimised for industrial applications like high-voltage ventilation and air conditioning (HVAC) fans, fan motors, pumps and motor drives.

For more information contact Dirk Venter, Altron Arrow, +27 11 923 9600, dventer@arrow.altech.co.za.

Sigfox system-in-package

ON Semiconductor’s AX-SIP-SFEU is a programmable RF transceiver system-in-package (SiP) integrating an advanced RF system-on-chip (SoC) with all surrounding bill of materials (including a TCXO). The device provides a highly integrated Sigfox solution for both uplink (transmit) and downlink (receive) communications.

With the challenging space constraints of many IoT (Internet of Things) applications – where, for example, connectivity is needed close to the sensor – the 7 x 9 x 1 mm SIP transceiver has a miniature footprint and is smaller than a module-based solution.

Due to the need for long-life from a battery powered solution, a further concern for design engineers working on wireless communications applications is power consumption. Sigfox’s predictable and claimed lowest energy consumption ‘device-to-cloud’, is complemented by ON Semiconductor’s own ultra-low power design to give the SIP standby, sleep and deep sleep mode currents of just 0.5 mA, 1.3 µA and 100 nA, respectively.

The AX-SIP-SFEU connects to the customer’s product via a simple universal asynchronous receiver transmitter (UART) interface. AT commands are used to send frames and configure radio parameters, with an application programming interface (API) variant available for customers wishing to write their own software. The device is delivered with conformal shielding and pre-certified radio regulatory approvals.

For more information contact Andrew Hutton, RF Design, +27 21 555 8400, andrew@rfdesign.co.za.

NB-IoT developer kits

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For more information contact Renaldo Fibiger, Altron Arrow, +27 11 923 9600, rfibiger@arrow.altech.co.za.
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USB Type-C development kit

With the USB Type-C development kit from Würth Elektronik eiSos, those looking to take advantage of the expanded range of options offered by USB Type-C and USB Power Delivery (PD) in their projects have a convenient solution at hand. Built from proven USB-Type C technology from STMicroelectronics, the kit is ready for immediate use in prototypes and represents a reference design for safe and flexible USB PD applications up to 100 W.

The USB Type-C connector is today being used by many devices. Whatever the final application is, there are many reasons for adopting USB-C connectors. Since it is reversible, it can be plugged into a device any which way. Able to carry up to 100 W charging power (from 5 V/0.1 A up to 20 V/5.0 A), it merges and is backward compatible with the functionality of both legacy Type-A and -B ports in a single connector, and even can change roles on the fly.

Würth’s USB Type-C development kit includes three assembled boards and a high-current-rated USB Type-C cable:

- The first board is the 40 W Source Evaluation Board with the STUSB4710 auto-run controller and on-board DC-DC converter from STMicroelectronics. The STUSB4710 integrates all the digital and high-voltage analog circuitry needed to autonomously support full USB PD negotiation. It supports up to 5 Power Data Objects (PDO) and power-sharing applications thanks to its I²C interface. Typical applications are power-source applications such as AC adapters, power supplies, power hubs, smart plugs and DC-DC applications.

- The second board is the 100 W Sink Evaluation Board with the STUSB4500 auto-run controller. It allows straightforward migration from STD-B, micro-B or custom power plugs to a Type-C connector. This solution is ideal for automatically prompting a charging process – even if the battery is empty. The STUSB4500 supports up to three PDos. Typical applications are electronic devices charged through a USB Type-C cable.

- The third board is the 100 W Source Demo Board with the STUSB1602 – an analog front-end that is a companion chip of the STM32 microcontroller – and on-board DC-DC converter. The STUSB1602 provides up to 5 PDos. Typical applications include power-source applications such as AC adapters, power supplies, power hubs, smart plugs and DC-DC applications.

For more information contact Jason Page, Würth Elektronik eiSos, +27 71 259 9381, jason.page@we-online.com.

Solution for connecting PIC MCUs to Google Cloud

From coffee makers to thermostats to irrigation systems, PIC microcontrollers (MCU) are at the heart of millions of embedded applications.

As developers migrate next-generation PIC MCU-based applications to the cloud, they must overcome complexities associated with communications protocols, security and hardware compatibility.

To accelerate the development of these applications, Microchip Technology announced a new Internet of Things (IoT) rapid development board for Google Cloud IoT Core that combines a low-power PIC microcontroller (MCU), Crypto Authentication secure element IC and fully certified Wi-Fi network controller.

The solution provides a simple way to connect and secure PIC MCU-based applications, removing the added time, cost and security vulnerabilities that come with large software frameworks and real-time operating systems (RTOS). Once connected, Google Cloud IoT Core provides powerful data and analytics to help designers make better, smarter products.

As part of Microchip’s extended partnership with Google Cloud, the PIC-IoT WG development board enables PIC MCU designers to easily add cloud connectivity to next-generation products using a free online portal at www.PIC-IoT.com. Once connected, developers can use Microchip’s MPLAB Code Configurator (MCC) development tool to develop, debug and customise their application. The board combines smart, connected and secure devices to enable designers to create connected applications in minutes.

For more information contact Shane Padayachee, Avnet South Africa, +27 11 319 8600, shane.padayachee@avnet.eu.

Motor control development tool

ST-MC-SUITE from STMicroelectronics is an entry point for easy access to all resources for motor-control application development with the company’s STM32 and STM8 microcontrollers.

The tool lets users gather tutorials and documentation, store project setups (hardware and software), get links to download software solutions including the newly updated X-CUBE-MCSDK package, and buy evaluation hardware online.

Intuitive features include the choice of a generic search tool or an adaptive front end that filters relevant content based on the project description. Documents and videos can be previewed and saved in a personalised bundle to download in compressed .zip format.

Users can also create setups to select and save items to start their projects, including appropriate software and a choice of applicable evaluation boards (control and power), motor control kits and inverters that can be purchased online. Supporting documentation can be downloaded directly or added to the personalised information bundle. Users can save multiple setups to compare different approaches for each project, or manage several projects simultaneously.

The X-CUBE-MCSDK motor-control software development kit contains firmware libraries and the STM32 Motor Control Workbench graphical configurator. The latest release, version 5.3, adds support for the STM32G0 microcontroller series and includes the FreeRTOS real-time operating system. Updates to STM32 Motor Control Workbench allow direct access to firmware examples and hardware abstraction layer (HAL) and low layer (LL) APIs.

ST-MC-SUITE is initially focused on brushless DC motor and permanent magnet synchronous motor designs using field-oriented control (FOC). Support for extra motor types and control techniques is planned for later this year.

For more information contact EBV Electrolink, +27 21 402 1940, capetown@ebv.com.
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MCUs for industrial IoT endpoints

Renesas Electronics’ new highly integrated SSD3 MCUs (microcontrollers) simplify application development with their secure cryptographic engine and Synergy software package. Equipped with advanced security, the devices simplify designing cost-sensitive, low-power Internet of Things (IoT) endpoint devices.

The MCUs offer 512 KB Flash memory and a large 256 KB SRAM memory. This 2:1 ratio of embedded Flash to SRAM supports intensive communication stack utilisation for robust IoT connectivity, and the 8 KB data Flash enables a great number of read/write cycles.

Each SSD3 family member integrates several analog components including two 12-bit analog-to-digital converters (ADCs), a 2-channel 12-bit digital-to-analog converter (DAC), high-speed 6-channel comparator, temperature sensor, and a 6-channel programmable gain amplifier (PGA). They also offer a scalable set of 13 independent 32-bit general-purpose timers, and communications interfaces such as USB, CAN, i²C, SPI, SDHI and SSI.

