New-Tech Magazine Europe

September 2016

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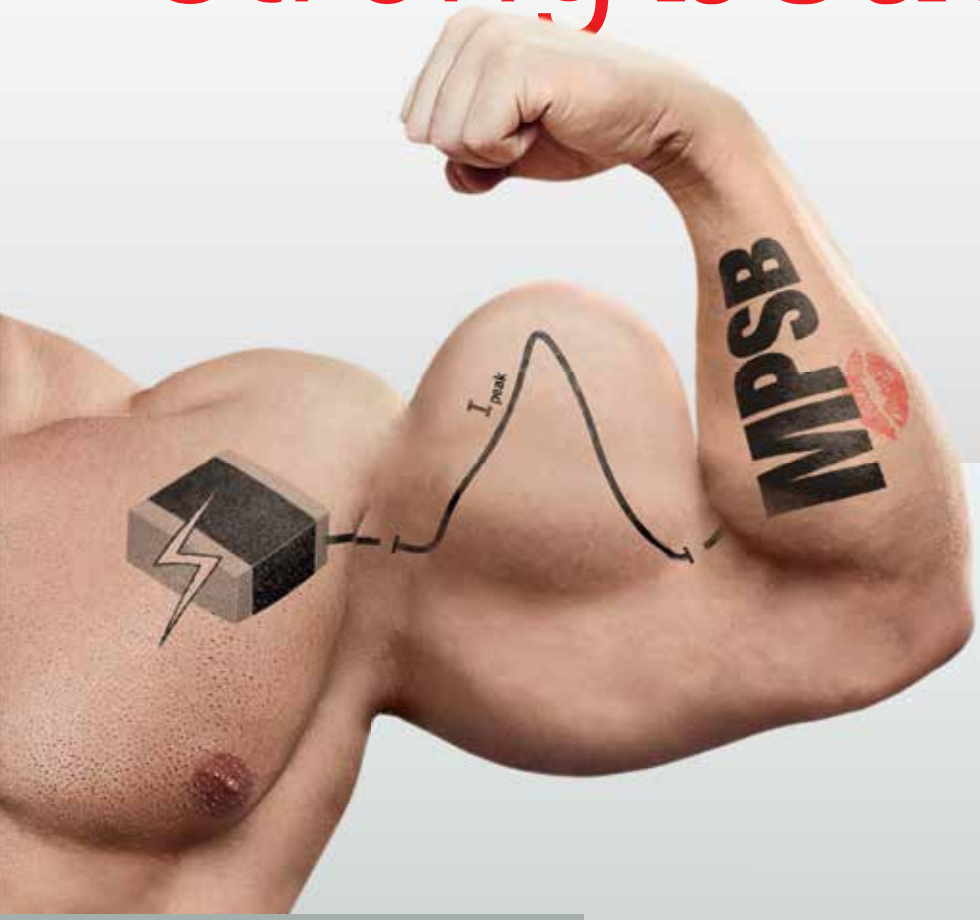
WÜRTH ELEKTRONIK



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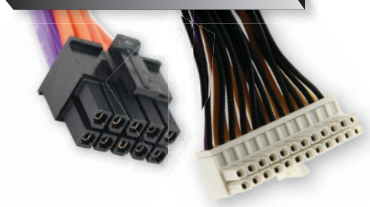
- muscular peak current capability
- high rated currents
- ultra-low R_{DC} to minimize unwanted losses
- effective broadband filtering

INTEGRATING DESIGN WITH FLEXIBILITY

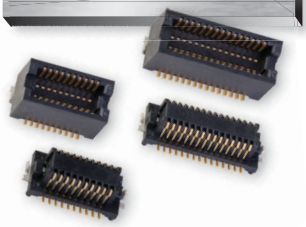
Introducing the New Products from BASICS Portfolio

Minitek® Pwr 3.0/4.2mm Connector



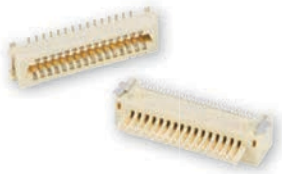
Minitek MicroSpace™ 1.27mm Crimp-to-Wire Connector

BergStak® 0.50mm Mezzanine Connector



BergStak+™ PCIe 4.0 Mezzanine Connector

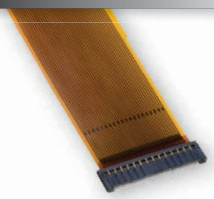
Conan® 1.00mm Mezzanine Connector (Right Angle)



USB 3.1 Type C Gen 2 Connector

Industrial Mini I/O

High Speed FPC



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Intelligent Systems

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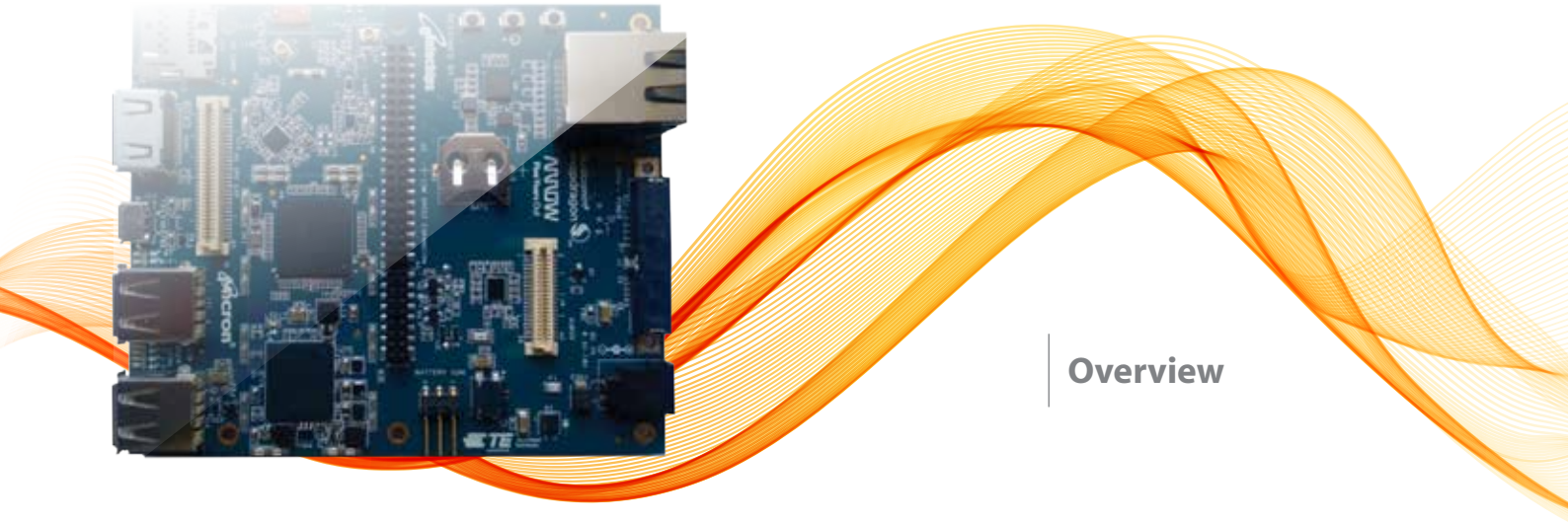
Internet-of-Things | Board

Welcome to the **SD 600eval**

This SD 600eval by Arrow Electronics is based on 96Boards Consumer Edition (CE) specification and features the Qualcomm® Snapdragon™ 600 processor and a quad-core Qualcomm® Krait™ 300 CPU with up to 1.7GHz clock speed per core, capable of 32-bit operation.



Overview

Processor
Snapdragon 600 processor APQ8064
Quad-core Krait 300 CPU at up to 1.7GHz per core
Adreno 320 GPU with support for OpenGL ES 1.1/2.0, OpenCL 1.1, WebGL 1.0, DirectX9.3

Memory/Storage
2GB PoP LPDDR2 533MHz
16GB e.MMC
SATA
SD 3.0 (UHS-I)

Video
1080p@30fps HD video playback and capture with H.264 (AVC)

Camera Support
Two MIPI-CSI interfaces – 4-lane CSI port and 2-lane CSI Port

Audio
PCM/AAC+/MP3/WMA, ECNS, Audio+ post-processing (optional)

Connectivity
WLAN 802.11 a/b/g/n/ac 2×2 Dual-Band 2.4GHz/5GHz
Bluetooth 4.0/LE
On-board as well as external BT & WLAN antenna
GPS/GLONASS
External GPS antenna
One OTG USB 2.0 Micro AB
Two USB 2.0 Type A
PCIe to Gigabit Ethernet via AR8151
HDMI

I/O Interfaces
One 40-pin Low Speed (LS) expansion connector
UART x2, SPI, PCM, I2C x2, GPIO x12, DC power
One 60-pin High Speed (HS) expansion connector
4L MIPI-DSI, USB, HSIC, SDIO, I2C x2, 2L+4L MIPI-CSI
One 16-pin & 40-pin Audio expansion connector
Stereo Headset/Line-out, Speaker, Analog/Digital Mics

External Storage
Micro SD card slot
SATA Hard Drive connector

User Interface
Power/Reset
User configurable Switch
6 LED indicators
1 Wi-Fi activity LED (Yellow)
1 BT activity LED (Blue)
4 User LEDs (Green)

OS-support
Android 5.1
Linux based on Ubuntu/Debian

Power, Mechanical and Environmental
Power: +6.5V to +18V
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Operating Temp: 0°C to +50°C
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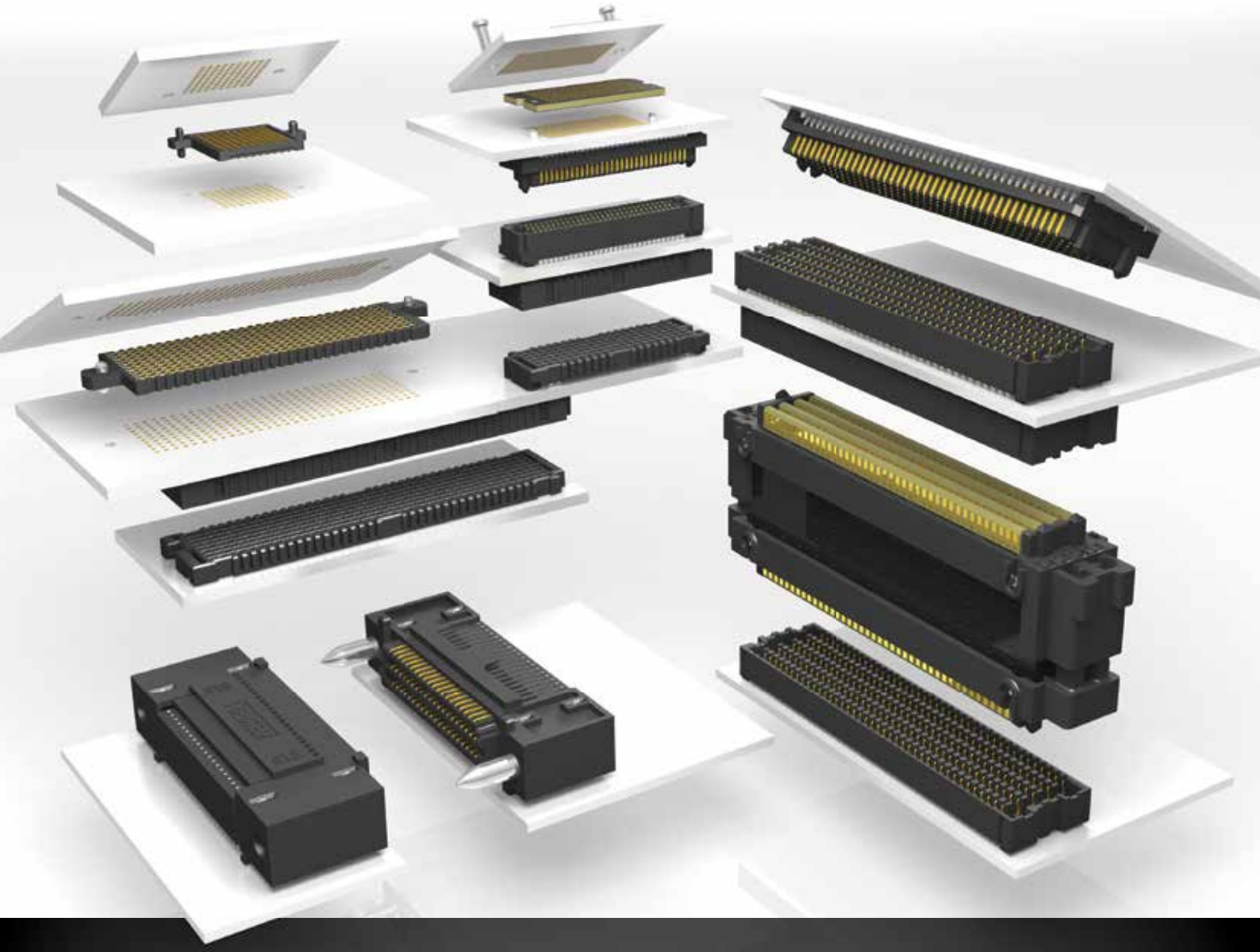
HIGH DENSITY ARRAYS



- (1,27 mm x 1,27 mm) .050" x .050" grid array for maximum grounding and routing flexibility
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Read To Lead

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About New-Tech Magazines Group

'New-Tech Magazines' A world leader in publishing high-tech and electronics, producing top quality publications read by tens of thousands professionals from all over the world especially from Europe, innovative electronics, IoT, microwave, homeland security, aerospace, automotive and technological industries.

Our specialized target audiences prefer New-Tech Europe because they know that our publications are a reliable source of the latest information in their respective fields. Our multidimensional editorials, news items, interviews and feature articles provide them with a full, well-rounded picture of the markets in which they operate - an essential asset for every technological leader striving to stay ahead, make the right decisions, and generate the next global innovation.

Moreover, as an attractive platform for advertisers from around the world, New-Tech Europe has become a hub for bustling international commercial activity. Here, through ads and other promotional materials, Israeli readers obtain crucial information about developers and manufacturers worldwide, finding the tools, instruments, systems and components they need to facilitate their innovative endeavors.

Targeting the needs of both the global and european industries and global advertisers, New-Tech Magazines Group constantly expands and upgrades its services. Over the years, the company has been able to formulate a remarkably effective, multi-medium mix of offerings, combining magazine publications with useful online activities, newsletters and special events and exhibitions.

www.new-techeurope.com

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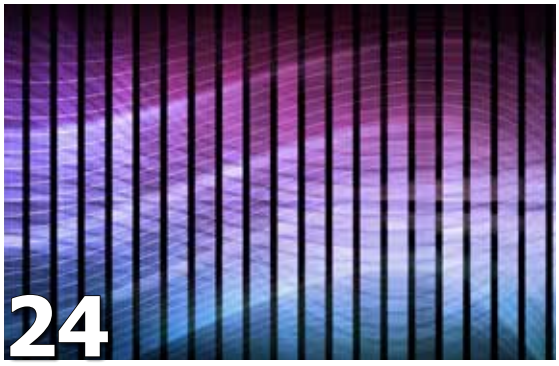

Infineon secures new smart wearables for Taiwanese iPASS transport ticketing system

Users of public transport in Taiwan now have a new range of secured iPASS-ready wearables at hand: Infineon Technologies AG (FSE: IFX / OTCQX: IFNNY), one of the world's largest suppliers of security chips, provides its unique Boosted NFC secure element solutions for wearables performing secured transactions such as transport ticketing and micropayment. In the recently launched K.R.T. GIRLS themed wrist straps and Garmin's vivosmart HR fitness tracker, the proven and certified solution enables outstandingly reliable and fast contactless data transmission. Thus, they will further increase consumers' trust and acceptance of secured mobile payment.