The Renesas Synergy platform is a fully supported software/hardware platform that enables development to begin at the application programming interface (API) level, reducing the complexity of designing security-aware connected devices and HMI systems with graphical user interfaces and capacitive touch.

For more information contact Jody Botha, Hi-Q Electronics, +27 11 894 8083, jody@hi-q.co.za.

FPGA-based video/imaging solution

Microchip Technology released the new PolarFire FPGA imaging and video solution to address the challenges of developing complex computer algorithms which enable systems to capture and display information and high-resolution images. The solution delivers capabilities to support resolution as high as 4K in small, low-power form factors necessary for a wide variety of imaging and video applications.

The new imaging and video solution includes a complete ecosystem for customers, with comprehensive application-specific hardware, optimised intellectual property suite for image processing, sample reference designs, demonstration designs and collateral.

The video and imaging kit enables high-performance evaluation of 4K image processing and rendering using dual-camera sensors suitable for designing demonstrations for video stitching, static and dynamic object insertion, as well as real depth estimation based on disparity maps. With its modular intellectual property suite providing clients the ability to prototype and accelerate time to market, the kit can be leveraged for multiple projects.

The kit also includes industry-standard imaging interfaces bolstered by 4 GB on-chip DDR4 and 1 GB Flash memory for frame buffering and user configuration, respectively. It offers bidirectional MIPI as a sensor interface and the choice of HDMI, DSI for display and SDI for broadcast-grade video.

The kit also facilitates the evaluation of reference designs for picture-in-picture (PiP) and edge detection with configurable resolution and image signal parameters. These features enhance the solution’s suitability for applications including surveillance and IP cameras, automotive and other untethered/mobile use cases, machine vision/medical, smart home and others in the industrial, aerospace/aviation and defence markets.

For more information contact Shane Padayachee, Avnet South Africa, +27 11 319 8600, shane.padayachee@avnet.eu.
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Load shedding’s toll on electronics manufacturing

By Brett van den Bosch.

It is no secret that power outages as a result of mismanagement at Eskom have an effect on all our lives, both personally and in business.

The manufacturing sector tends to be particularly hard hit by this, since virtually every aspect of all operations requires electrical power. This is certainly the case for the electronics industry, so we asked some of the local players how the week or so of load shedding in February this year (which reached Stage 4) affected them, as well as their forecasts for the future.

Dataweek: How much disruption did the latest week of load shedding cause to your operations?
Rob Steltman, owner of Barracuda Holdings: Even though we have generator backup for our factory units, load shedding is incredibly disruptive. Working 24/7 in some areas requires managers and maintenance to be on site outside of normal hours for a power changeover.

Also, there is downtime as the lines have to be stopped completely, turned off, changed over to generator power, then restarted again for every load shedding period. This causes a minimum of 30 to 40 minutes of downtime on the entire SMD plant, sometimes twice a day. Schedules have not always been adhered to and when outages come as a surprise, the disruption is huge and products can be damaged together with equipment.

Hosia Matlou, director at Phahama Systems Development: At some point we knew that this snake was going to raise its ugly head again but we didn’t know exactly when. It presented a lot of challenges in terms of production, so we have been affected to an extent.

We found ourselves having to work extended hours to try and catch up with the lost time but that was never possible with the same staff complement. We do have generators but they can only power up so many machines, and in an environment where our business mostly requires three-phase power there was only so much we could do.

Load shedding just added to the misery that the industry and the economy at large is facing, making a bad situation even worse. We found ourselves having to deal with crisis after crisis and customers are not so forgiving. It happened at the wrong time when the industry was just coming out of the December holidays and we were trying to pick up the pieces of the past year which was very, very quiet. It killed the momentum and affected our cash flow badly – it made the working hours short but we still had to pay full salaries to our employees.

The load shedding really set us back almost a whole month and customer confidence came crumbling down. The China song started to reverberate even louder. It just stretched everything – the driver took longer than usual to collect and deliver because of the dead traffic lights; traffic affected production as well.

It was a bad, rolling wave that affected one thing after the other. Let’s hope Eskom fixes and manages the load shedding better.

Ushir Mehta, director at Production Logix: Fortunately, being situated in an industrial area, we were not affected too badly with the exception of the day we went to Stage 4 load shedding. Even with this, we have a generator that can run the entire plant so the impact is not too severe.

The major problem we have with load shedding and the power supply in general is the impact it has on our equipment. Quick dips and spikes take their toll on sensitive equipment which is costly to repair or replace. Where we can we have protected machinery with surge protection but this does not guarantee any safety from high-frequency spikes.

Daniel Dock, managing director of Trax Interconnect: How ironic that just as I started writing this we started with Stage 2 load shedding and I am writing this with the generator rumbling in the background.

The disruption is pretty bad for us, despite how well we have planned for it. Last year we installed a 120 kVA UPS (uninterrupted power supply) to keep the computer network and critical machines running. Almost every machine in our process is controlled by either a PLC or a computer.

One cannot, however, run inductive loads off a UPS, so all the automated cranes on our plating lines need to be placed on hold before load shedding is scheduled to start, and plating can only resume once our generator is safely up and running.

We have a large 500 kVA generator which is capable of running approximately half of our factory, so while we are load shedding we need to turn off lines selectively so as not to overload the generator; this is a manual process since the work can be in different places each time load shedding occurs.

We are also not able to risk having multilayer boards in our vacuum press when load shedding is looming, due to the risk of delamination if the power is cut during a critical part of the pressing cycle.

Dataweek: Are you worried about further power disruptions and how are you planning to deal with them?
Rob Steltman: This is of great concern to us. Due to our high power requirements, alternatives other than generators are not really an option for us. It is complex and costly enough investing in equipment to keep up with technology, without now having to consider basic services such as power and water as well.

As for water, since we are based in the Western Cape, we were forced to install an independent water supply to the factory from a borehole during the drought last year and the looming Day Zero.

Hosia Matlou: The prospect is there and it’s always at the back of every businessman’s mind. Honestly I don’t know how to deal with it – as I’m writing this comment now I’m without power. The fact that the power grid is so unreliable makes me wonder how serious the government is in dealing with this power crisis.

Tshwane has become one of the worst run municipalities and I don’t care what the stats are saying. Every municipality must look after its industrial hub. I have seen services in Tshwane declining every day but the costs of staying and running your small business diminishing daily.

What government preaches and what it does are two different matters. We are tired of hanging in there!

Ushir Mehta: Like most other businesses, this is always a worry. We fortunately have a generator that is more than capable of powering our site, however the cost impact of running this for a sustained period of time is prohibitive. We don’t currently have any need to deal with the disruptions as we are already prepared. We are considering modifications to the system to help us with a seamless transition from mains to generator supply.

Daniel Dock: We have already done what we can within our financial limitations – buying another 500 kVA generator is not feasible for us. As it is, we already plan our production shifts around the load shedding schedule. The problem is when, like today, it escalates from Stage 1 to Stage 2, your shifts are messed up.

For us the biggest worry is the impact load shedding has on our customers and business confidence in general. We are already under duress as far as our input costs are concerned, and one is not able to pass the cost of running diesel engines or paying your staff overtime to catch up on to your customers.

Dataweek: Are you confident about business conditions going forward?
Rob Steltman: We have concerns based on policy turning to reality. Our hope lies in the resilience of South African companies (our customers) having navigated very turbulent

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It is no secret that power outages as a result of mismanagement at Eskom have an effect on all our lives, both personally and in business.
Continued from page 14

waters over the past decade and coming out on top.

Finding niche markets and being prepared to do what others feel is not worth the effort, has allowed us to grow during this period. On a personal note, I feel relieved that there is better insight into the extent of the problems faced by the country and that there is now acknowledgement and a serious effort to rectify them. How long the process will take, and who will survive it, is anyone’s guess.

Ushir Mehta: I’m sorry to sound unpatriotic but I feel that there was nothing much in finance minister Tito Mboweni’s recent budget speech that gave me even a ray of hope.

Let’s look at the digital migration process: we were told last year by the previous minister of communications that they had decided to change the funding model. This after running in circles for over 12 years; after money was looted left, right and centre then you want to change the funding model… why? That was my silent question.

They are trying to change the picture frame but still holding on to the same image. I think even the minister of finance was never briefed about the problems in the rollout of the set-top boxes because Eskom and their other state-owned-enterprise cousins are high on the minister’s agenda.

There was hope to revive the industry with the local manufacturing of the boxes but now it looks like we will have to wait for Zimbabwe with all its financial problems to migrate first. It really amazes me that the same government doesn’t see the opportunities that are there if we just complete this programme. They are the ones killing the economy – the mobile operators are singing every day, “please free the spectrum.”

Lack of innovation is also playing a very critical role in getting our manufacturing sector back on its feet. I’m still wondering what exactly the role of the CSIR is. I need someone to spell back on its feet. I’m still wondering what exactly is the role of the CSIR or existence?

Hosia Matlou: Compared to previous years, I am definitely positive about the South African economy. I believe we still have a long way to go to get our economy to where it should be but I am excited for the prospects available to our industry.

There is a big focus on the skilled sector and in particular to BEE compliant companies, and we are starting to see larger corporates put more emphasis on wanting to find companies that are both capable and compliant. I don’t think we will see a major improvement in the economy in the short term, but possibly in the medium term as corruption is hopefully dealt with.

I am also confident that South Africa has the right skills with respect to engineering and manufacturing to make the electronics sector a success. The large sectors that we supply into have also been allocated good budgets for the new fiscal year, which will also have a positive impact on us.

Daniel Dock: No we are not too confident about business conditions for our line of business in the immediate future. Taking a long-term view, one hopes that president Ramaphosa is able to deliver on his promises to revive our economy and attract investment. Sorting out Eskom is going to be key to that.

We have also been very negatively affected by problems at the state-owned enterprises, in particular Denel which has not paid its account in over a year and has done a lot of harm to the entire electronics industry supply chain.

Dataweek: Have you done any expansions or added any new equipment or capabilities recently?

Rob Steltman: We are continuously adding capacity as well as new capabilities to our factory, in an effort to provide a comprehensive service to our customers. We have spent a great deal of effort to provide more than just PCB population.

Hosia Matlou: I think we all know that manufacturing is a multi-dynamic industry. We wait for engineers to start designing new products to feed into the manufacturing belt. Without new products there is nothing to invest in. IoT has been the biggest buzz word at the moment, but personally I think it came early in South Africa. It hasn’t shaken up the market, or the industry for that matter.

I really want to invest in new equipment but you must back it up with a solid business plan or venture. My 50-year-old pick-and-place machine still does the job without any sweat. It is a wait and see game at the moment but unfortunately it affects lots of companies in the value chain. That is the reality.

Ushir Mehta: We recently invested in a Koh Young 3D solder paste inspection machine, as well as a fully automatic cut/strip/crimp/twist machine to deal with our growing harnessing division. We are currently investigating adding a new SMT line as well as selective soldering and various other harnessing machinery to address the needs of the automotive industry.

Daniel Dock: Trax is always trying to add additional capability and we are looking at ways to produce boards for the export market, in particular Europe where our pricing is still attractive compared to other European manufacturers. Later this year we will be implementing resin filling of vias, which will allow us to do ‘via in pad’ which is becoming essential with the modern BGA components that have a very tight pitch between pads.

Dataweek: Are there any other headaches your operation is experiencing?

Rob Steltman: We have managed the component lead times well, in partnership with our clients and suppliers. We hope that we are through the worst of it now, although there are still some challenges when urgent projects arise with very short lead times.

Industry labour rates are high, and without productivity and efficiency we quickly become uncompetitive. Gearing up to use innovation and technology is the only way we see ourselves remaining competitive as time passes. I do not believe we are unique in this regard.

Hosia Matlou: Fund raising challenges and the old boys’ club mentality. I don’t see a way for new entrants into this market unless you design your own products. There are so many contract manufacturers fighting for the same clientele, we are all knocking at the same door using a different doorbell. I don’t know for how long, but it seems we are at the crossroads now.

I don’t want to talk about the funding challenges because whatever is happening in those institutions is very, very scary. For now I will stay in my little corner – maybe this is all just a bad dream. In Tsawa they say “Modimo ke ooo” (God bless).

Ushir Mehta: Our biggest headache by far is supplier delivery performance, as well as the component lead time situation. The long lead times on certain components make it particularly difficult to operate effectively in an environment where customers can source their products from anywhere in the world.

Quite disappointing also was the performance of major suppliers who don’t meet their own committed supply dates, which we calculated to be approximately 30% on time and in full for the previous year. This has a knock-on effect on our own production environment in terms of constantly needing to reschedule production orders. It makes for a very unstable operating environment.

Daniel Dock: Fortunately the water crisis in the Western Cape is no longer an issue, but our next big headache is going to be treatment of effluent water. All our water saving efforts now mean we have a more concentrated effluent stream which is going to require additional capital investment in the form of a wastewater treatment plant. This is another expense that is very difficult to absorb following on from the R2 million we spent last year on boreholes and borehole water treatment plants.

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How to analyse blind via hole failures

By Bob Willis.

While the use of blind vias has become fairly common in electronics manufacturing today, inspection of via holes during fabrication is still problematic. This article considers a simple and easy way of assessing blind vias that makes failure analysis easier to perform and produces less controversy.

This technique has been used successfully to complement standard microsections, and in this author's opinion it is easier to perform. There are of course more advanced methods to be used, but at a price. Producing sections using a focused ion beam is an ideal tool for removing the possibility of damage, but introduces other forms of contamination or feature damage. Such methods are more analytical in their approach and out of the reach of many assemblers and PCB suppliers. Normally these methods are only used when there is a disagreement between a supplier and producer which leads to a potential court case.

It has become common practice to use blind, filled and stacked vias in many portable electronics products. Experience has shown that this method of interconnection is reliable, provided the fabrication process is well defined and controlled.

Through-hole, blind and buried vias can stand up to conventional and lead-free manufacture as the length of the barrel is short. It is, however, still difficult to inspect via locations during the fabrication process, and there is often much debate on the cause of any failure or if a particular via is satisfactory of not. Much of this relates to the contact between capture and the plating, and poor sectioning or etching methods can give different answers.

Unfortunately the IPC-A-600G standard did not address the issue of via assessment when it was last updated and released during 2004, but the recent revisions 600H and 600J do include some guidelines.

Blind and buried vias have been used in the industry for many years. Great experience exists, but very few standards or inspection guidelines exist for a company to reference. Very few users evaluate sample vias before and after thermal shock or focus on the quality control methods used in manufacture.

Producing a microsection is still the most common method of via assessment. Engineers who have learned the procedures of microsectioning will state that it requires a great level of skill and experience to correctly prepare and make an assessment of a blind via. Often the assessment can be debated due to the methods of sectioning and the final etching process used on the copper layers.

Over the last year experience has been gained in using a different approach, or perhaps just coming at the problem from a different angle. Over many years engineers have produced traditional microsections looking at plated through-holes along the length of the barrel. In the case of multilayer boards, if any concerns are seen on barrel plating and inner foil separation, experienced engineers would turn the section around and examine the copper pad connection on half the remaining hole. Basically, one can grind down vertically to obtain a different view.