Wearers of the Garmin fitness trackers for example, will be able to ride Taiwan's Metro Rapid Transit, Taiwan Railways, ferries, busses, taxis and public bike systems with a light tap of their wrist bands on the iPASS card readers. They can also pay at four major convenience store chains in Taiwan. Among these are 7-11 and FamilyMart covering 13,000 locations around the island at many tourist sites, gas stations and hospitals.

Boosted NFC SE – secures NFC payment in ultra-small devices

The transportation ticketing and micro payments functionalities are made possible with Infineon's Boosted NFC secure element solution. It offers:

Bank-level security – proven and reliable security based on globally recognized standards such as Common Criteria EAL5+/6+ and EMVCo;

Scalability – a range of boosted NFC SE products from 240 KB to 1 MB of embedded memory, scalable for single or multiple applications with over-the-air administration;

Small footprint with low power – requiring 80 per cent less printed circuit board footprint and only 75% stand-by power of conventional NFC solutions, both being crucial for smart wearable devices.

Infineon provides the industry's broadest portfolio of financial-level security chips and solutions that perform as crypto-engine and secured storage of sensitive data such as keys, certificates or biometric information for electronic payment transactions. Almost half of all chip-based payment cards issued worldwide in 2015 use security solutions from Infineon. To make cashless payment even easier and more convenient for consumers, Infineon has optimized its contactless technology for payment applications with even the smallest smart wearables.

Intel and TPG to Collaborate to Establish McAfee as Leading Independent Cybersecurity Company Valued at $4.2 Billion

Intel Corporation and TPG today announced a definitive agreement under which the two parties will establish a newly formed, jointly-owned, independent cybersecurity company. The new company will be called McAfee following transaction close. TPG will own 51 percent of McAfee and Intel will own 49 percent in a transaction valuing the business at approximately $4.2 billion. TPG is making a $1.1 billion equity investment to help drive growth and enhance focus as a standalone business.

Chris Young, the new company's CEO to be

Through this transaction, TPG, a leading global alternative asset firm with demonstrated expertise in growing profitable software companies and carve-out investments, and Intel, a global technology leader that powers the cloud and billions of smart, connected computing devices, will work together to position McAfee as a strong independent company with access to significant financial, operational and technology resources. With the new investment from TPG and continued strategic backing of Intel, the new entity is expected to

Wireless Mesh Network. Wired Reliability.

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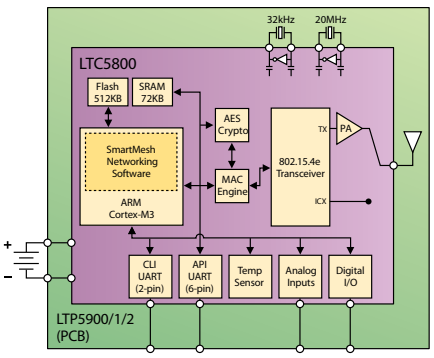
The Dust Networks LTC® 5800 and LTP® 5900 product families from Linear Technology are embedded wireless sensor networks (WSN) that deliver unmatched ultralow power operation and superior reliability. This ensures flexibility in placing sensors exactly where needed, with low cost "peel and stick" installations. The highly integrated SmartMesh® LTC5800 (system-on-chip) and LTP5900 (PCB module) families are the industry's lowest power IEEE 802.15.4e compliant wireless sensor networking products.

Features

- Routing Nodes Consume <50µA Average Current
- >99.999% Reliability Even in the Most Challenging RF Environments
- Complete Wireless Mesh Solution – No Network Stack Development Required
- Network Management and NIST-Certified Security Capabilities
- Two Standards-Compliant Families: SmartMesh IP (6LoWPAN) and SmartMesh WirelessHART (IEC62591)

Highly Integrated LTC5800 and LTP5900 Families



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ARROW

capitalize on significant global growth opportunities through greater focus and targeted investment.

The new company will be one of the world's largest pure-play cybersecurity companies. Last year, Intel Security unveiled a new strategy that refocused the business on endpoint and cloud as security control points, as well as actionable threat intelligence, analytics and orchestration. This new strategy allows customers to detect and respond to more threats faster and with fewer resources.

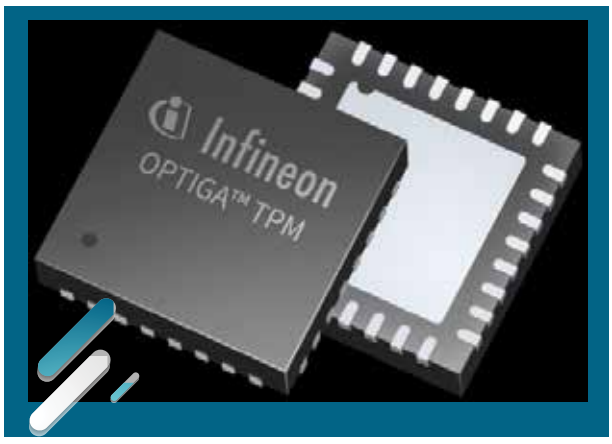
Chris Young will be appointed CEO of the new company upon closing of the transaction. Today he published an open letter to Intel Security's stakeholders outlining benefits of the transaction and new company.

"As a standalone company supported by these two partners, we will be in an even greater position of strength, committed to being the best provider the cybersecurity industry has ever seen," Young said. "We will continue to focus on solving the unique demands of customers in the dynamic cybersecurity marketplace, drive innovation that anticipates future market needs, and continue to grow through our strategic priorities."

Currently, Intel Security's comprehensive software platform protects more than a quarter of a billion endpoints, secures the footprint for nearly two-thirds of the world's 2,000 largest companies, detects more than 400,000 new threats each day, and represents more than 7,500 strong of the industry's most talented professionals. The business has demonstrated strong momentum. Through the first half of this year, Intel Security Group revenue grew 11 percent to $1.1 billion, while operating income grew 391 percent to $182 million. Intel Security also increased total bookings 7 percent per year on a constant currency basis from 2013 to 2015.1

Under the terms of the agreement, TPG will own 51 percent of a newly-formed cybersecurity company in a multi-step transaction valuing Intel Security at approximately $4.2 billion, based on an equity value of approximately $2.2 billion plus McAfee net debt of approximately $2 billion. The debt initially will be financed by Intel until completion of audited financial statements for McAfee (expected within three to five months of close). The transaction is expected to close in the second quarter of 2017, subject to certain regulatory approvals and customary closing conditions.

Mocana Security of Things Platform™ integrates support for the Infineon OPTIGA™ TPM



Infineon Technologies AG (FSE: IFX / OTCQX: IFNNY) and Mocana Corporation take IoT security to the next level. Embedded systems security specialist Mocana integrates support for the Infineon OPTIGA™ TPM (Trusted Platform Module) security controller as a standard feature into its latest Security of Things Platform™.

Developers who choose Mocana's platform for smart factories, infrastructure, automotive and other security-critical IoT designs can now quickly and easily integrate hardware protection into their devices. In addition, millions of IoT devices that already incorporate OPTIGA TPMs from market leader Infineon could benefit from the advanced security features offered by the Mocana software platform.

The Mocana Security of Things Platform secures manifold aspects of connected devices through a comprehensive collection of services such as pre-boot verification, certificate management, cryptographic engines, secured data transport and secured firmware updates. The platform with integrated support for the OPTIGA TPM family will be available in Q4 2016.

OPTIGA TPMs are standalone security controllers based on the international standards of the Trusted Computing Group (TCG). TPMs protect integrity and authenticity of embedded systems by implementing advanced cryptographic algorithms in hardware. These established devices have been used successfully to provide security in PCs for over 15 years and are increasingly included into different embedded systems. A TPM can be thought

of as a "safe" within the system as it is capable of resisting both logical and physical attacks.

"We are very excited to announce that Mocana's software is compatible with Infineon's OPTIGA TPM 1.2 chips," said Dean Weber, CTO at Mocana. "We believe this technology will advance Mocana further as a leader in the embedded security space, being one of the few companies that offer security down to the root of trust, which ensures that IP connected devices and the data they provide can be safe and trusted".

"Developers can rely on solutions with Infineon's proven hardware and Mocana's established software," said Joerg Borchert, Vice President of the Chip Card & Security Division at Infineon Technologies Americas Corp. "Thus, they can quickly and easily bring to market products and systems that provide the highly advanced levels of protection that these applications demand".

Infineon makes the Internet of Things (IoT) smart, secure and power efficient. Sensors, controllers, power components and security solutions are the building blocks for all major IoT applications from connected cars to industrial or smart home applications. We help our customers to create sustainable IoT success with benchmarking semiconductor technologies and our system understanding of the automotive, energy and security markets. Further information is available at: www.infineon.com/iot, www.infineon.com/iot-security and www.infineon.com/tpm.

An EPFL startup makes residential solar panels twice as efficient

With a 36% yield, the solar panels developed by startup Insolight could deliver up to twice as much energy as traditional panels. The company came up with a thin structure that directs the sun's rays to the small surface area of very high performance solar cells. The result is a highly efficient flat photovoltaic system.

Twice as much electricity for the same surface area: that sums up Insolight's solar panels. The company, which is based in EPFL's Innovation Park, has developed a prototype with a yield – the quantity of electricity produced from the light energy received – of 36.4%, while solutions currently available on the market offer throughput of only around 18-20%. These results, which could represent a world record, have just been validated on a prototype by the Fraunhofer Institute, an independent lab based in Germany.

How did they reach such a high yield? A transparent, flat and very thin optical system made from plastic directs the sun's rays to the tiny surface area of very high performance cells. These cells, which boast a yield of 42%, are made up of a number of layers that were specially designed to capture differing wave lengths. Because they are expensive to produce, these super cells are only used in certain sectors – like space – at this point. So the startup took another tack. Instead of working to increase the yield of the solar panels themselves, the company uses lenses to focus light waves on small segments of the super cells – segments that are only several square millimeters in size. "It's like a shower: all the water goes down one small drain, there's no need for the drain to cover the entire floor of the shower," says Laurent Coulot, CEO of the startup.

The crux of the innovation lies in the microtracking system, patented by the startup, that captures 100% of the sun's rays regardless of the angle of incidence. The transparent plate, which is injection-molded, is equipped with an array of millimetric lenses, which act as a small network of magnifiers. It is moved several millimeters during the day by a metallic frame. This slight movement, which takes place in real time as a sensor detects the sun's position, maximizes the yield. The company developed its innovation in the Laboratory of Applied Photonics Devices under one of EPFL's Innogrants, which go to promising startups. The system takes up such a small amount of space that it can be installed like any solar panel. Christophe Moser made space for the team in his lab and provided them with crucial expertise, as he was developing a solar concentrator for a project to produce hydrogen using sunlight. Insolight's modules could be of interest in that field as well, according to Moser.

Similar systems are being developed in several labs around the world, but the EPFL startup pulled off a considerable feat in rapidly producing a system that was nearly market-

ready. "All the components were designed from the start to be easily mass produced," says Mathieu Ackermann, the company's CTO. The startup's three young founders are EPFL alumni who all worked in industry before creating their own startup. They began by fleshing out their idea in their spare time before setting up their company. "Working in industry gave us what we needed to reach our goal, which was to develop solar panels that could be rapidly brought to market at a competitive price."

The founders are convinced that their solar panels will lower the price per kWh paid by consumers. The system will probably be a little more expensive to buy, "but this will be quickly offset by the additional energy that will be generated," says Florian Gerlich, COO. "The price of solar panels has dropped sharply in recent years, but not enough to produce electricity at a competitive cost," he says. "For residential systems, solar panels accounted for less than 20% of total installation costs in the United States in 2015. Even if the solar panels were free, this would not always offset the system's cost. Currently, most of the margin earned by solar energy developers comes from subsidies. Yet these subsidies are declining."

By combining efficiency and ease of installation, the founders of the startup hope to shake things up by making photovoltaic systems competitive with fossil energies. "Insolight has designed a highly innovative system, and these initial prototypes show an impressive yield in external assessments," says Christophe Ballif, Director of EPFL's Photovoltaics Laboratory. "They now need to test the limits of their concept, show how a commercial-sized system can perform, and prove the product's economic potential."

Advantest's T5851 Tester Wins Best of Show Award at Flash Memory Summit

Leading semiconductor test equipment supplier Advantest Corporation (TSE: 6857) earned a Best of Show Award with its T5851 tester at the 11th Annual Flash Memory Summit, held August 9-11 in Santa Clara, Calif. The awards presented at the summit provide the highest honors in the flash memory and solid-state storage industry.

In the category of Most Innovative Flash Memory Technology, Advantest's T5851 system was recognized for changing the way flash memory is tested to improve the performance, availability, endurance and/or energy efficiencies of electronic products. The T5851 provides multi-protocol support in one tool for high-performance universal flash storage (UFS) devices and PCIe BGA solid-state drives, minimizing customers' capital investments and deployment risks. Its tester-per-DUT architecture and proprietary hardware accelerator deliver the fastest test times in the industry, contributing to a lower cost of test.

The T5851 is designed for high-volume testing, as well as reliability and qualification testing, of protocol NAND devices. This flexible system can be configured to test up to 768 devices in parallel by using an automated component handler such as Advantest's M6242 system.

"We are proud to receive this industry acknowledgment of the innovative advances that we bring to the market for non-volatile memories, which are so vital to low-power, mobile applications," said Masuhiro Yamada, executive officer with Advantest. "Our T5851 system is designed for system-level testing of these devices while still providing the reliability, low-cost and high-volume productivity that the market needs."

"The booming market for new consumer electronics utilizing flash storage creates the challenge for a scalable platform for testing flash memory," said Jay Kramer, chairperson of the Flash Memory Summit's Awards Program. "We are proud to select Advantest's T5851 for the Best of Show Technology Innovation Award as it is available in both production and engineering models to address a wide range of test program environments while providing the versatility to test the memory ICs powering smart phones, tablets and ultra-portable laptops."

2.65 MILLION EURO EUROPEAN PROJECT TO SUPPORT FLEXIBLE SEMICONDUCTOR ADOPTION IN ASIA

SmartKem has secured a €1.8million EU grant to support the industrialisation and technology transfer of their semiconductor platform to display makers in Asia.

With a €850k contribution from SmartKem, the €2.65million project will accelerate the adoption of organic semiconductors as a universal thin film transistor (TFT) backplane platform for the mass manufacture of flexible and curved mobile, embedded and large area OLED and LCD displays.

Organic semiconductors, a key enabling component in the evolution of flexible active matrix displays, is competing to offer manufacturers a route to the production of high performance curved, foldable and even roll-able OLED and LCD displays. SmartKem is at the forefront of this market as a leading innovator of organic semiconductors for the low temperature, solution coat production of high performance TFTs on plastic.