Examination of blind vias by back grinding

The following procedure may be used to examine blind and stacked via interconnections for routine testing or during failure analysis of a printed circuit board. The illustrations outline the typical procedure and the information that may be obtained from any via.

A section of the board must be cut containing the via or group of via holes under examination. This can be conducted with a rotary diamond saw to minimise damage to the board or with a diamond core drill. Examination of the Gerber files can help to determine the points of interest, provided the fault locations have been determined by electrical test or by using X-ray. The design files can also show other via positions in this layer.

The board section must be cleaned in IPA to remove any surface contamination. This also ensures the mounting resin will adhere correctly during curing. Often if a no-clean flux has been used or the joint areas have been reworked, the amount of flux prevents resin bonding to the surface of the boards, leaving voids in the section.

The section of the board must be marked or a reference diagram/photograph made so that the correct via or vias are always being examined. The board section is then placed in a microsection mould. The position must be such that the back of the via or capture pad is facing down.

The epoxy mix must be poured in slowly to cover and surround the section of the circuit board. The epoxy is simply being used to hold the board during the grinding operation. The section mould must be placed in an air circulated oven and the epoxy allowed to cure. When the epoxy is fully cured it is carefully removed from the mould and the exposed face of the board towards the back of the via hole capture pad must be ground.

Grinding can be conducted initially using a 400 grit paper, then reducing to a 600 grit paper to slow down the epoxy removal rate. Scratches are not really an issue in this procedure, but control of the depth is more important. When approaching the back side of the capture pad, finer paper must be used to stop the copper trace and pad from being mechanically ripped from the resin.

The depth of grinding must be checked regularly with a microscope or 20x eye glass to determine when the pad surface is near. Ideally the objective is to reach the base copper foil.

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surface or the epoxy layer just below the copper track and pad. With care, and by keeping the section flat, it should be possible to examine more than one via interconnection using this technique.

If more than one via can be examined, then a better understanding of the quality of the interconnection and general fabrication process can be made. If this technique is only being used for failure analysis of a specific via, other vias can be examined first without disturbing the via in question. They allow an engineer unfamiliar with the technique to practice on pad and via separation.

When the section to the base of the copper foil has been ground, it must be placed under a microscope and the track end connected to the capture pad must be lightly probed. The track must then be peeled from the surface of the epoxy. If, during grinding, the copper surface is not reached, far more strain will be put on the track and copper pad during peeling.

With experience, an operator will be able to tell by the colour change when not covered in resin. Remember that the copper foil at this point may be just a few microns thick. When the copper track is peeled back, the capture pad will also be separated from the base of the plated via if there is intermittent bonding.

The track and connected pad can now be placed in a sealed container for future examination, and the section can be placed in another sealed container. Correct storage of the samples prevents any debris from falling on the two surfaces and possibly confusing any future analysis.
Both of the mating surfaces of the blind via that have been separated can be carefully examined. Initial examination is conducted with a high magnification microscope to look at the previously mating surfaces. It should be possible to compare the surface of each and show how they have separated, if the copper plating to the pad was defective or not. The two surfaces should have features that match like two jigsaw pieces.

Using an SEM (scanning electron microscope), images can be taken of both mating surfaces. A mechanical break between two copper surfaces should provide a distinctive pattern, allowing comparison on both surfaces. If the vias were correctly formed with a sound metallurgical bond but failed due to assembly or rework conditions, a hard, brittle copper fracture would be noted. If the quality of the plating, hole and pad surface preparation was poor, then surface analysis on an SEM should be able to identify and characterise the surface. It could then be compared with the surrounding materials.

SEM images in Figure 4 show the surface of a 0.5 mm capture pad (left) after separation from the bottom of the 0.25 mm blind via (right). There is no evidence of a fractured surface, suggesting that a true bond could not have formed during the blind via plating process. Although no measurement of the force to remove the capture pad has been made, the bond was noticeably weaker than pads of the same size on known good vias.

For more information visit www.bobwillis.co.uk
Buried in each electronic gadget or appliance there’s always at least one PCB and each one has to be perfect. There’s quite simply no latitude – a PCB fault will kill the device it’s part of.

Although they are largely passive platforms for surface mounted and leaded components, PCBs are by no means simple in design or easy to manufacture. Many of the fabrication processes have to be precisely controlled in case they destroy the board under construction or cause faults which will surface on the assembly line or in the field.

Now, to add to the challenges faced by PCB manufacturers, today’s already tiny PCBs are getting smaller and increasingly complex. The tolerances they have to work with are measured in microns and the faults they have to guard against are, quite literally, microscopic and buried deep within the layers of the board.

To check each layer as it’s completed, automatic optical inspection (AOI) and flying probe tests verify copper pattern quality and the integrity of pad, trace and via connections. Those tests are relatively straightforward, but checking the completed board, where the interior layers are entombed and the faults being checked for are microscopic and probably latent, is far more difficult.

Microsectioning is a commonly used technique as it can yield several levels of results.

**What is microsectioning?**
To see inside a PCB, you need to take it apart. Microsectioning is a destructive testing technique. Several sample, or sacrificial, boards are taken from each fabrication run and a specific, pre-determined section is cut out for examination.

Samples are taken from the order overrun, so while the client is not losing any stock, he can match test results to specific production runs and so to specific batches of PCBs.

**Potting, honing, polishing – preparing the microsection**
The process of microsectioning involves selecting a specific section of the board the manufacturer knows will show signs of stress or defect, if there are any. The target segment is cut out, leaving a clearance to ensure the microsection to be examined is not damaged or distorted in the process. This segment is then potted in clear resin.

Once the resin has cured, the target zone – usually a cross-section along a line of vias – is exposed by honing and then polishing away excess material. Final polishing is done with 0,05 micron grit jeweller’s paste to ensure an optically correct, scratch-free surface.

This is a far more skilled and technical process than it seems from this brief description. As the microsections are going to be...
analysed using an electron microscope or powerful optical microscope, the surfaces have to be absolutely flat and scratch-free.

**Faults found through microsectioning**
Microsections are taken from various stages of the manufacturing run to ensure a comprehensive analysis of each batch of PCBs.

Generally, qualified inspection analysts will be checking or confirming the following:
- How the base material has held up through the manufacturing process.
- That the layers in a multi-layer board have bonded well.
- The plating thickness on the walls of plated through-holes or vias.
- That there is no tearing away of plating from via walls.
- The thickness of conductors.
- The thickness of surface finishes.
- Whether hole drilling has been carried out correctly and no damage has occurred through overheating or blunt drill bits.
- That the multilayer stack-up is met, relative to the design requirements.
- That copper wrap thickness and copper cap plating thickness are compliant.
- That there are no plating cracks, resin recessions, plating voids, delamination, smear, copper cracks, blistering, laminate void cracks, excessive wicking or plating nodules present.

The results of the microsection inspection are recorded on the inspection report and kept on file, together with the microsection sample, for at least two years. They can be referred to in the event of an inquiry into product failure or a query from the customer about the quality of any particular batch of PCBs.

**How often are samples taken?**
The sample frequency depends on the size of the order – samples are taken whenever a predetermined square meterage of product has been processed. From each board sacrificed, samples are taken either from diagonally opposing corners, or as specified in the original manufacturing drawing.

If the PCBs are particularly complex and the order is small, the customer can include a test coupon into the design. The coupon will be a sample section of the PCB with the attributes of the PCBs being manufactured, but will not be a complete board. This saves the sacrifice of an actual PCB while giving the same results.

**Production line health checks**
Apart from quality control on PCBs, microsections reveal information the manufacturer will use for production line intelligence and health checks.

Apart from PCBs that are being made for clients, manufacturers run numerous test boards through their plants each day. These test boards go through the entire manufacturing process and are then used to check a multitude of factors including electroplating quality, laminate bonding, hole connection, drill quality, de-smearing and connection quality, to mention just a few.

Apart from pre-empting problems on their production lines, manufacturers use microsectioning in the search for perfection of their processes and techniques.

**Designed for obscurity, checked for perfection**
While PCBs are at the very core of our ability to make smaller and more reliable electronic equipment, you never hear about what brand of PCB is lurking in any device you may have in your tool kit at work or home.

PCBs are designed to remain obscure and put up with the worst possible conditions, particularly in the scientific, mining, automotive, military, avionics and aerospace industries. Their ruggedness and reliability are testament to the people who design, manufacture and test them, and to the processes and standards that have been developed to ensure their reliability and longevity.

For more information contact Cirtech Electronics, +27 21 700 4900, dee@cirtech-electronics.com.

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Temperature Profiling with the new SuperM.O.L.E® Gold 2

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This article summarises X-ray radiation dose, and the techniques that can be employed to reduce radiation exposure to samples in a Nordson Dage Quadra X-ray inspection system.

**Quadra X-ray geometry**
First we need to consider how the Quadra X-ray inspection system works. Quadra allows the internal structure of samples to be seen by shining X-ray light through a sample (Figure 1). This creates a shadow image that is detected in real-time using a high-resolution Aspire flat panel X-ray detector. The darkness of the shadow cast by any point in the sample depends on how much X-ray light has been absorbed by that part of the sample.

High image magnification is used to see smaller features clearly. This is achieved by moving the sample closer to the X-ray tube. For the highest magnification, the sample tray is lowered to the top of the X-ray tube.

Viewing the sample from different angles allows more defects to be observed. The Aspire flat panel detector moves around two oblique axes to allow this. X-rays from the QuadraNT X-ray tube are emitted over a wide cone angle so there are plenty of X-rays available off-axis.

Different materials absorb radiation to differing degrees (Figure 3). Lead is very good at absorbing X-ray radiation which is why it’s used to shield the X-ray cabinet. Silicon and aluminium are relatively poor at absorbing X-rays so images tend to be very bright. Tin and copper, commonly used in solder, are somewhere in between.

The shadow created at any point also depends on the voltage and power used to drive the X-ray tube (Figure 4). An X-ray tube operating at a voltage of 80 kV creates X-rays over the entire energy range up to 80 keV. Increasing the voltage to 160 kV doubles the X-ray output energy range from 80 keV to 160 keV.

Increasing the tube power increases the number of X-rays emitted at every point over the range. In general, higher energy X-rays are more likely to pass through a sample than lower energies. High energy beams are useful for looking at thick samples, or materials that strongly absorb X-rays, for example lead. Lower energy X-rays are better for thinner samples, or materials that weakly absorb X-rays, for example copper or silicon.

**What is X-ray dose?**
The X-ray dose for any part of the sample is a measure of the X-ray energy absorbed per unit mass, and is measured in units of gray (Gy), where 1 Gy = 1 J/kg = 100 rad.
Since different materials absorb incoming X-rays with differing efficiency, their absorbed dose will vary when placed in the same X-ray beam. A material like lead, which absorbs X-rays well and casts a dark shadow in an image, will absorb a higher dose than a material like silicon which absorbs X-rays weakly.

The absorbed dose also varies with:
- Distance to the X-ray source: The amount of X-ray radiation reduces as $1/r^2$ in the same way a light appears brighter the closer you are to it.
- Time in X-ray source: X-ray dose is cumulative so the longer spent in the X-ray beam, the higher the absorbed dose.
- X-ray tube output: The higher the tube power or voltage, the larger the absorbed dose.

**How to reduce sample dose**

Reducing the magnification used and minimising the time the X-ray tube is switched on are effective ways to reduce X-ray dose. Quadra’s low dose mode can be used to switch X-rays off when it detects the sample is no longer being manipulated.

Another method is to filter out lower energy X-rays (Figure 5). These X-rays do not contribute to the final image for two reasons:
- Absorption by sample: At low energies, particularly below 20 keV, X-rays are strongly absorbed by most samples. They contribute to sample dose, but are less likely to make it through the sample to the X-ray detector.
- Detector sensitivity: Flat panel X-ray detectors, like AspireFP, are insensitive to X-rays below ~20 keV. Any X-rays that manage to pass through the sample have a lower likelihood of being detected.

Filtering out low energy X-rays is an effective way to reduce sample dose without compromising image quality. A filtering sample tray is available for Quadra which incorporates zinc strips to absorb low energy X-rays while letting higher powers pass through to the sample. This can reduce overall X-ray dose by up to 80% (Figure 6).

Masking is a simple way of reducing X-ray dose for any components on a board that do not need to be inspected at all by X-ray. A portion of dense material, for example lead, can be attached to the sample tray immediately below the sample to mask the sensitive component from X-rays.

Quadra includes a dose calculation tool that tracks the average dose acquired by the whole sample during inspection. For the most accurate results, the tool can be calibrated by measuring X-ray dose in the path of the X-ray beam before and after the sensitive component (Figure 7).

**Getting better images from thin samples**

High energy X-rays are poorly absorbed by thin samples, or by weakly absorbing materials such as silicon or aluminium. Medium energy X-rays give the best image contrast for these samples. However, these energies are typically between 30 and 80 kV and are attenuated by ~90% by the standard aluminium sample tray.

A thin sample tray is available for Quadra which is manufactured from a thin layer of carbon fibre instead of a thicker layer of aluminium. This allows 10 times more medium energy X-rays to pass through, creating clearer images with better contrast.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.
Printed circuit broker, Elmatica, recently released a new film about product development, explaining why cooperating with an experienced partner could be a smart move.

“We have several times seen the unfortunate result of inadequate planning and execution in the early phase of the product development process, explains the company’s CEO, Didrik Bech. “Early involvement of an experienced partner in the design phase can save you from costly mistakes. This new movie is meant to inspire all parties involved in product development, and bring attention to doing things correctly, from the beginning. At Elmatica we value transparency and sharing knowledge, we are not reluctant to share our know-how or ask the challenging questions.”

The animated movie (accessible at www.youtube.com/watch?v=kGFJvLBqmCE) follows a product, this time a robot, from when the idea is hatched in the designer’s head until the finished product is loaded safe and sound on an aeroplane towards the end customer. The whole process is supported by the printed circuit broker.

“The product development process is broken down as a six-step process from idea generation to launch. We want to focus on how close cooperation with an experienced partner, which knows PCBs by heart, can improve the process and ensure that cost and time saving elements are considered in all phases,” says Bech.

Changes in the supply chain
Elmatica has supported the development of thousands of products since its establishment in 1971. Even if the process is more or less the same in 2019 compared to 1971, some things have changed as several companies have outsourced parts of their supply chain and products have increased in complexity, with the result that many are often more reliant on external knowledge and specialists.

“We have organised our products to match different parts of your development process. This makes it easier for you to understand what we do, and for you to decide when and how you would like to include us. In this movie, we show how each of our products can fit with your product development process, supporting it from the beginning until the end, delivering technical assistance, auditing, experience, seminars and contacts,” says Bech.