Adoption of the SmartKem semiconductor platform, truFLEX® not only offers an ultra-flexible TFT platform for new form factor displays but also a transistor that delivers simplified pixel drive circuitry through high transistor electrical stability. It also provides world leading reduction in power consumption in any display format, translating to weekly and not daily charging of mobile OLED and LCD display based devices such as smartwatches and smartphones.

SmartKem will lead the 2-year project, which will focus on the industrialisation and transfer of their organic semiconductor platform over large area plastic substrates using standard slit coat processing. The main objective will be to maintain electrical and physical uniformity and quality of transistor performance over large area formats for mass production on existing production lines in Asia.

The requirements for the project deliverables are driven by a number of commercial agreements that SmartKem have with display OEMs for the adoption of the truFLEX® technology platform for flexible display manufacture. The success of the project will ensure a strong European position in the supply of specialised, high value materials to this new, high growth sector of the display industry in Asia.

GE Plans to Invest 1.4B USD to Acquire Additive Manufacturing Companies Arcam and SLM: Accelerates Efforts in Important Digital Industrial Space

GE (NYSE: GE), the world's leading digital industrial company, today announced plans to acquire two suppliers of additive manufacturing equipment, Arcam AB and SLM Solutions Group AG for $1.4 billion. Both companies will report into David Joyce, President & CEO of GE Aviation. Joyce will lead the growth of these businesses in the additive manufacturing equipment and services industry. In addition, he will lead the integration effort and the GE Store initiative to drive additive manufacturing applications across GE.

"Additive manufacturing is a key part of GE's evolution into a digital industrial company. We are creating a more productive world with our innovative world-class machines, materials and software. We are poised to not only benefit from this movement as a customer, but spearhead it as a leading supplier," said Jeff Immelt, Chairman and CEO of GE. "Additive manufacturing will drive new levels of productivity for GE, our customers, including a wide array of additive manufacturing customers, and for the industrial world."

GE expects to grow the new additive business to $1 billion by 2020 at attractive returns and also expects $3-5 billion of product cost-out across the company over the next ten years.

Arcam AB, based in Mölndal, Sweden, invented the electron beam melting machine for metal-based additive manufacturing, and also produces advanced metal

powders. Its customers are in the aerospace and healthcare industries. Arcam generated $68 million in revenues in 2015 with approximately 285 employees. In addition to its Sweden site, Arcam operates AP&C, a metal powders operation in Canada, and DiSanto Technology, a medical additive manufacturing firm in Connecticut, as well as sales and application sites worldwide.

SLM Solutions Group, based in Lübeck, Germany, produces laser machines for metal-based additive manufacturing with customers in the aerospace, energy, healthcare, and automotive industries. SLM generated $74 million in revenues in 2015 with 260 employees. In addition to its operations in Germany, SLM has sales and application sites worldwide.

Arcam and SLM will bolster GE's existing material science and additive manufacturing capabilities. GE has invested approximately $1.5 billion in manufacturing and additive technologies since 2010. The investment has enabled the company to develop additive applications across six GE businesses, create new services applications across the company, and earn 346 patents in powder metals alone. In addition, the additive manufacturing equipment will leverage Predix and be a part of our Brilliant Factory initiative.

The additive effort will utilize GE's global ecosystem, but be centered in Europe. GE will maintain the headquarters locations and key operating locations of Arcam and SLM, as well as retain their management teams and employees. These locations will collaborate with the broader GE additive ecosystem including the manufacturing and materials research center in Niskayuna, New York, and the additive design and production lab in Pittsburgh, Pennsylvania. They will also complement the technologies brought on by other key acquisitions such as Morris Technologies and Rapid Quality Manufacturing.

Each acquisition is structured as a public tender offer for all of the outstanding shares of stock of each company. The closing of each public tender offer is subject to various conditions, including minimum acceptance thresholds and regulatory approvals. GE is in the process of making the necessary filings with authorities with respect to such tender offers, and, upon approval, the documents will be made publicly available.

Additive manufacturing (also called 3D printing) involves taking digital designs from computer aided design (CAD) software, and laying horizontal cross-sections to manufacture the part. Additive components are typically lighter and more durable than traditionally-manufactured parts because they require less welding and machining. Because additive parts are essentially "grown" from the ground up, they generate far less scrap material. Freed of traditional manufacturing restrictions, additive manufacturing dramatically expands the design possibilities for engineers.In July, GE Aviation introduced into airline service its first additive jet engine component – complex fuel nozzle interiors – with the LEAP jet engine. The LEAP engine is the new, best-selling engine from CFM International, a 50/50 joint company of GE and Safran Aircraft Engines of France. More than 11,000 LEAP engines are on order with up to 20 fuel nozzles in every engine, thus setting the stage for sustainably high and long-term additive production at GE Aviation's Auburn, Alabama, manufacturing plant. Production will ramp up to more than 40,000 fuel nozzles using additive by 2020. GE Aviation is also using additive manufacturing to produce components in its most advanced military engines. In the general aviation world, GE is developing the Advanced Turboprop Engine (ATP) for a new Cessna aircraft with a significant portion of the entire engine produced using additive manufacturing.

NXP and Midea Introduce New Smart Kitchen Appliance at IFA 2016

NXP Semiconductors N.V. (NASDAQ:NXPI) in collaboration with Midea, the world's major consumer household appliance manufacturer in China, today unveiled a smart kitchen appliance using semiconductor microwave heating technologies. Combined with NXP innovative RF cooking components and Midea's heritage of creating a more comfortable lifestyle for people, the new appliance delivers an ideal balance of quality, precision and performance. With the appliance, consumers can enjoy perfectly heated food within minutes.

The secret to efficient and effective heating, delivered by the Midea appliance, is NXP's MHT1004N, a low-voltage solid state cooking transistor which creates and delivers energy in an effective and efficient way. The component enables greater control over the heating process and allows the Midea appliance to control energy in a closed loop manner for evenly heated food. The semiconductor cooking method also enables consistent results thereby enabling smart

features for internet-connected appliances.

"We're excited to team up with NXP and transform the conventional methods of cooking to solid state," said Luan Chun, director of the appliances business unit innovation center at Midea. "Together, we've also jointly developed a standard system unit, which enables us to quickly implement new designs using a flexible, modular approach for future product developments."

"Midea and NXP have been cooperating for years to research and develop solutions for the future smart kitchen,"

said Mr. Wu Dong, senior director of RF products at NXP Semiconductors Asia Pacific. "This new appliance calls upon our years of collaborating and innovating together with the same vision — to usher in a smarter cooking experience into consumers' kitchens."

The new product from Midea is based on the MHT1004N, the latest generation cooking component from NXP. The MHT1004N is specifically developed as a 300 watt cooking device. For more information about NXP RF cooking technology, visit our site.

Epson Partners with DJI to Create AR Smart Glasses Solutions for Piloting Unmanned Aerial Vehicles

Epson, providers of the Moverio augmented reality (AR) smart eyewear platform, today announced a partnership with DJI, the world's leading maker of unmanned aerial vehicles (UAVs), to create new solutions for the Epson Moverio smart glasses and DJI's suite of products and software development kit (SDK) that enhance the safety, productivity and capabilities of UAVs for hobbyists and professionals alike.

As one of the first initiatives of the partnership, DJI will optimize the DJI GO app for the Epson Moverio BT-300 AR smart glasses, due to be launched in various markets in late 2016. With the app and the Moverio glasses, drone pilots will be able to see crystal clear, transparent first person views (FPV) from the drone camera while simultaneously maintaining their line of sight with their aircraft. The DJI GO app works with the DJI Phantom, Inspire and Matrice series flying platforms as well as the Osmo handheld gimbal and camera.

In certain markets the two companies will co-market the Moverio BT-300 as a certified DJI accessory, along with the DJI GO app. The Epson smart glasses will be available for purchase on DJI.com while the DJI GO app will be available for download from the Moverio Apps Market.

The Epson/ DJI partnership arrives as businesses look to expand the use of drones for a variety of aerial photography and videography purposes. Construction, real estate, insurance, agriculture, emergency response, conservation, academic research, film and video production and numerous other fields that benefit from UAVs have embraced the relaxed rules. However, regulatory authorities such as the FAA in the United States have maintained the rule that UAVs must remain within the visual line-of-sight (VLOS) of the remote pilot, reinforcing the relevance of the Epson and DJI partnership.

"The Moverio BT-300 marks an impressive advance in performance for the platform and will make flying and filming safer and help users stay in compliance with local and federal regulations," said Michael Perry, director of strategic partnerships, DJI. "We are excited to see the incredible applications that can be built with the BT-300 and the recently relaunched DJI SDK – the possibilities truly are endless."

DJI maintains a 70 percent market share of the $2 billion consumer drone market, and its aerial platforms are used by two-thirds of businesses approved by the FAA to operate commercially.*1 More than 600,000 UAVs are expected to be in use in 2017.*2

"We believe this partnership with DJI will revolutionize how UAV pilots operate their aircraft in this fast-growing industry, now and into the future," said Eric Mizufuka, product manager, New Ventures for Epson America. "In addition to validating Epson's investment in its Moverio line, this is the first time AR smart glasses will be widely available for a mass-market consumer application, marking an historic milestone in

the evolution of the category."

In addition to making drone piloting safer, the goals of the partnership include providing pilots and film-makers with new AR tools for enhanced productivity when using a UAV. Epson and DJI will also work together to create entirely new experiences for the fast-growing number of UAV hobbyists and businesses, as well as conduct joint sales and marketing efforts worldwide.

Launching its first-generation smart glasses in 2011, the Epson Moverio BT-300 represent the world's lightest binocular, transparent smart glasses with an OLED display. Combining breakthrough silicon-based OLED digital display technology and Android OS 5.1, the Moverio BT-300 enables truly transparent mobile AR experiences.

Epson and DJI will be demonstrating the DJI GO app on the Moverio BT-300 during InterDrone 2016 in Las Vegas (Booth 81 this week, 7-9th Sept.), and in Cologne at COPTER WORLD at Photokina" (Hall 6, 20-25th Sept).

IBM and Harrow Council to bring Watson Care Manager to individuals in the UK

IBM Watson Health (NYSE: IBM) and Harrow Council announced a 10-year agreement to use cognitive technologies to help people with personalised social care needs choose the best services. The commercial agreement is the first of its kind with a UK local authority, and marks the first implementation of Watson Care Manager outside of the USA.

Left to Right standing: Aaron Torrens (IBM), Chris Greenway (Harrow Council), Cllr Anne Whitehead (Harrow Council), Andreas Haimboeck-Tichy (IBM), Cllr Simon Brown (Harrow Council), Sean Renner (IBM), Cllr Adam Swersky (Harrow Council), Rob Fletcher (IBM), Bernie Flaherty (Director of Adult Services, Harrow Council) Left to Right seated: Ash Woodcock (Legal lead for Harrow Council), Leader of Harrow Council Sachin Shah, Sharon Bagshaw (IBM), Kivanc Arda (Legal lead for IBM). Image Credit: IBM

Using Harrow Council's expertise and innovations in adult social care, IBM will enhance Watson Care Manager to enable individuals and caregivers to quickly and easily select the most appropriate provider that can deliver the services they need, using their allocated personal budget.Many social and health programmes globally require personal budgets, and Watson Care Manager's new functionality could simplify that process for individuals beyond Harrow and the UK.

As part of the Watson Care Manager system, health and social care providers bid to supply the service and secure the contract – a process designed to stimulate competition and drive down costs. Watson Care Manager then automates payments and ensures the service has been delivered to the user. By integrating cognitive technologies that provide personalised insights and evidence-based guidelines and best practices, it will provide guidance for adherence to an individualised care plan.

Social Care accounts for some 35% of council spending and the ageing population's costs could soon exceed all other council spending. Over the past year, the National Health Service has unveiled a number of updates on the implementation of Personal Health Budgets and the Integrated Personal Commissioning programme that combines Health and Social Care budgeting. The enhanced Watson Care Manager solution is designed to create an integrated approach to health and social care that improves individual choice while meeting the requirements of NHS and other local authorities.

The platform maximises the workflow for care management activities such as scheduling, developing individualised care plans, managing budgets, selecting providers and enabling care. IBM Watson Care Manager not only provides personal insights for more impactful care plans, it provides insights for more effective use of care management resources.

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Terminal Blocks Highlight & Heavy Duty Connectors

› Lily Hu NINGBO DEGSON ELECTRICAL CO.,LTD

A terminal block is one method of connecting a selection of different electrical wires. They come in a variety of shapes and sizes so you can normally find one that will be compatible with whatever project you are carrying out. However, the difference between blocks can lead to problems if an incorrect type is used or if it is not connected properly. Terminal blocks are widely used in some major industries where wiring between equipment's widely used. Major application and industries widely adopted TBs are Industrial Controls, HVAC equipment and controls, building automation, Communications equipment, Test and Measurement, Fire & Security, Lightning.

Use of TBs for connection simplifies wire termination and removal from contacts. Allows easy and cost-effective servicing of PCB or Wire-termination corrections Prevents over-insertion of wire, compact design allows for flexibility to meet unique design requirements.

Offering a wide variety of industry standard options provides manufacturing and installation personnel new freedom in product design while maintaining intuitive operation and a lower installed cost. Selection of models for PCB mounting, DIN Rail support, color selection, different connection method (screw, fast connection) , labeling option , support of popular wire gages based on application help user to find the proper solution.

Typical terminal Block connectors feature various wire termination methods including rising cage clamp, wire protector, spring, IDC and crimp snap. The design of Terminal Block connectors consists of one-piece board mount terminal blocks and two-piece plug connectors with mating straight and right-angle shrouded headers. A special version - which can be mated either 90° or 180° - completes the product line. Board mount connectors, as well as pc board plugs and headers, are stackable end-to-end without loss of centerline spacing.

New Terminal Block Implementation LED Light

Several vendors introduce lately solutions for the booming LED lightening industry. New PCB connector adapters SMT usually, enable the quick, easy, and secure connection of flexible LED PCBs when combined with series of connectors. The PCB adapters can be used as an extension, as a corner connection, or as a T-distributor. The white PCB adapters are designed for 2- and 4-position applications with 8- or 10-mm-wide LED strips. UL-approved materials ensure that they can be safely used in applications requiring UL approval. Features and benefits of the newly solution supporting LED strips are :Tool-free termination saves time and cost while reducing errors, High-current capacity enables long LED strips to be connected without an

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CABLES

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Get the performance of semi-rigid cable, and the versatility of a flexible assembly. Mini-Circuits Hand Flex cables offer the mechanical and electrical stability of semi-rigid cables, but they're easily shaped by hand to quickly form any configuration needed for your assembly, system, or test rack. Wherever they're used, the savings in time and materials really adds up!

Excellent return loss, low insertion loss, DC-18 GHz. Hand Flex cables deliver excellent return loss (33 dB typ. at 9 GHz for a 3-inch cable) and low insertion loss (0.2 dB typ. at 9 GHz for a 3-inch cable). Why waste time measuring and bending semi-rigid cables when you can easily install a Hand Flex interconnect?

Two popular diameters to fit your needs. Hand Flex cables are available in 0.086" and 0.141" diameters, with a tight turn radius of 6 or 8 mm, respectively. Choose from SMA, SMA Right-Angle, SMA Bulkhead, SMP Right-Angle Snap-On and N-Type connectors to support a wide variety of system configurations.

Standard lengths in stock, custom models available. Standard lengths from 3 to 50" are in stock for same-day shipping. You can even get a Designer's Kit, so you always have a few on hand. Custom lengths and right-angle models are also available by preorder. Check out our website for details, and simplify your high-frequency connections with Hand Flex! *RoHS compliant*

SMA | SMA Right Angle | SMA Bulkhead | SMP Right Angle Snap-On | N-Type | N-Type Bulkhead

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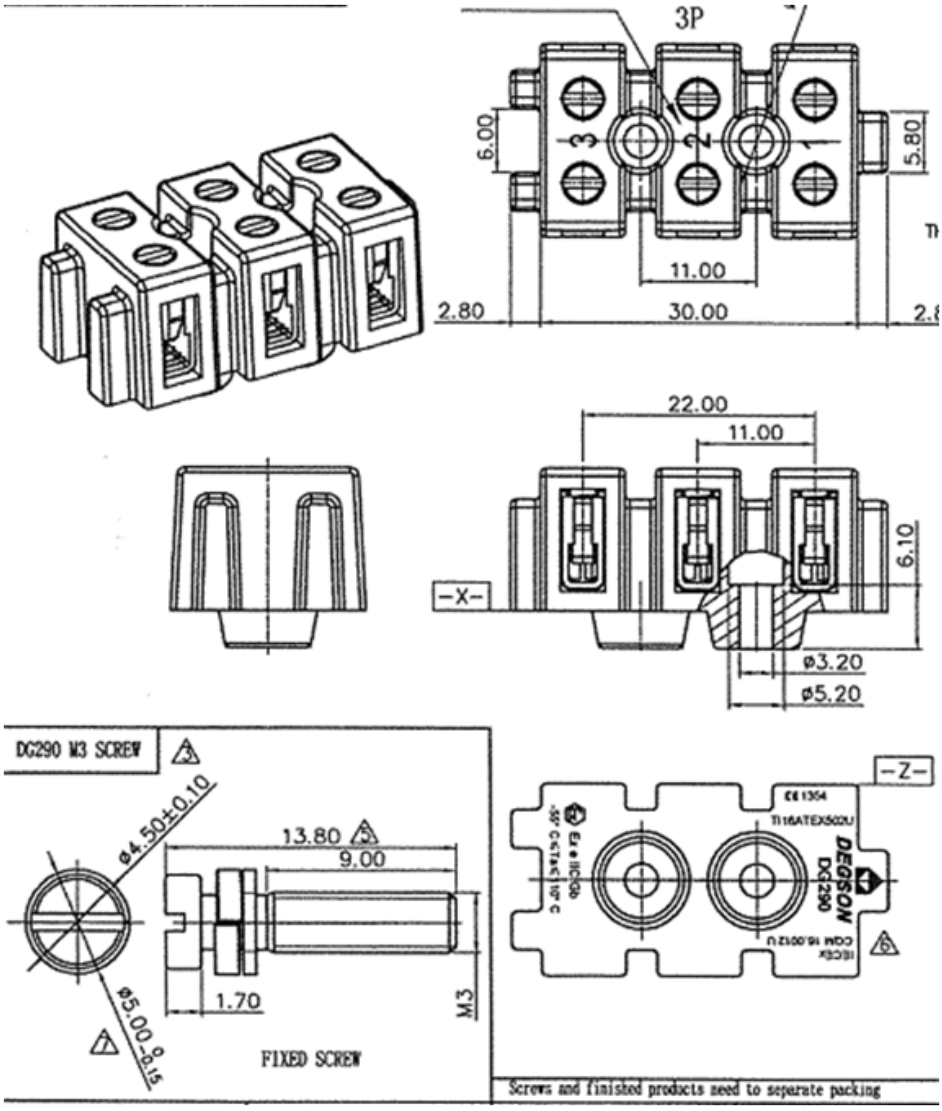
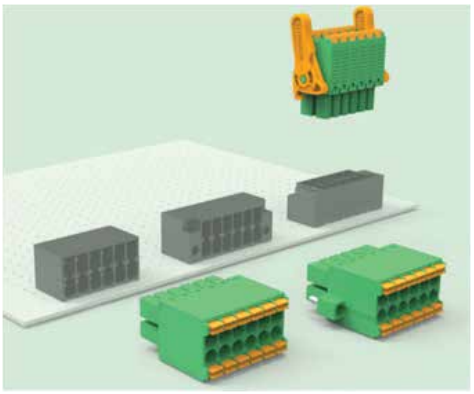


IECEX , ATEX Certified Terminal Block DG 290



15EDGKNH/15EDGKNHM/15EDG KNHG-3.5

additional power supply, Locking pin ensures secure connection to the PCB, Rated up to 5 A and 60 V UL.

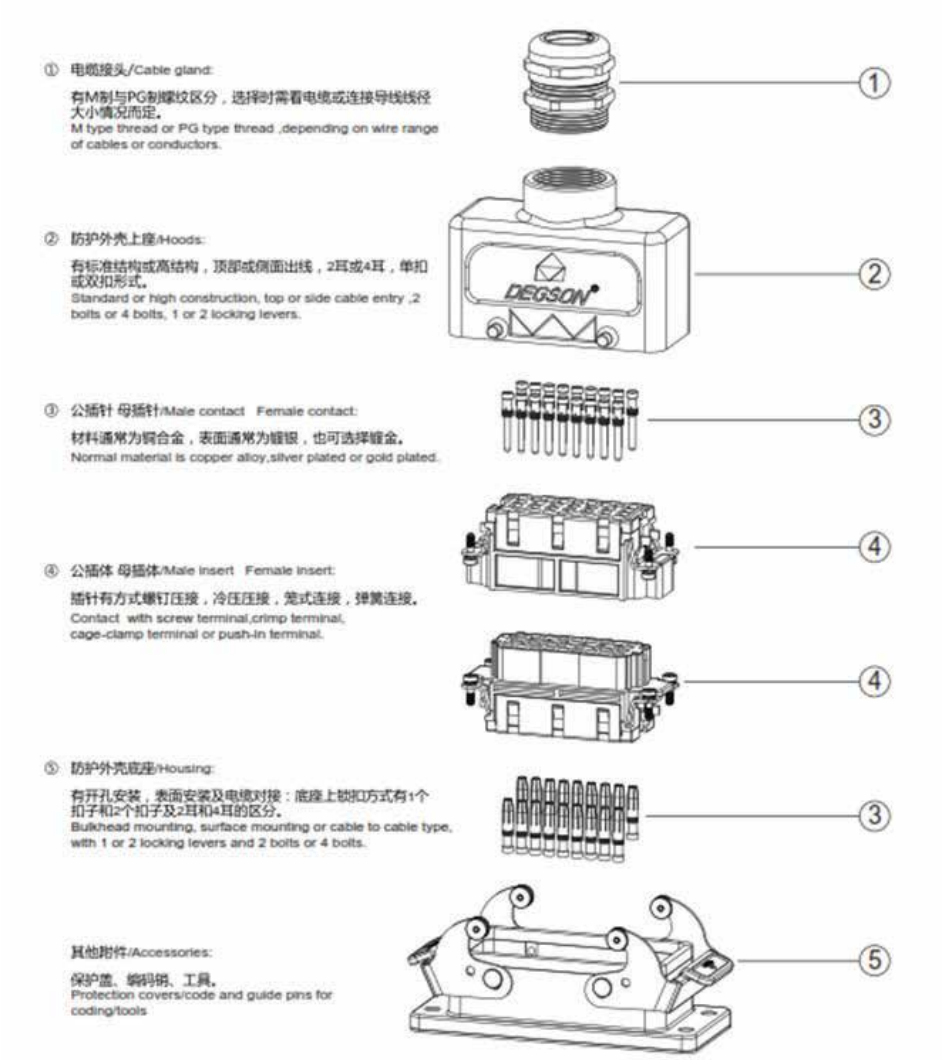
The new connectors support reliable long-term installation of LED modules (assembled from LED arrays mounted on rigid and thermally conductive substrates for optimal heat dissipation) into a wide variety of applications, e.g. high/low bay indoor lighting, street lighting, floodlighting and emergency lighting.

Applying SMT TBs with surface-mount reflow soldering processes greatly simplifies LED module PCB assembly. Connecting the conductors in lighting fixtures was formerly often done using hand soldering. This is often unreliable and prone to error when using printed circuit boards with a metal core, due to the high degree of heat dissipation. The optimized design of the new connector hold-downs ensures rugged solder-pad retention and supports reliable handling during equipment final integration.

PCB mounting design options commonly include a horizontal male and a discrete wire push-in spring-cage terminal block part. Both are made from high-temperature LCP plastic which is completely colour-stable after the SMT assembly process and UV resistant for long-term installation. As a result they minimise shadowing effects within the light fixture. Pluggable female, discrete wire, push-in spring-cage cable connectors are also available. These have a strong but flexible locking-latch design which is highly damage resistant and ensures dependable mating.

Implementing TBs method under explosive environment

Implementing TBs under Explosion proof environment required taking into consideration several new aspects and addresses it under well-known standard such as ATEX. The risk of explosion is particularly high in certain types of industries, which generate inflammable gas, inflammable liquid or inflammable dust. Indeed, the new ATEX directive now considers the explosion risk caused by dust. Refineries, Petrochemical and chemical industries. An explosion can occur if the following factors arecombined: Presence of inflammable substances Presence of an ignition source or inflammation source: fire, flame, electrical or mechanical sparks, overheated surfaces, electrostatic Discharges Oxygen.



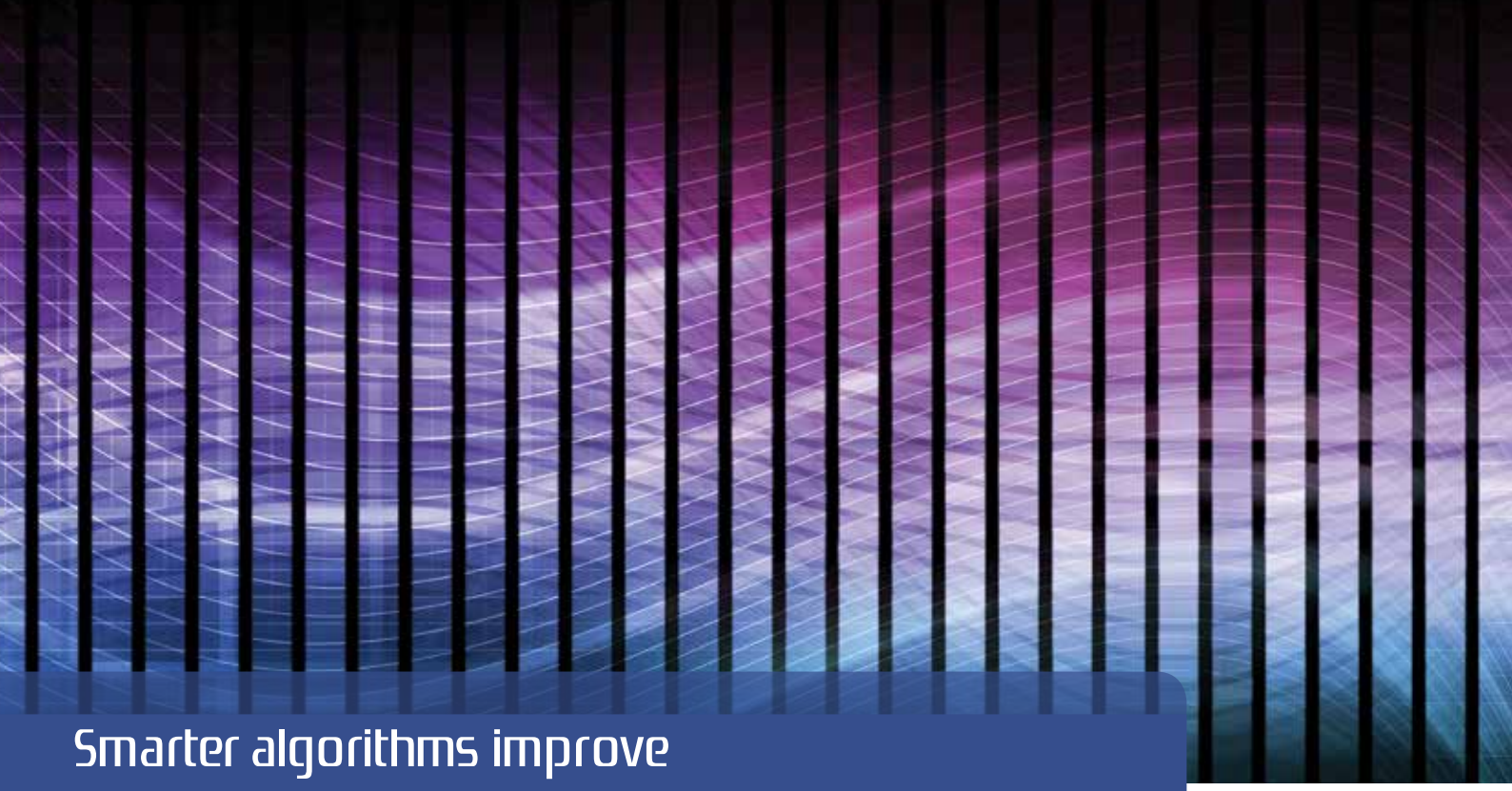
Heavy Duty Connector Finished product

In order to be used under explosion proof environment item should be design and certified to meet ATEC and or IECEX standard. Industry support variety of products that are certified for the appropriate standard already.

Heavy Duty connectors

To address challenging environments and demanding applications and markets such as industrial Automation, Transportation, Robot, manufacturers lately introduced solution which provides flexibility to build "your own solution". Introducing variety of bodies support flexible number of pins, different housing shapes, implementing locking mechanism and use of different pins customer can build his own solution to fit his environment, product.

The connectors housing, sealing and locking mechanism protect the connection from external influences such as mechanical shocks, foreign bodies, humidity, dust, water or other fluids such as cleansing and cooling agents , oils, etc. The degree of protection the housing offers is explained in the IEC 60 529, DIN EN 60 529, standards that categorize enclosures according to foreign body and water protection Code letters



Smarter algorithms improve stepper-motor performance

› Mark Patrick, Mouser Electronics

The stepper motor is a popular choice for intelligent precision motion control. Unlike a standard DC motor, which is designed for continuous rotation, the stepper motor provides the ability to rotate around an axis one step at a time. This makes the motor ideal for applications that call for precise positioning and speed control. However, to ensure that the motor control remains precise at all operating points for the application, it is important to tune the motor to the controller.

A typical stepper comprises a stator, a rotor attached to a shaft and a number of coil windings that are used to generate magnetic fields at fixed positions around the stator. In a permanent-magnet stepper motor, the rotor uses a disk made of magnetic materials. The disk may have just two poles. A more complex disk, generally used in precision motors, may interlace many poles around the outside of the disk. A variable-reluctance stepper motor is, in contrast, entirely electromagnetic.

When power is removed from the motor, it will not resist turning by external forces.