For more information visit https://elmatica.com/contact/

Flux management system earns APEX award
BTU International was awarded a 2019 NPI award in the reflow soldering category for its new Aqua Scrub flux management technology. The award was presented to the company during a ceremony that took place at the San Diego Convention Centre during this year’s IPC APEX Expo.

Aqua Scrub technology is BTU’s next generation solder reflow flux management system. The energy efficient, patent-pending design uses an aqueous-based scrubber technology compatible with most known paste and flux types. The flux and solution are automatically contained and packaged for disposal.

The machine has an attractive cost of ownership and is designed to decrease operational costs by four times over traditional condensation systems. Reduction in cost can be attributed to reduced downtime, labour and disposal costs.

The Aqua Scrub is purpose-built as a standalone system that can be easily retrofitted on PYRAMAX reflow ovens already in the field, as well as being configured on new PYRAMAX ovens. This self-contained unit mounts on the backside of the oven to minimise the impact on oven operation and factory floor space.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.

Solder dross recovery system
Stannol’s Solder Saver is a mechanical device to reduce dross, which occurs as an unavoidable side effect in wave soldering systems.

According to its manufacturer, solder consumption can be reduced by 30 - 50%, meaning it can provide a return on investment in just a few months.

The handling of the device is simple and can be performed without any training. The user simply places the tip of the Solder Saver into the wave solder bath at a shallow angle, so that the blades can reduce the dross. When the blades start rotating after actuating a pushbutton, the sponge-like dross structure will be broken up and a part of the metal will be directed back to the soldering bath.

The device can be used for multiple wave and selective soldering systems, and is suitable for lead containing and lead free solder baths.

For more information contact Electronic Industry Supplies, +27 11 726 6758, hreispty@iafrica.com.

Five tips for good product development
1. Ask the right questions. When starting a product development process, you need to ask all the important questions like why, how, where, what, when? What is possible, cost-effective, legal and smart? Find the best solution for the ‘heart’ of your electrical product – the PCB.
2. Do your research. When the concept is set, research and analysis begin. Involve an experienced partner to help you identify challenges, growth potential and compliance.
3. Do not skip steps when designing. If PCB design is not your strength, involve someone with the skills. This will save you from costly mistakes. The same goes for the choice of the manufacturer.
4. Know where you produce. Make sure to have a trusted partner for production, offering transparency, documentation and audited manufacturers.
5. Do not step in the “oh, I forgot the documentation” trap. When your product is ready for launch, use a partner with a global delivery platform and experience with documentation, regulations and compliance. You do not want your product to face trouble at the finishing line.
Ventilated sensor enclosures

The new 1551V miniature ventilated sensor enclosures from Hammond Manufacturing are designed to house sensors and small sub-systems installed in the manufacturing environment as part of IoT (Internet of Things) systems.

While there is no relevant international standard, the 1551V enclosures are designed around the PCB (printed circuit board) sizes selected by leading sensor manufacturers for their latest generations of products.

The ABS UL94-HB 1551V is available in black, grey and white as standard, and in four plan sizes: 80 x 80 mm, 80 x 40 mm, 60 x 60 mm and 40 x 40 mm, each 20 mm high. Maximum PCB sizes are 74 x 74 mm, 74 x 34 mm, 54 x 54 mm and 34 x 34 mm, respectively.

Four PCB mounts are moulded into the base and the 20 mm height gives enough space for board-mounted RJ45, USB and other standard communication interfaces. To simplify access, the snap-fit closure allows repeated opening and closing without tools. There are ventilation slots on all four vertical faces, and mounting slots and a 15 mm cable knock-out in the base.

Environmental sensors monitoring basics such as temperature, humidity and pressure are widely installed, and are now increasingly intelligent sub-systems, with data processing and communications capability embedded on a small PCB. For active components that produce relatively large amounts of waste heat, the 1551V provides excellent airflow for cooling purposes.

For more information contact Electrocomp, +27 11 458 9000, andrew@electrocomp.co.za.

Compact fan for extreme conditions

A new addition has been made to the 420J product range from ebm-papst.

The tube-axial fans withstand temperatures down to -40°C and are now also available for 48 V d.c. voltage input, IP68 degree of protection and EMC protection class B.

So far, the 40 x 40 x 28 mm product range has been designed for 12 and 24 V d.c. voltage inputs. Thanks to the new 48 V version, the fan can also be used for applications operating as standard with 48 V, such as base-stations in telecommunications systems. Special software and a special circuit design ensure reliable startup and operation at extremely low temperatures. A characteristic feature of all versions is their high level of energy efficiency.

The electronics of the 48 V d.c. version have been optimised to comply with the more stringent EMC Class B limit values for both conducted interference and radiated interference. There is thus no need for separate protection filters and shields. For applications involving greater dust, moisture and salt fog impact, the fans can optionally be supplied with IP68 degree of protection (dust-proof and with protection against continuous submersion). Not only the electronics, but also the winding, is then encapsulated in plastic.

The fan’s features facilitate use in outdoor applications such as cellular base stations or frequency converters for satellite transmission. They can also be used in IT servers and routers, as well as for laser cooling.

For more information contact Nadia Speranza, ebm-papst South Africa, +27 11 794 3434, nadia.speranza@za.ebmpapst.com.
Electrichouses for harsh environments

Phoenix Contact has introduced new electronics housings for especially harsh ambient conditions. The robust housings of the ECS series, with IP69 degree of protection, are suited for a broad temperature range of -40°C to +100°C, and reliably protect the integrated electronics against physical influences.

These electronics housings are therefore a particularly good solution for devices for both indoor and outdoor applications. Standardised panel feed-throughs such as M20, PCB connection technology such as M12, and optional accessories for wall and mast installation also increase the application spectrum of these robust housings.

The extruded aluminium enclosures of Gainta’s ALUG7XX series are available in different sizes, with lengths suitable for indoor desktop device or outdoor wall-mounting junction/control box use. Five standard colours (gold, silver, red, blue and black anodised finish) and modern aluminium bodies with either plastic or die-cast aluminium end panels are offered. A recessed area of 0,5 mm in depth is designed into the top, in order to affix a product label or do silk-screen printing.

Optional continuous rubber seals designed to meet IP66 rating are offered when customers need to install in the cover and use the enclosure outdoors. Black coated, die-cast wall mounting kits are also available, in addition to a 1,6 mm inserted PCB and PCB stoppers.

For more information contact Sivan Electronic Supplies, +27 11 887 7879, elecsupp@global.co.za.

For more information contact Richard Schoonebeek, Phoenix Contact, +27 11 801 8200, rschoonebeek@phoenixcontact.co.za.

Extruded aluminium enclosures

Enclosure front-panel customisation service

Pentair offers a wide choice of front panels and plug-in units for all kinds of electronics applications, and complements this with Front Panel Express, a rapid customisation service for all 19” and standard Schropp panels.

It is designed to speed up production programmes and provides a perfectly customised product with only a dimensioned drawing required. The customisation service entails a simple three-step process. The first step is product selection, giving customers a choice of front panels and plug-in units, all available from stock. Variable dimensions are available, from 2U to 9U and from 2 HP to 84 HP, and different surfaces and finishes can be chosen. The product selection conforms to VME, CompactPCI, AdvancedTCA and MicroTCA specifications.

The second step is modification, whereby 2D and 3D CAD data is available for download, in addition to a CAD library of cut-outs for connectors. The customer can then simply upload their customised CAD file including holes, cut-outs, printing, surface finishes or shielding.

Finally, the third step is assembly, at which stage a large range of lever and static handles is available. Other choices offered to the customer include textile or stainless steel EMC shielding, a choice of sleeves and screws, and complete front panel kits with handles or individual components. Pentair also offers a full assembly service.