In a permanent-magnet motor, when power is applied to the motor, the rotor will seek the most stable position it can find. The electromagnetic field generated in the coil will attract one pole of the magnet formed on the rotor and repulse the other. When the nearest opposite pole on the disk aligns itself with the electromagnetic field generated by the coil, the rotor will stop and remain fixed in this position while the field in the coil remains unchanged. If the current flow in this coil is removed and applied to another at a different position, the magnets will be pulled to the next stable position where the rotor can again come to a stop.

Typically, a variable-reluctance motor uses a number of coils in the stator, arranged opposing pairs. A three-phase motor will have three such pairs. Providing energy to each pair of coils in turn moves the metallic rotor from step to step.

Because of mechanical limitations, the rotor can rotate on demand only up to a certain maximum speed. The torque of the motor will typically be maximised at low speeds. As a result, motors are often used at low speeds to provide maximum control and torque.

Resolution can be increased through the use of microstepping. In normal operation, the current from one coil is not removed completely before activating the next. Instead, the current is reduced in one while the current in the other is increased. If this sharing of current is controlled across the two coils the situation creates

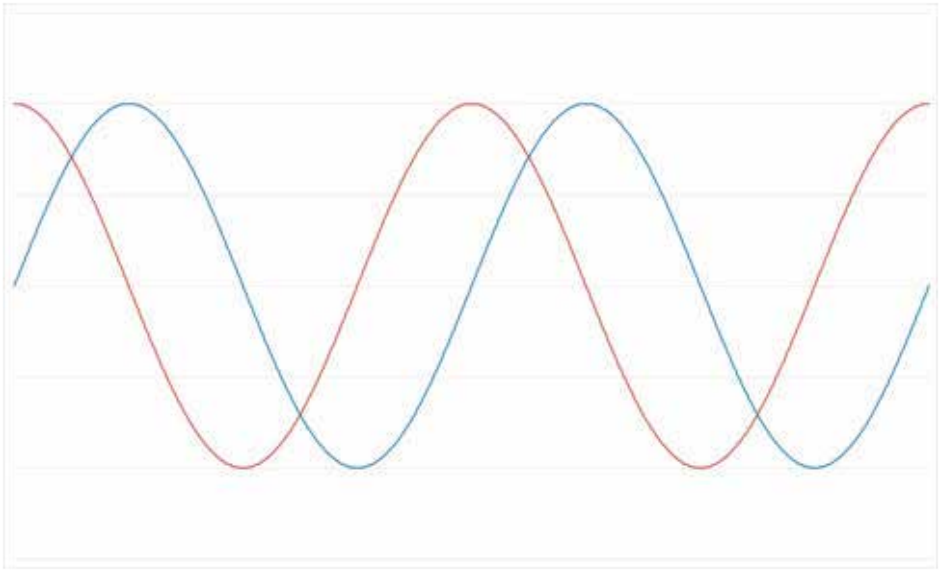


Figure 1: Pair of stepped sinusoidal waveforms for controlled microstepping

smaller virtual steps than trying to drive the motor using discrete current transitions.

In principle, two sinusoidal signals, one shifted in phase by 90° from the other, can create smooth continuous motion. In practice, the waveforms are not entirely sinusoidal – the current level for the coil in each position has a discrete level. Microstepping in this way creates smoother motion and can help reduce noise and vibration in the motor compared to shifting between full steps. However, precise current control to the motor is important to maintain precise control, particularly at low speeds falls because it is possible for the motor to miss microsteps unexpectedly.

The specific current levels are normally generated using pulsewidth modulation (PWM) chopping techniques. A H-bridge of two pairs of power transistors delivers the chopped current to the motor coils. Typically, the drive current is normally interrupted when the chopped current reaches the threshold for that microstep. After this point, the current will begin to decay. The profile of that decay will depend on the operation of the H-bridge.

With slow decay, current is recirculated using both low-side power transistors. The drawback of this mode is that the slow decay can limit the amount of current that needs to be regulated to drive the motor. Fast decay uses the H-bridge to reverse the voltage across the coil winding, which causes the current to fall off at a fast rate. However, this can lead to large ripple currents that hampers efficiency and may be unsuitable for large current levels that may be needed by the motor being driven.

Mixed decay combines the two decay modes. It begins with a fast decay before switching, after a fixed time, to the slow decay mode. This does allow for most microstepping situations but demands the control algorithm be optimised for the specific motor being used. The tuning depends on the magnitude of load current, supply voltage and stepping rate. Usually, lower load currents call for a different mix of fast and slow decay compared to higher load currents.

Traditionally, the best scheme is picked by cycling through the fixed-decay ratios and observing the current profile on an oscilloscope for a given microstepping sequence. The key problem with fixed decay schemes is that they do not react to changes in conditions. Parameters can vary in operation, such as the back electromotive force (EMF) and the microstepping rate that affect current and voltage levels dynamically.

Optimising for a high step rate, which is usually achieved through the application of a higher ratio of fast to slow decay, can lead to excessive ripple in current when the motor is holding steps or moving slowly through them. If the system is battery powered, the voltage supplied by the cell will decline as its charge is depleted, which if not regulated will lead to different voltage conditions being applied to the motor. And, as the motor ages, the initial decay profile may prove to become increasingly unsuitable.

The answer is to adopt algorithms that adapt to changing conditions in the motor. The stepping commands and the PWM behaviour can provide as guides to where to set the decay changeover point on a per-step basis. On each PWM cycle, the controller will switch the H-bridge over at a given point. Adaptive tuning remembers the timing of this switch and uses it to determine the fast-slow decay ratio for the following step.

By monitoring the step commands – taking notice of whether the motor is moving quickly or not – the percentage of fast decay can be increased and decreased according to the motor's demand. As the motor slows down, the amount of fast decay can be scaled back.

Such algorithms can be incorporated into microcontroller firmware but are also available in off-the-shelf stepper-motor controllers such as the Texas

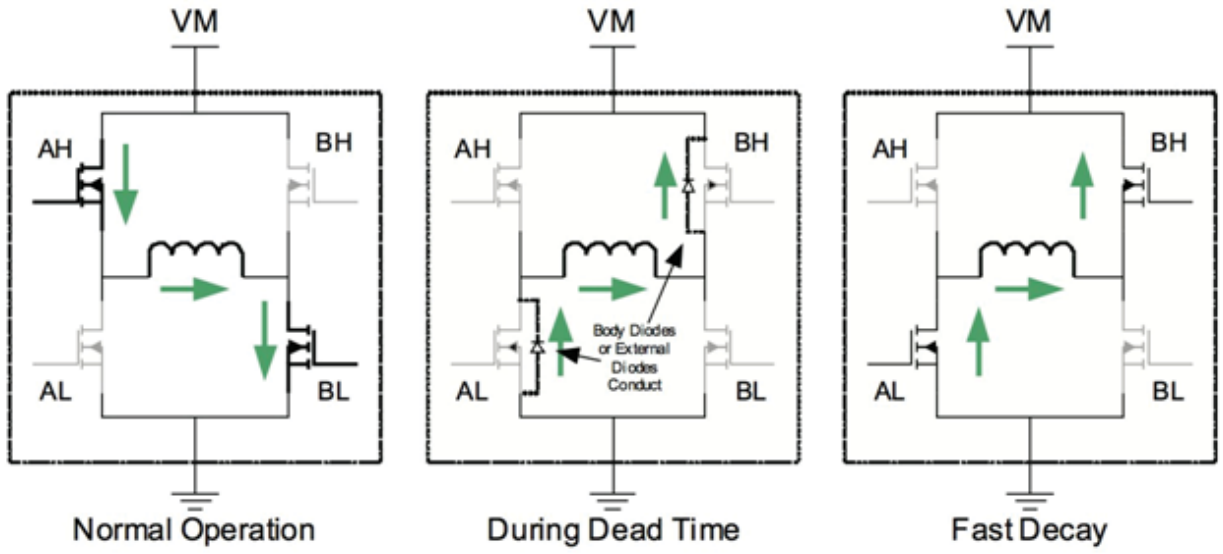


Figure 2a: H-bridge current flow for fast decay mode (Image courtesy of Texas Instruments)

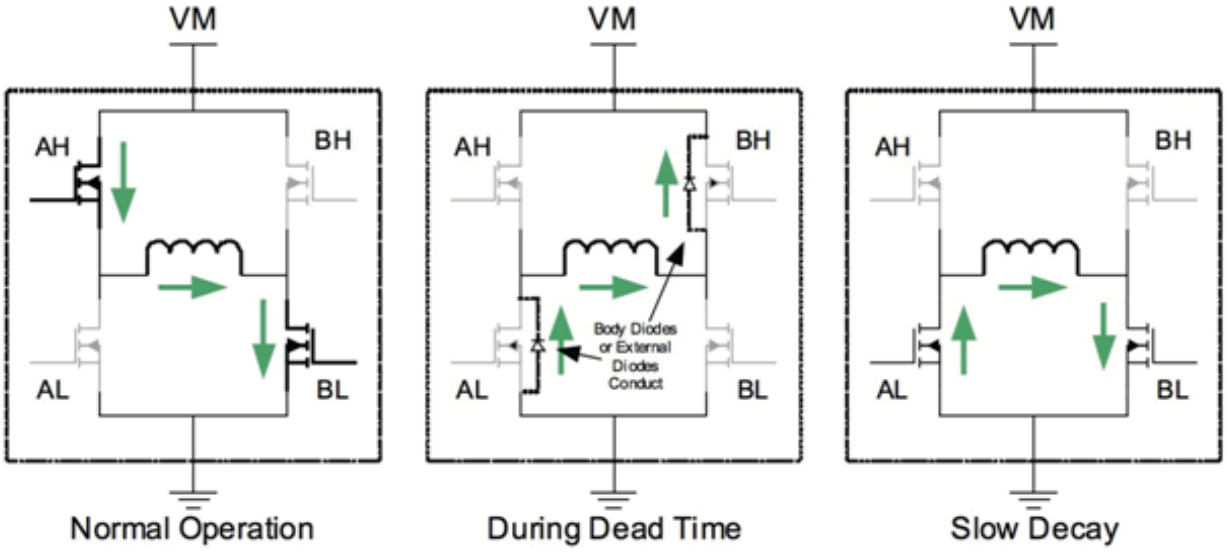


Figure 2b: H-bridge current flow for slow decay mode (Image courtesy of Texas Instruments)

Instruments DRV8846. The adaptive-decay scheme used in the DRV8846 compensates automatically for supply voltage, load inductance, load resistance, back EMF and the current magnitude.

Through the use of adaptive decay, the DRV8846 no longer needs the control pins that would normally be used to set the decay ratio, which helps save on package cost. Further, the algorithm is designed such that it uses slow decay as much as possible, which results in a more power-efficient design. This is because the current is flowing through the low-side power transistors only, which is typically more efficient than switching the H-bridge into a reverse configuration.

A strategy employed by another device with adaptive decay control, the STMicroelectronics L6472, is to monitor the PWM switchover signal on rising and falling steps to determine whether it happens before or after a set minimum on each microstep. If the target current threshold is reached before that minimum time, a fast decay is used in place of the normal slow decay up to a point determined by a programmed maximum fast-decay time. If two fast decays are encountered during a series of rising

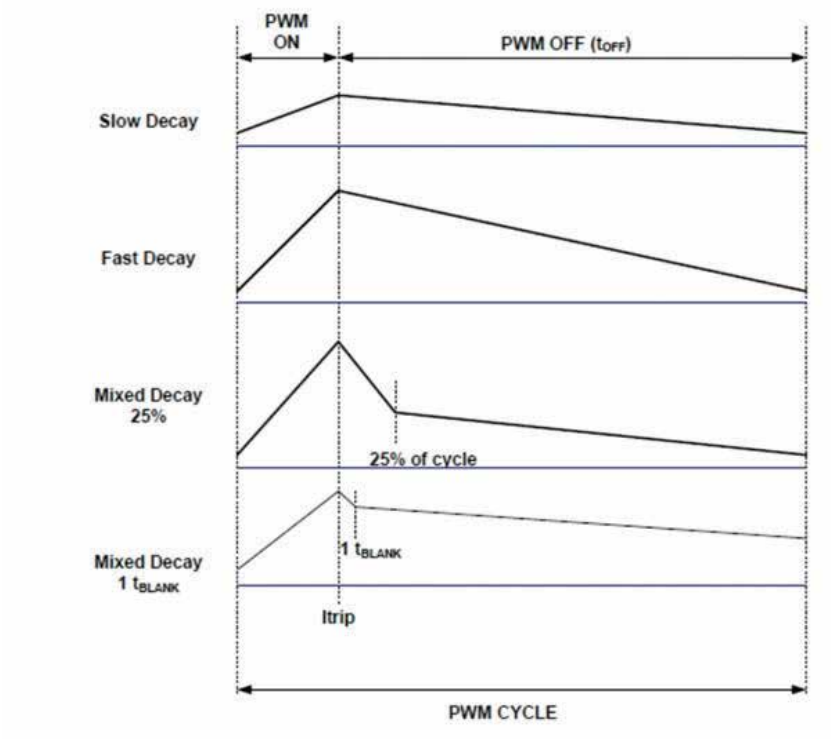


Figure 3: Current decay in slow, fast and mixed modes (Image courtesy of Texas Instruments)

steps, the algorithm will continue to inject them until the motor stops or the sine wave zero is crossed.

On falling steps, the algorithm in the L6472 will, at first, use fast decay rather than slow to reach the target level as quickly as possible. But, to avoid strong ripple currents forming, the algorithm will adjust over time to increase the fast-decay threshold which will lead to moving into slow-decay mode unless the current demand changes enough to demand fast decay. The result is a continuous balancing of the fact and slow decay modes.

Thanks to more intelligent methods for applying current decay to stepper motor coils, it is possible to take advantage of the smoother motion profile of microstepping and ensure that the motor responds well to changes in voltage, operating conditions and even ageing.

Powering The Cloud for an Energy-Efficient Internet of Everything

› Mark Adams, CUI, Inc.

As the Internet of Everything adds increasing pressure on Cloud services, software-optimized power conversion will realize valuable energy savings to help operators keep on top of costs

Introduction: Keeping Up with the Data Deluge

The Internet of Everything (IoE) will capture data continuously from activities such as retail, transportation, infrastructure management, manufacturing, mining, food production, security and many others. Figures from Cisco say a large retail store collects about 10GB of data per hour and transmits 1GB of that to a data center. An automated manufacturing site can generate about 1TB of data per hour, of which about 5GB may be stored, and a large mining operation can generate up to 144TB per hour.

Cloud services will hold the key to transforming the data collected into useful information, but will face enormous pressure to keep up with the explosion in data received from more and more IoE applications.

Energy is the most significant resource consumed by the data centers at the heart of today's Cloud services. Over a typical lifetime of three years, the cost to power a server actually exceeds the equipment purchase price. The cost of running the cooling systems vital to maintain a safe equipment-operating temperature must also be considered. The desire to minimize these costs is a serious concern for data center operators, and is driving major industry trends such as siting new data centers in cooler climates and in locations close to plentiful renewable sources of energy such as hydroelectric plants. Current favored locations include the US Pacific North West and Scandinavia. Operators are also looking to establish higher acceptable maximum equipment operating temperatures to save on cooling costs.

However, at the same time as determining better ways of handling unwanted heat, operators recognize the importance of treating the cause: improving the overall energy efficiency of data center equipment in order to reduce operating costs as much as possible.