For more information contact Actum Electronics, +27 11 608 3001, sales@actum.co.za.
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Conduction cooled AC-DC power module

Rated at 504 W, the baseplate conduction-cooled PFHS00F-28 from TDK-Lambda is packaged in a compact 101.6 x 61 mm footprint. Using industry standard PMBus commands, the output voltage and fault management levels can be adjusted (read/write) and product status read back. The PFHS00F series is optimised for COTS (commercial-off-the-shelf), LED signage, communications, broadcast, test and measurement equipment.

The PFHS00F-28 has an operating efficiency of up to 92%, enabled through the use of the latest technology. This includes GaN semiconductors, bridgeless power factor correction with synchronous rectification and digital control. A digital isolator replaces the traditional optocoupler for long-term stability and reliability.

Operating from a wide-range 85 to 265 V a.c. input, the module will deliver 18 A at 28 V with an adjustment capability of 22.4 – 33.6 V via the trim pin or the PMBus. It has a baseplate temperature range of -40°C to +100°C and measures 101.6 x 61 x 13.5 mm (L x W x H).

Product features and options include droop mode current share, a 12 V auxiliary standby output, remote on/off, remote sense, an open collector ‘power good’ signal, output trim and PMBus communication. The PMBus can be used to program the output voltage, activate the remote on/off, change the under/over-voltage, over-current and over-temperature set points, plus read back input and output current, input voltage and internal temperature.

Input to output isolation is 3 000 V a.c., input to case is 2 500 V a.c. and output to case is 1 500 V d.c. Safety certification is to IEC/EN/UL 60950-1 standards with CE marking for the Low Voltage and RoHS2 directives.

For more information contact Tobie Muller, Accutronics, +27 11 782 8728, tmuller@accutronics.co.za.

Rack mounted power supplies

XP Power has introduced a series of rack-mount, high-voltage DC power supplies able to supply up to 60 kV.

Aimed at laboratories and OEMs, the EY series of 1200 W power supplies feature flexible embedded controls with low ripple and noise. They are air insulated, fast-response units with tight regulation and extremely low arc discharge currents.

For use in the medical, industrial and general high-voltage areas, the most important applications for the units are in vapour deposition, ion implantation, glow discharge, electrostatics, plasma sources, cyclotrons, X-ray and other vacuum tubes.

The EY series comprises of 16 models from 0 - 1 kV to 0 – 60 kV at 1200 W output power. Typically, ripple is less than 0.02% RMS of rated voltage at full load, and off-line pulse-width modulation provides high efficiency and a reduced parts count for improved reliability. The first four models in the range feature reversible polarity, and the others can be purchased as positive or negative polarity units.

The power supplies feature automatic crossover from constant-voltage to constant-current regulation, providing protection against overloads, arcs and short circuits. Their arc quench feature ensures that the HV output is inhibited for a short period after each load arc to help extinguish the arc, while their remote analog and digital control via RS-232 and USB offers flexibility of integration. Similarly, optional Ethernet control provides the possibility of control and monitoring from remote locations.

The EY series’ bench/2U rack-mount format makes them suitable for location on a test bench or for integrating with other equipment in a standard 19-inch rack. Featuring embedded microcontroller control, front panel digital encoders on the units provide high-resolution local adjustment of voltage and current program.

The power supplies can operate from single-phase AC supplies of 180 to 264 V, are fully RoHS and CE compliant, and come with a 3-year warranty.

For more information contact Vepac Electronics, +27 11 454 8053, sales@vepac.co.za.

DIN-rail power supplies

Traco Power’s new TIB series of DIN-rail power supplies combines efficient circuit topology with optimised cost/performance ratio for industrial environments and for electrical control cabinets.

The units have a very high efficiency of up to 94.5% which allows a very slim package design. The case offers the potentially useful feature to fix the DIN-rail clip to the side wall for mounting inside flat panels. Over a period of a minimum of 4 seconds they can operate with a boost power of 150%. The boost power facilitates the activation of stepper motors, solenoids or actuators.

The units operate with a high power factor of up to 99% by active power factor correction, which also keeps the input inrush current low. The TIB series models are available with a nominal power of 80, 120, 240 or 480 Watts (+50% boost power). The output voltage is adjustable from 23.5 to 28 V d.c. They come with safety standard approvals for IEC/EN 60950-1, UL 60950-1 and UL 508.

For more information contact Conical Technologies, +27 66 231 1900, traco@conical.co.za.
DIN-rail redundancy module

TDK announced the introduction of the DRM40 series of DIN-rail mounted redundancy modules. Two 10 V to 30 V d.c. inputs are rated at 20 A each and the output at 40 A. A 150% peak load capability for four seconds is provided for capacitive and inductive loading. The internal MOSFET reverse current protection devices have a low 200 mV drop, reducing voltage losses in the module.

An LED on the front panel provides a visual indication when both input currents are balanced and equally sharing the output load. Applications for the DRM40 modules include factory automation, process control, and test and measurement equipment where two power supplies are used in a redundant configuration, paralleled to obtain higher power or for battery charging purposes.

In addition to two front mounted LEDs, the DRM40 has two isolated ‘DC good’ PhotoMOS relays to remotely monitor the presence and status of each input voltage. For cost-sensitive applications, the DRM40B model provides the same reverse protection functionality, without the ‘DC good’ and current balancing circuitry.

The DRM40 series is housed in a metal enclosure, measuring 124 mm in height, 125 mm deep and a width of 35 mm. The modules are rated for full-load operation in -40°C to +70°C ambient temperatures.

For more information contact Tobie Muller, Accutronics, +27 11 782 8728, tmuller@accutronics.co.za.

PMBus quarter-brick converters

Murata has launched a series of 600 W, DOSA compliant, 12 V output, digital quarter-brick DC-DC converters from Murata Power Solutions.

The series was designed for high-reliability applications based on a 32-bit ARM processor that supports the latest PMBus commands for digital control and telemetry functions. The DSQ, DCQ and DAQ converters support the full ‘TNV’ input range of 36 – 75 V, with a typical efficiency of 96% at full-load with 48 V input.

The series is designed to support droop mode current sharing of multiple modules for increased power output with tight load sharing. I/O isolation is 2250 V d.c., with a functional insulation system, and it carries the UL/CSA safety agency approvals.

Options for these modules include a digital interface supporting the latest PMBus command set, parallel load sharing, positive or negative on/off logic, along with options for standard ‘analog’ DOSA pinout and a 5-pin bus converter pinout.

Application examples include telecommunications networking equipment, computing equipment, wireless base stations, PoE systems, MicroTCA, fan trays and test equipment.

The DSQ model includes a PMBus interface that provides a means (through an I²C bus) to configure output voltage, soft start parameters, input and output over-voltage protection limits, input under-voltage lockout, current limit and thermal shutdown. Telemetry functions include output voltage and current, input voltage and temperature, as well as indications for ‘power good’ and on/off status.

The heart of the module is a 32-bit processor controlling all functions and parameters. To support the PMBus, Murata Power Solutions is offering an optional evaluation board that is supported by downloadable software with a user-friendly GUI. The evaluation boards and a GUI manual are available upon request.

For more information contact Gyula Wendler, Altron Arrow, +27 11 923 9709, gwendler@arrow.altech.co.za.
RF over fibre links

The EMCORE 5200 series fibre-optic inter-facility link (IFL) is a cost-effective alternative to coaxial cable for 20 MHz up to 6500 MHz communications applications.

The devices function as transparent RF fibre links, eliminating the limitations of copper systems by enabling longer transmission distance while retaining a high level of signal quality. They also provide network advantages such as simplified network design, ease of installation, and immunity from EMI/RFI and lightning.