Treating Cause as well as Symptom

Change is in progress everywhere, throughout servers, power supplies and system-management software, to maximize efficiency at every point.

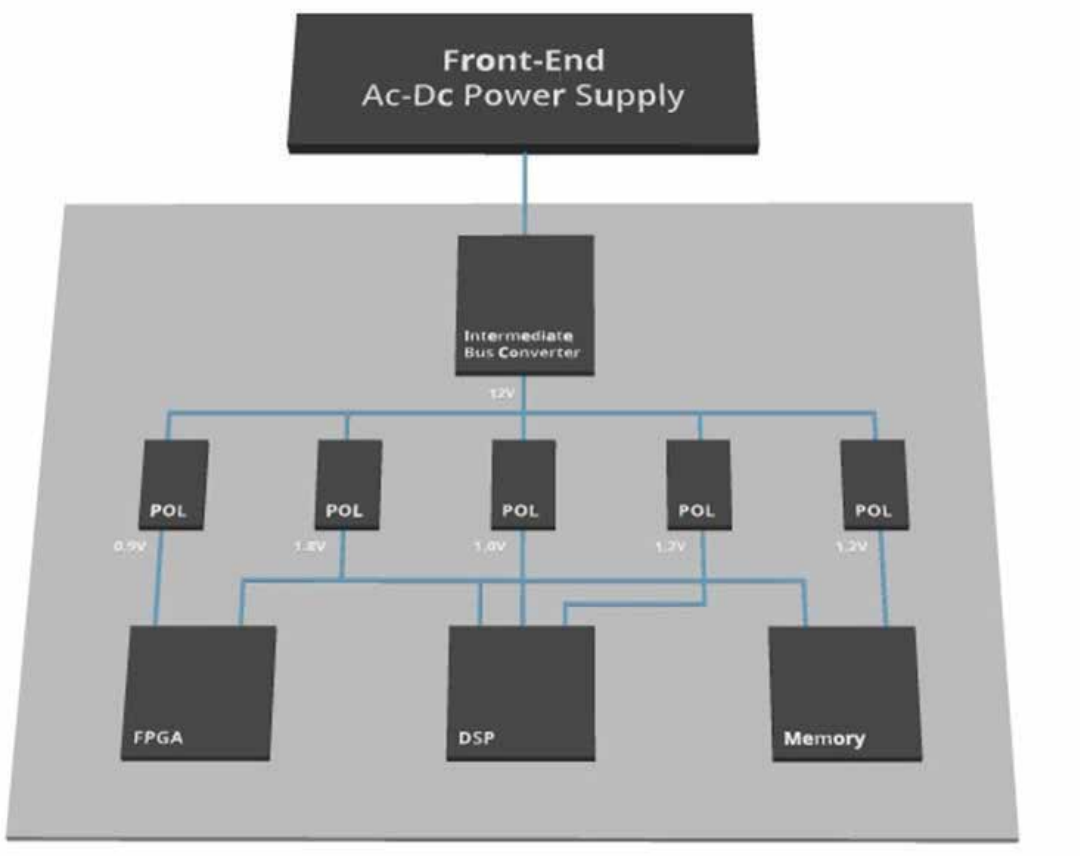


Figure 1. The traditional fixed distributed power architecture is optimized for earlier generations of servers.

It is worth noting, however, that peak power consumption continues to increase to meet demands for increased computing capability. Typical server board consumption has increased from a few hundred watts to 2kW or 3kW today, and could reach 5kW or more in the future. As a result, there is a growing difference between the server's minimum power at light load and maximum full-load power. Power distribution architectures are becoming more flexible, with real-time adaptive capabilities, to maintain optimal efficiency under all operating conditions.

Adapting the Power Architecture

Figure 1 shows a typical distributed power architecture comprising a front-end AC/DC converter that delivers a 48Vdc input to an Intermediate Bus Converter (IBC). The IBC provides a 12V intermediate bus that supplies low-voltage DC-DC point-of-load (POL) converters positioned close to major power-consuming components on the board, such as processors, System on Chips or FPGAs. Multiple POLs may be used to supply core, I/O and any other voltage domains. The 48Vdc front-end output and 12V intermediate bus voltage have been chosen to minimize down-conversion losses and losses proportional to current and distance when supplying typical server boards. However, given the changes in core voltage, current draw, maximum power and difference between full-load and no-load power, these fixed voltages are less suited to maintaining optimal efficiency. The ability to set different voltages, and change these dynamically in real-time, allows the system to adapt continuously to optimize efficiency.

Take Control with PMBus

The PMBus protocol provides an industry-standard framework for communicating with connected, digitally-controllable power front-end, intermediate and point-of-load converters (figure 2). A host controller can monitor the status of the converters, and can send commands to optimize input and output voltages and manage other aspects such as enable/disable, voltage margining,

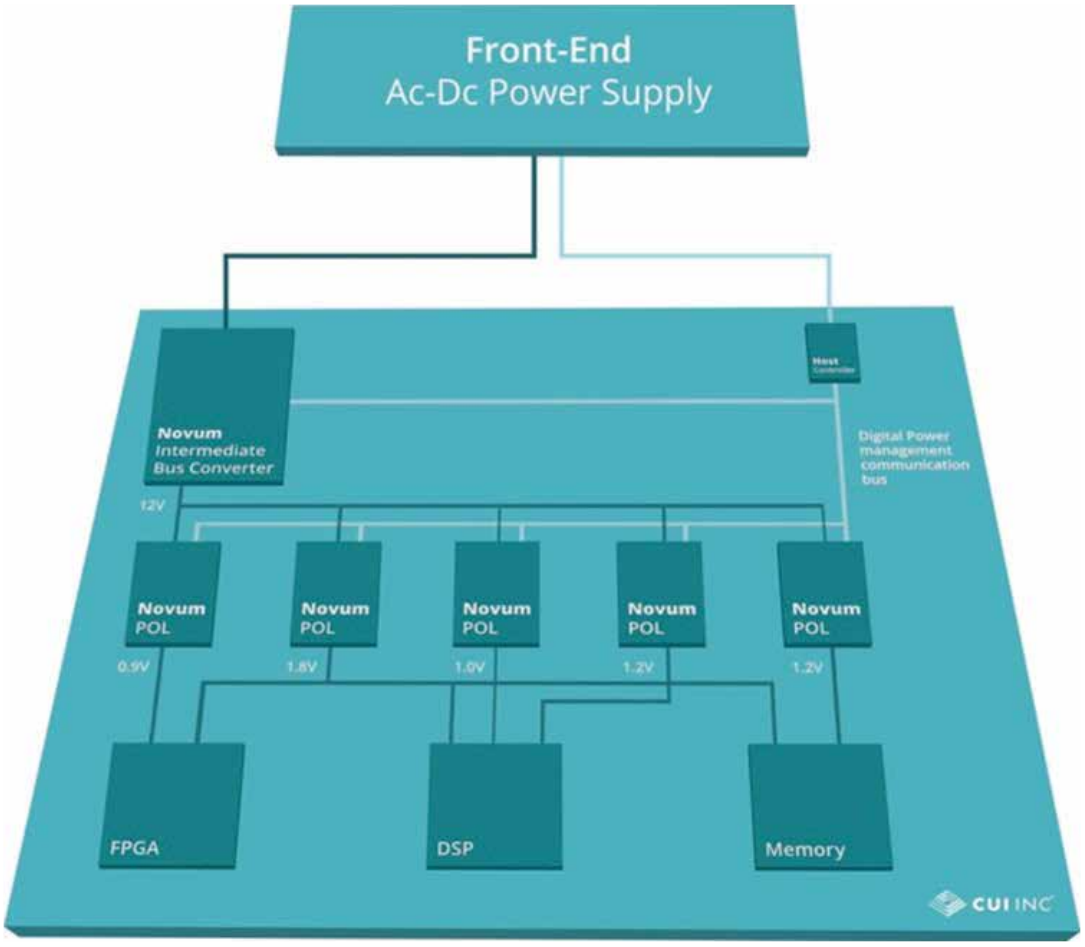


Figure 2. PMBus-compatible converters allow digital optimization on the fly to optimize energy efficiency.

fault management, sequencing, ramp-up, and tracking.

As system designers are developing more effective ways to exploit the controllability PMBus brings, power architectures are becoming software defined and respond in real-time to optimize efficiency. Some of today's most powerful techniques for optimizing efficiency include Dynamic Bus Voltage (DBV) optimization, Adaptive Voltage Scaling (AVS), and multicore activation on demand.

DBV provides a means of adjusting the intermediate bus voltage dynamically to suit prevailing load conditions. At higher levels of server-power demand, PMBus instructions can command a higher output voltage from the IBC in order to reduce the output current and hence minimize distribution losses.

AVS is a technique used by leading high-performance microprocessors to optimize both the supply voltage and clock frequency to ensure processing demands are always satisfied with the lowest possible power consumption. AVS also enables automatic compensation for the effects of silicon process variations and changes in operating temperature. To support AVS, the PMBus specification has recently been revised to define the AVSBus, which allows a POL converter to respond to AVS requests from an attached processor.

Multicore activation on demand provides a means of activating or powering down individual cores of a multicore processor in response to changes in load. Clearly, de-activating unused cores at times of low processing load can help to gain valuable energy savings.

Adaptive Techniques and Potential Savings

These are the first adaptive features to be implemented, as power supply developers begin introducing software-defined power architectures. Many additional, powerful techniques are expected to emerge, assisted by the arrival in the market of PMBus-

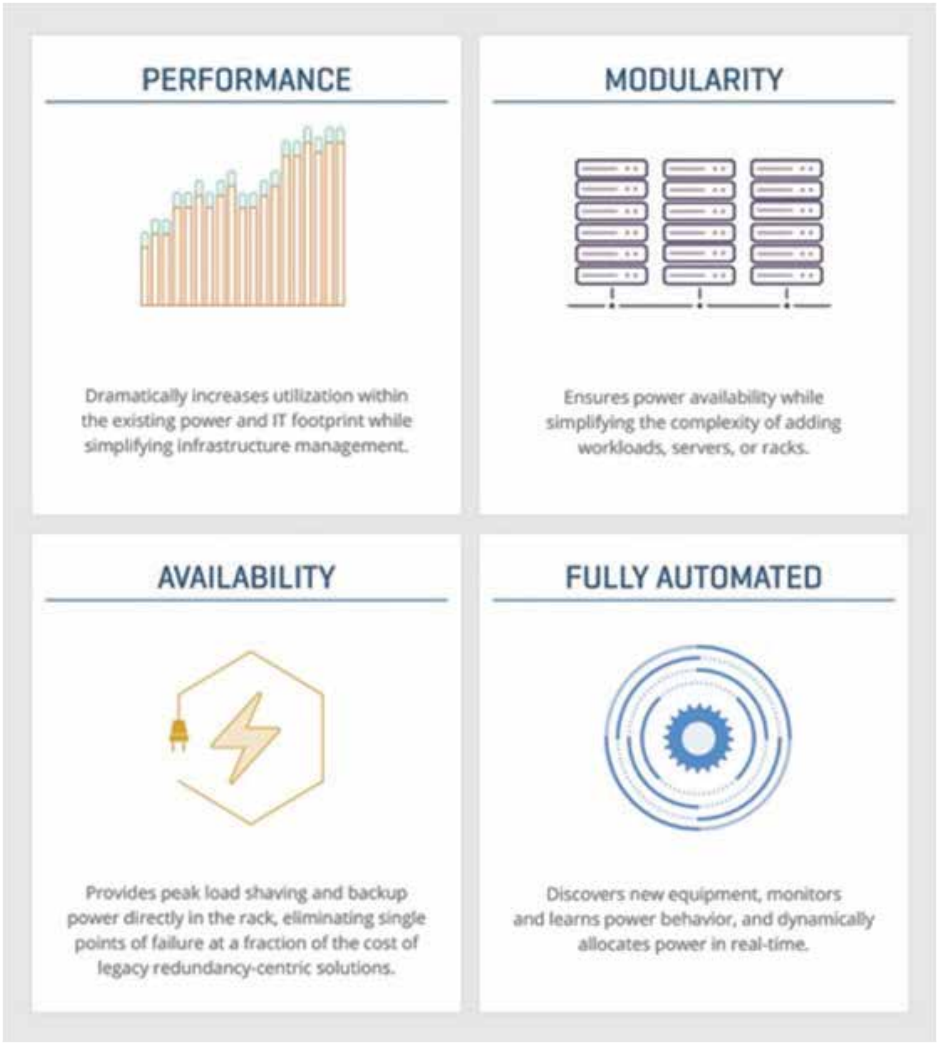


Figure 3. Potential advantages of Software Defined Power in data centers

compatible front-end AC-DC power supplies such as CUI's PSE-3000 and PSA-1100 and Novum® digital IBCs and non-isolated DC-DC digital POLs. Continuously optimizing the power-conversion architecture and bus voltages will yield improvements in each converter. In a power supply comprising a front-end AC/DC converter with average efficiency of 95%, an IBC operating at 93%, and a POL operating at 88%, an improvement of just 1% in each stage can reduce the power dissipated from 22.2% of the input power to 19.6%. This not only represents a 12% reduction in power losses, but also relieves the load on the data-center cooling system thereby delivering extra energy savings.

The Next Step: Improving Utilization Though Virtualization

Understanding how data centers use power and then leveraging software to intelligently provision and manage that power is another way to realize significant energy savings. Such virtualization of the power infrastructure makes power an elastic resource and can improve utilization by up to 50% within the existing power footprint. This not only means improved efficiency in terms of the power consumed but also avoids the capital expenditure of bringing additional, and unnecessary, resources into play. Virtual Power Systems, a company that is championing Software Defined Power®, has recently partnered with CUI to extend its software solution into the hardware domain with an Intelligent Control of Energy (ICE) Block that will enhance the management of power sources within data centers and similar ecosystems.

Conclusion

The Internet of Everything will feed huge quantities of data into the Cloud, which must be processed quickly and stored for later reference. As the demands on cloud data centers increase, energy efficiency is becoming an increasingly important factor governing operating costs. At the board level, energy lost during power conversion can be reduced by adjusting bus voltages as load conditions change. PMBus-compatible converters allow real-time software-based control to achieve a valuable reduction in these losses. At the system-level, virtualization via a combination of optimized hardware and software will greatly improve power utilization in data centers as capacity demands continue to rise.

The lifecycle of an idea

Steve Vecchialrelli, Vice President Supply Chain Solutions at Digi-Key Electronics

In May last year, one of just 200 Apple I computers ever made sold at auction in Germany for more than £400,000. Apple co-founder Steve Wozniak designed and hand-built the first machine immediately after going to a meeting of the Homebrew Computer Club in a Menlo Park, California garage. Two years later, Apple launched its first volume-sales machine, the Apple II, which was a more advanced and carefully cost-optimised design. To help with customer support, as Wozniak was the only person with first-hand knowledge of the inner workings of the original, the company offered trade-in deals to encourage customers to move to the more advanced machine. It was a recognition of the many factors at play in the construction of an electronic system – the importance of ongoing support in a product's lifecycle.

To ensure that the launch and ongoing support of a product is as smooth and successful as possible, many functions – and often a variety of people – will be involved throughout the lifecycle. As well as design engineering, marketing, product planning, purchasing and supply management, field support, reliability engineering, production engineering, quality and even key customers will play roles in the development lifecycle. Historically, many of these functions would have been performed serially.