The 5200 series can be used in wireless, headend, TVRO and broadcast applications, among others. Its compact design allows for four units to fit into a 1RU chassis.

For more information contact Conical Technologies, +27 66 231 1900, daniel.haywood@conical.co.za.

Compact motor starter with full protection

The new Christian P-4.0 motor starter from TELE is designed for motors up to 4,0 kW at 400 V, and includes five functions in one compact unit, requiring only 22,5 mm width.

It offers a soft start, soft stop, forward/reverse, overload protection and an integrated 3-phase motor contactor.

By offering integrated motor protection, the use of an external MCB is unnecessary. A simple circuit breaker protects the installation against short circuit and faulty wiring. The soft start and stop function is performed by reliable semiconductors (thyristors) and the reversing function by an internal relay. After performing the start process, the semiconductors are bypassed by integrated relays to minimise power dissipation.

The above features help to protect motors, shafts and industrial plants from mechanical stress, and reduce maintenance and standstill times.

For more information contact Vepac Electronics, +27 11 454 8053, sales@vepac.co.za.

Dual-circuit tact switch

C&K has extended its KSC range of tactile switches with the addition of a new dual-circuit model. The new KSC-DCT tact switches offer single-pole double-throw, normally-closed normally-open dual-circuit functionality that provides two outputs from a single input.

Housed in a tiny 6,2 x 6,2 x 2,9 mm PCB-mount package, the silicone 70SH actuator included in the package extends the height to 5,2 mm above the PCB surface for easy operation and easier integration through pre/post travel. Rated for 300 000 operations, the switches require an operating force of 4,75 N and provide a nominal travel distance of 0,85 mm.

The switches are IP67 sealed and operate over the temperature range of -40°C to +85°C, making them suitable for use in harsh environments, such as those found in automotive, industrial and medical applications.

For more information contact TRX Electronics, +27 12 997 0509, info@trx-electronics.co.za.

High-voltage double chokes

With its WE-TDC HV, Würth Elektronik eiSos has introduced a further double choke optimised for SMT assembly.

The magnetically shielded 1:1 transformer, with an isolation voltage of 2 000 V, boasts very lower losses and a low level of stray inductance.

The product family encompasses nine different models – five in an 8038 package and four in an 8018 – each with a height of just 1,8 mm. The chokes are specified across extended operating temperatures from -40°C to +125°C, and have functional isolation for a working voltage of 250 V

They are suitable for use in switching controllers with a second, unregulated output voltage, in buck, boost, Sepic, Zeta and CUK converters, as well as in isolated converter applications with high packaging density (e.g. flyback converters).

The components are packaged in 16 mm tapes, are available from stock, and samples can be requested.

For more information contact Jason Page, Würth Elektronik eiSos, +27 71 259 9381, jason.page@we-online.com.
Rail-mount fibre-optic distributor

Webb Industries has introduced Telegärtner's new, modular rail-mount fibre-optic distributor.

The STX distributor can be extended according to actual needs, with stackable modules that allow for quick and easy additions and changes at any time.

The STX range offers a broad portfolio of different modules that accept 12 fibres and ST, SC and LC adaptors, as well as a high-density LC module with 24 fibres. All modules are available for OM1 to OM4 multimode and OS2 single-mode fibres.

Customers can select from a variety of modules for pre-terminated breakout and mini-breakout cables. This includes modules with an integrated hinged splice cassette and pigtails stripped ready-to-splice, and modules for pre-terminated fibre-optic cables.

The adaptors are mounted at a 45-degree angle so users can conveniently plug patch cords in and out using a minimum of valuable space. Horizontal cables can enter the modules from four different directions. This gives the installer the opportunity to decide on-site about the best cable routing. “This offers users and installers the maximum flexibility,” says Webb's Stephen Hands.

With dimensions of just 35 x 215 x 155 mm (two-module width), the compact modules make the most of available space, enabling users and installers alike to conveniently patch and store any fibre slack. The modules can be mounted on TH35 rails as specified in DIN 60715, and on flat surfaces/walls.

For more information contact Stephen Hands, Webb Industries, +27 11 719 0000, prichards@webb.co.za.

SMD antennas for LTE/cellular/5G

The Reach series of antennas from Taoglas covers all cellular bands and all sub-6 GHz 5G deployments.

The PCS.66.A covers the 600 MHz to 6000 MHz spectrum supporting band 71, on a small form factor of 32.0 x 25.0 x 1.6 mm. The PCS.86.A is a slightly smaller form factor and covers 791 MHz to 6000 MHz, with a form factor size of 32 x 16 x 1.6 mm.

The Reach series will help to address low-band frequencies as well as most new module chipsets, and they are backwards compatible with all 4G/3G/2G applications, including LTE, GSM, CDMA, DCS, PCS, WCDMA, UMTS, HSDPA, GPRS/EDGE, IMT, Wi-Fi, and CBRS 600 MHz to 6000 MHz.

The patent-pending design uses printed circuit board material and innovative design techniques to deliver high efficiencies at all bands when mounted on the device’s main PCB. They are suitable for lower-cost LTE applications, especially IoT projects requiring wide bandwidth, and come supplied on tape and reel to allow them to be mounted via pick-and-place.

Their high radiation efficiency over the entire operating bandwidth means that the total efficiency is only limited by the impedance mismatch loss. As a result, these antennas can be optimised via a matching network to the specific bands needed for any application. Efficiencies as high as 90% have been measured when the return loss is very high (-15 dB or more).

If tuning is required, they can be tuned for the device environment using a matching circuit, or other techniques on the main PCB itself.

For more information contact Andrew Hutton, RF Design, +27 21 555 8400, andrew@rfdesign.co.za.
MACOM Technology Solutions has expanded its GaN-on-Si power amplifier portfolio with the introduction of its new MAMG-100227-010 broadband PA module optimised for use in land mobile radio (LMR) systems, wireless public safety communications and military tactical communications and electronic countermeasures (ECM). Combining the design efficiencies of a fully-matched (50 Ω), two-stage PA architecture with top- and bottom-side mounting configurability, the chip enables design flexibility for radios balancing stringent size, weight and power (SWaP) specifications. It features a bandwidth of 225 – 2600 MHz, with 10 W CW output power, 40% typical power added efficiency over the band, 22 dB typical power gain, and up to 36 V operation.

Nordic Semiconductors new nRF52811 system-on-chip (SoC) is a full-featured connectivity solution that supports Bluetooth 5.1 direction finding and a range of popular low-power wireless protocols for applications such as gateways for smart home and industry products. It includes a multiprotocol 2.4 GHz radio (featuring 4 dBm output power with -97 dBm sensitivity at 1Mbps in Bluetooth 5 mode), a 64 MHz, 32-bit Arm Cortex M4 processor, and 192 KB of Flash and 24 KB of RAM memory. It also comes with a wide range of analog and digital interfaces. The chip is accompanied by an updated version (v15.3.0) of Nordic’s nRF5 software development kit which includes a Bluetooth 5 certified RF software protocol stack.

Microchip has released new dual- and single-core dsPIC33C digital signal controllers (DSCs) with more options to meet changing application requirements across memory, temperature and functional safety. The dual-core dsPIC33CH512MP508 enables support for applications with larger program memory requirements, while the single-core dsPIC33CK64MP105 adds a cost-optimised version for applications that require smaller memory and footprint. All devices in the dsPIC33C family include a fully featured set of functional safety hardware to ease ASIL-B and ASIL-C certifications in safety-critical applications.
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