The lifecycle might start with the familiar "back of an envelope" sketch, quickly moving on to a proof-of-concept design. This version would not be expected to go into production. Instead, it would go through a series of revisions that focus on improving production cost, reliability and usability. Purchasing and supply-chain management plays a key role in this process by focusing not just on component pricing but continuity of supply.

In recent years, many electronics OEMs have embarked on a programme of supplier consolidation, in which they favour a small number of larger suppliers with which they can negotiate better pricing and ensure that all the components they require are available even in times of shortage. This can involve significant redesign to a proof-of-concept version to ensure that components selected by the engineering team fit the purchasing policy or that a waiver has been organised for key parts.

Similarly, marketing and sales play key roles in product planning as they have the information available to them on how much they can charge and make reasonable predictions on sales levels assuming the system meets its objectives. If a product is too expensive, it will need to be redesigned to reduce its cost or have

its functionality expanded to fit into a higher price bracket. With information on expected sales, marketing can help purchasing negotiate volume discounts.

Although the various product planning and re-engineering functions can be performed serially, in today's fast-moving marketplace, it is unlikely to be successful. The entire lifecycle of a product can be just two or three years, from idea to end-of-life. Decisions taken early will have a dramatic effect on the product's success.

OEMs have to be able to move from design to full production extremely quickly to beat their competition. The time from prototype to production needs to be extremely short and rules out the process of serial redesigns. As a result, design engineering as a function is being tightly integrated with purchasing, marketing and other engineering roles.

Engineers now start out with approved lists of suppliers and perform cost analyses to provide marketing with early guidance on likely end-user pricing levels. This is a laborious process without tools. To support the engineer in making decisions guided by supply-chain issues we have seen the introduction of tools that help build up the bill of materials (BOM).

A BOM management tool, such as the BOM Manager software from Digi-Key, provides instant feedback on component-selection decisions and collates much of the information needed to keep other parts of the team in the loop. The software on its own is not enough. A direct link from BOM management to distribution is vital, because this provides all-important feedback on how easy it will be to source components from prototype to production.

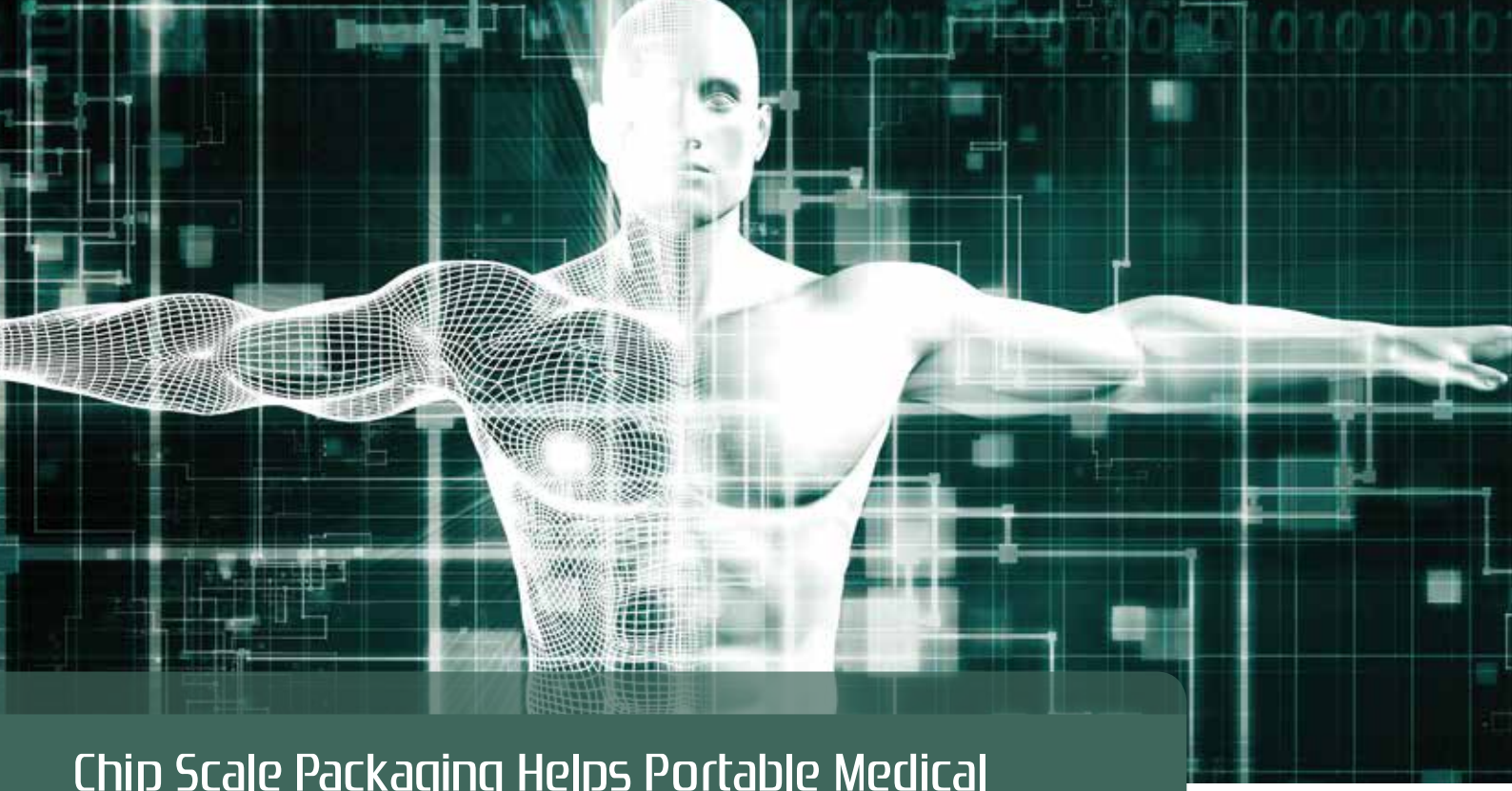
Stocked product at a major catalogue distributor is an important indicator of the ease with which product can be sourced throughout its lifecycle. These are generally products with a large customer base or the prospect of one, which in itself provides high assurance of supply needs being met later on. By selecting stocked product, design engineers can also be sure of receiving parts for the prototype as quickly as possible – within 48 hours with a major distributor. By selecting the distributor with the greatest breadth of BOM, the design engineering team can more easily meet deadlines while selecting components from the supplier list approved by purchasing.

As well as providing feedback on stocking and pricing levels, a sophisticated BOM management tool can inform component selection over the entire lifecycle of a product idea. Because it is tied into the distribution network, it can determine whether a given component is coming to the end of its own lifecycle. If a component is not recommended for new designs, that will be shown in the tool.

The BOM management tool can provide vital information to the marketing team by allowing what-if analyses of volume purchases. For example, the engineers can quickly determine how per-part component prices will shift as the end product moves into higher volume. At the same time, the BOM management tool will determine the most effective means of packaging for each product. For prototype and early production runs, it will, for example, select cut-tape packaging for components in favour of full reels. The result of these features is a highly effective tool that minimises the amount of rework needed to get from the initial concept and prototype to production.

BOM management in partnership with the supply information that only a leading distributor can provide are becoming essential tools not only in shortening the time from prototype to production but in supporting the entire lifecycle of an idea.

Steve Vecchialrelli, Vice President Supply Chain Solutions at Digi-Key Electronics



Chip Scale Packaging Helps Portable Medical Devices Save Size and Weight

› Mike Delaus and Santosh Kudtarkar, Analog Devices, Inc.

Wafer-level chip scale packages are allowing designers of portable healthcare equipment - such as invasive sensing, medical implants, and disposable monitors - to reduce size and power requirements.

ne of the key trends in medical equipment design is to bring equipment closer to patients at the doctor's office or at their own home by making these devices more portable. This involves all aspects of the design, but especially effects size and power consumption. Shrinking the electronic portion of these instruments is being aided greatly by the use of wafer-level chip-scale packages (WLCSPs).

These new applications include invasive sensing, medical implants, and disposable, portable monitors. But to get the most out of WLCSPs in terms of performance and reliability, designers should heed the best practices in designing the printed-circuit board (PCB) land pattern, pad finish, and board thickness.

Wafer-level chip scale packaging is a variant of the flip-chip interconnection technique (Figure 1). With WLCSPs, the active side of the die is inverted and connected to the PCB using solder balls. The size of these solder balls is typically large enough (300 µm pre-reflow for 0.5-mm pitch, and 250 um pre-reflow for 0.4-mm pitch) to avoid the underfill that is required for flip-chip interconnects. This interconnection technology offers several advantages.

First, considerable space savings are obtained by eliminating the first level package (mold compound, lead frame, or organic substrate). For example, an 8-ball WLCSP occupies only 8% of the board area taken up by an 8-lead SOIC. Next, inductance is reduced and electrical performance is improved by eliminating the wire bonds and leads used in standard plastic packages.

Also, designs yield a lighter weight and thinner package profile, due to the elimination of the lead frame and molding compound. No underfill is required, as standard surface-mount (SMT) assembly equipment can be used. And finally, high assembly yields result from the self-aligning characteristic of the low mass die during solder attachment.

Package Construction

WLCSPs can be categorized into two construction types: direct bump and redistribution layer (RDL).

A direct-bump WLCSP consists of an optional organic layer (polyimide), which acts as a stress buffer on the active die surface. The polyimide

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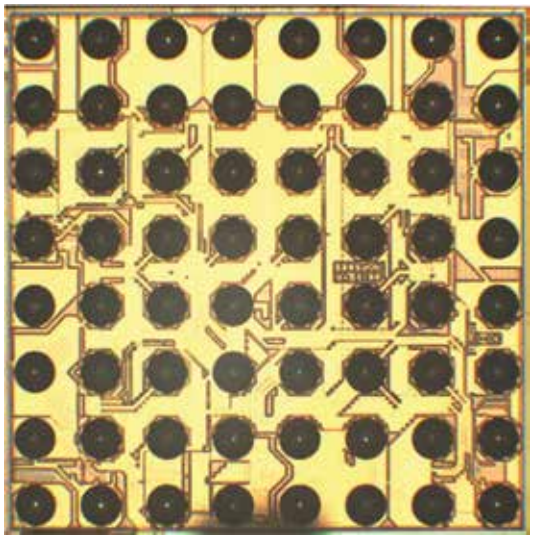

Figure 1. WLCSP Package

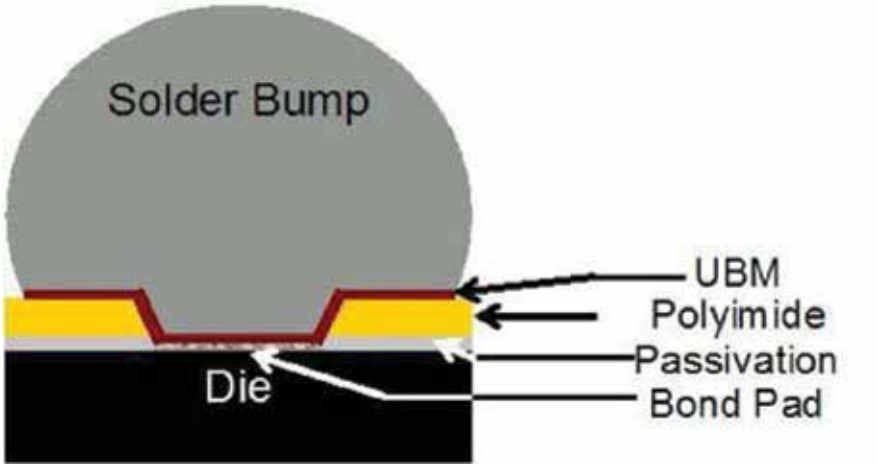

Figure 2. Direct Bump WLCSP

covers the entire die area except for openings around the bond pads. An under-bump metallurgy (UBM) layer is sputtered or plated over this opening. The UBM is a stack of different metal layers serving as diffusion layer, barrier layer, wetting layer, and antioxidation layer. The solder ball is dropped (which is why it's called ball-drop) over the UBM and reflowed to form a solder bump (Figure. 2).

RDL technology allows a die designed for wire bonding (with bond pads arranged along the periphery) to be converted into a WLCSP. In contrast to a direct bump, this type of WLCSP uses two polyimide layers. The first polyimide layer is deposited over the die, keeping the bond pads open. An RDL layer is sputtered or plated to convert the peripheral array to an area array. The construction then follows the direct bump, with a second polyimide layer, UBM, and ball drop (Figure 3).

Post ball-drop are wafer backgrind, laser-marking, testing, singulation, and tape and reel. There is also an option of applying a backside laminate after the backgrinding process to reduce die chipouts induced during sawing and to ease the handling of the package.

Best PCB Design Practices

The critical board design parameters are pad opening, pad type, pad finish, and board thickness. Based on the IPC standard, the pad opening equals the UBM opening. The typical pad openings are 250 µm for a 0.5-mm pitch WLCSP and 200 µm for a 0.4-mm pitch WLCSP (Figure 4).

The solder mask opening is 100 µm plus the pad opening. The trace width should be less than two-thirds of the pad opening. Increasing the trace width can reduce the stand-off height of the solder bump. Hence, maintaining the proper trace width ratio is important to ensure the reliability of the solder connections. For board fabrication, two types of pads/land patterns are used for surface-mount assembly (Figure 5):

- Non-solder-mask defined (NSMD): The metal pad on the PCB (to which the I/O is attached) is smaller than the solder-mask opening.
- Solder-mask defined (SMD): The solder-mask opening is smaller than the metal pad.

Because the copper etching process has tighter control than the solder-mask opening process, NSMD is preferred over SMD. The solder-mask opening on NSMD pads is larger than the copper pads, allowing the solder to attach to the sides of the copper pad and improving the reliability of the solder joints.

The finish layer on the metal pads has a significant effect on assembly yield and reliability. The typical metal pad finishes used are organic surface preservative (OSP) and electroless nickel immersion gold (ENIG). The thickness of the OSP finish on a metal pad is 0.2 µm to 0.5 µm. This finish evaporates during the reflow soldering process, and interfacial reactions occur between the solder and metal pad.

The ENIG finish consists of 5 µm of electroless nickel and 0.02 µm to 0.05 µm of gold. During reflow soldering, the gold layer dissolves rapidly, followed by reaction between the nickel and solder. It is extremely important to keep the thickness of gold below 0.05 µm to prevent the formation of brittle intermetallic compounds. Standard board thicknesses range from 0.4 mm to 2.3 mm. The thickness selected

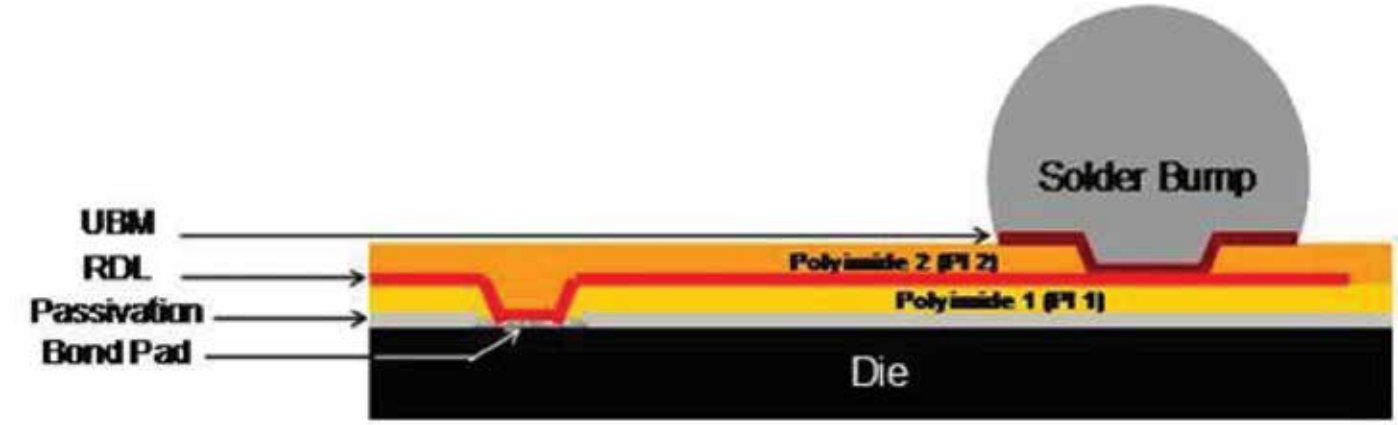

Figure 3. Redistribution Layer (RDL) WLCSP

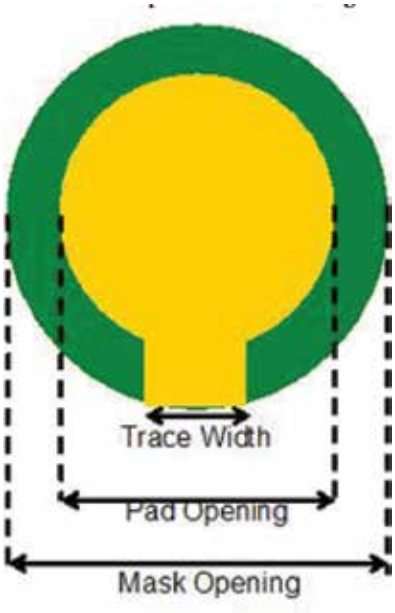

Figure 4. Pad Opening

depends on the required robustness of the populated system assembly. The thinner board results in smaller shear stress range, creep shear strain range, and creep strain energy density range in the solder joints under the thermal loading. Hence, the thinner buildup board would lead to a longer thermal fatigue life for solder joints.

Figure 5. Pad Type

Testing and Assessment

In conjunction with the aforementioned variables, WLCSP reliability is assessed by subjecting the device to accelerated stress tests such as high temperature storage (HTS), highly accelerated stress testing (HAST), autoclave testing, temperature cycling, high temperature operating life testing (HTOL), and un-biased highly accelerated stress testing (UHAST). In addition to thermo-mechanical induced stress testing, mechanical tests such as drop and bend testing are also carried out.

HTS testing is performed to determine the effect of long-term storage on devices at elevated temperatures without any electrical stresses applied. This test assesses the long-term reliability of devices under high temperature conditions. The typical test conditions are 150°C and/or 175°C for 1000 hours. This test consists of exposing the parts at the specified ambient temperature for a specified amount of time.

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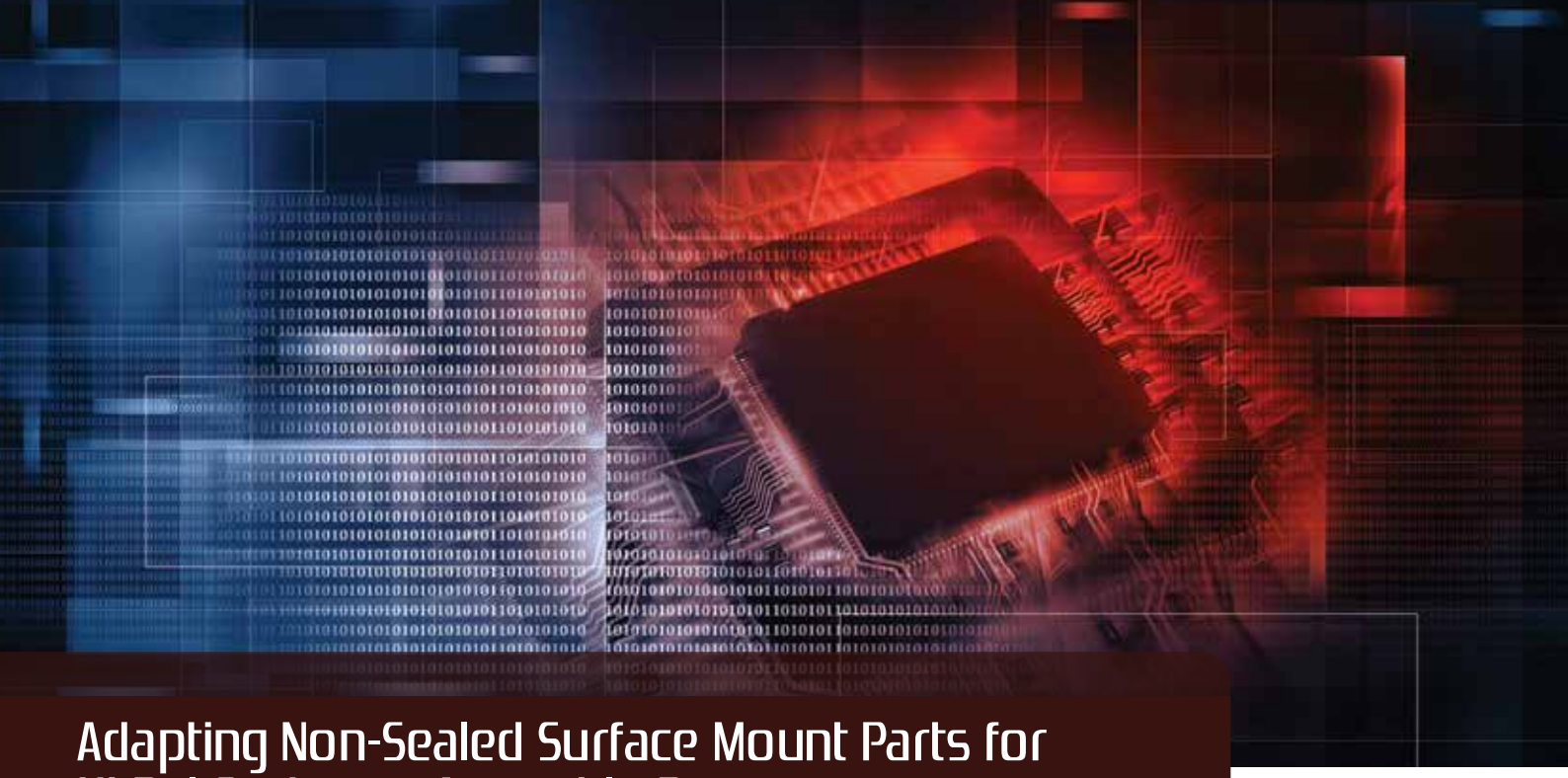

Adapting Non-Sealed Surface Mount Parts for Hi-Rel Customer Assembly Processes

› Jonid Xhakollari, Manufacturing Process Engineer, Mini-Circuits

The perfect integration of a product within the customer's assembly process can be just as critical to the success of that product as the electrical performance. Mini-Circuits and many RF/microwave component manufacturers build surface-mount components that are soldered onto customers' PC boards using a reflow process. Following reflow, the board must be cleaned to remove solder balls, flux, salt deposits and other debris. While a number of cleaning methods exist, the industry – and especially manufacturers of equipment for military and other hi-rel applications – have gravitated towards aqueous wash. A conformal coating is then applied to protect the circuit from moisture and other adverse environmental conditions. This process poses unique challenges for the integration of surface mount parts into customer assemblies, particularly components with open and semi-sealed case styles.

This article presents a proprietary technique Mini-Circuits has developed to adapt non-sealed surface mount components for customer assembly processes, preserving high reliability after aqueous wash and conformal coating.

Reliability Risks of Open and Semi-Sealed Surface-Mount Parts

Mini-Circuits' surface-mount parts may be categorized into three basic package types:

- Plastic encapsulated MMIC devices. Examples include QFN and SOT-89 case styles. A semiconductor die is wirebonded to bonding pads and sealed in a plastic enclosure.

Figure 1: plastic encapsulated MMIC devices.

- Ceramic, hermetically sealed cavity packages for hi-rel requirements. MAC-series mixers, for example incorporate a semiconductor die on GaAs wirebonded to baluns embedded in an LTCC multi-layer substrate. The die is hermetically sealed in a controlled nitrogen atmosphere.
- Open or semi-sealed PCB component assemblies such as VCOs, mixers, filters and diplexers. Circuitry is either fully exposed or shielded in a non-sealed case or "can".

Plastic encapsulated and hermetically sealed components are generally well-suited to hi-rel assembly processes without any special adaptations. Open and semi-sealed components, however, are susceptible to performance shifts and even catastrophic failure when exposed to the conditions of aqueous wash and conformal coating processes. During aqueous wash, components are fully immersed in de-ionized water at high temperature which can ingress into the unit package and become trapped. After aqueous wash, moisture along with any contaminants trapped inside the case of semi-sealed units can lead to dendritic growth, shorting, corrosion and a variety of other known reliability risks.

Open component assemblies are less problematic than semi-sealed assemblies with respect to trapped moisture, but for some more sensitive open structures such as filters and diplexers, the customer's conformal coating can change

Figure 1: plastic encapsulated MMIC devices.

Figure 2: hermetically sealed cavity packages.

Figure 3: semi-sealed and open component assemblies

Figure 4: Pre-coating on air coil legs.

Figure 5: Pre-coating on weld spot

Figure 6: Pre-coating on inductor.

the dielectric properties of the circuit, resulting in shifts in RF performance. For example, mixers and limiters are generally unaffected by contact with conformal coating, whereas VCOs and diplexers are sensitive and unsuitable for conformal coating unless contained in a sealed case.

The Solution: Proprietary Sealing Method

In an ideal world, we would simply adopt hermetically sealed cavity packaging for everything to withstand customers' assembly processes, but there are practical limits to this solution. Hermetic packaging adds significant cost to the component, and it is highly impractical to make hermetically sealed packages for larger structures. Therefore an alternative technique to adapt open and semi-sealed surface mount components for hi-rel assembly without adding extraneous cost or technical inconvenience to the process is highly desirable.

In response to customer requirements for open and semi-sealed components in our catalog for systems undergoing hi-rel assembly processes, Mini-Circuits developed a proprietary sealing method to protect these components during the aqueous wash process and enable them to operate reliably within the customer conformal coat. A special pre-coating is applied to certain areas of the Mini-Circuits unit, which prevents direct contact of the cleaning solution and the customer's conformal coat with the unit's sensitive circuitry. This pre-coating has been qualified to withstand the conditions of customer reflow, aqueous wash, and conformal coating processes without failures or shifts in RF performance.

The pre-coating seals the sensitive areas of the unit such that during the customer's reflow process, there is no wicking of solder or creation of solder balls in the sealed structure, which would otherwise cause reliability problems. This economical technique can be used to adapt open or semi-sealed surface-mount components in Mini-Circuits' catalog to preserve reliability in hi-rel assembly processes for minimal increase in cost.

Conclusion:

The trend toward aqueous wash and conformal coating in hi-rel applications means components that were once universally used will be increasingly unsuitable for integration into customer assembly processes in their standard form. Fortunately, Mini-Circuits has now developed a cost-effective approach to adapt non-sealed surface mount components for outstanding reliability in customer assembly processes involving aqueous wash and conformal coating. This gives customers the freedom to select components without limitations based on case style. Open and semi-sealed parts may be adapted for customers utilizing aqueous wash and conformal coating without adding inordinate cost or complexity to their board design or assembly process.

Payload and Mission Computing Requirements

Adlink

High Performance Rugged Computing Solutions that Meet or Exceed the Payload Computing Requirements Processing, I/O, and Storage - A mobile payload computer must possess advanced high performance embedded computing

characteristics, flexible networking capabilities, and industry standard I/O without exceeding the available size, weight, and power (SWaP), and cooling. All storage and system functions must be capable of supporting DoD IA requirements. And all of this must be delivered in a ruggedized, standards-based platform with a low power design that doesn't limit payload computing performance.

Thwarting improvised explosive devices (IEDs) with ground penetrating radar is a challenge for today's small form factor payload computing solutions. In future armored fighting vehicles, the processing performance required for IED detection as part of an electronic warfare solution will increase ten-fold. To be effective, ground mobile payload computer design requires a mature, rugged, highly reliable, standards-based computing architecture that meets DoD Information Assurance (IA) and intense application performance requirements.

In a ground vehicle, the Ground Mobile Payload Computers are the processing engines for the network of sensors and applications that make up IED detection. A payload computer must process enough sensor data in near real-time to enable counter measures to protect the warfighters.

As vehicle speeds increase beyond 15 to 20 mph, single compute engine capabilities fall short. System advancements in coupling Intel® and GPGPU processing architectures are required to meet the increase in vehicle speeds. A payload computer must support faster networking speeds to fully network the sub-system and support system scaling and failover. In addition, payload computers must be rugged, requiring MIL-STD-810G for a shock and vibration profile following method 514.6.

Products for Mobile Mission Computers, Ranging from Single Board Computers (SBCs) through to Complete Embedded Systems In today's armored fighting vehicle, the integration of vehicle electronic sub-systems for command, control, communications, computers, intelligence, surveillance, reconnaissance (C4ISR) and electronic warfare (EW) components, as well as power generation and distribution, are referred to as vetronics. The multiple

Thermal		Extreme Rugged Operating Temperature: -40°C to +85°C
Environmental	Immersion	ANSI/IEC 60529-2004 IP-67 Watertight (Ingress Protection)
	Humidity	95% at 60°C
	Shock	• MIL-STD-810G, Method 516.6, Procedure I - Functional Shock (40g shock) • MIL-STD-810G, Method 516.6, Procedure V - Crash Hazard Shock Test (75g shock)
	Vibration	• EN50155 • MIL-STD -810G- Table 514.6C-X Category 9 (Helicopter Vibration) • MIL-STD -810G- Table 514.6C-10 Category 11 (Rail Cargo Vibration) • MIL-STD -810G- Table 514.6D-9 Category 21 (Shipboard Vibration) • MIL-STD -810G- Table 514.6C-VI Category 4 (Composite-Wheeled Vehicle Vibration) • MIL-STD-810G, Method 514.6, Annex C, Category 7 - Vibration: Jet Aircraft
	EMI/EMC	• MIL-STD-461F ◦ CE101 Conducted Emissions, Power Leads, 30 Hz to 10 kHz ◦ CE102 Conducted Emissions, Power Leads, 10 kHz to 10 MHz ◦ CS115 Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation ◦ RS101 Radiated Susceptibility, Magnetic Field, 30 Hz to 100 kHz ◦ RS103 Radiated Susceptibility, Electric Field, 2 MHz to 40 GHz ◦ CS101 Conducted Susceptibility, Power Leads, 30 Hz to 150 kHz ◦ RE101 Radiated Emissions, Magnetic Field, 30 Hz to 100 kHz
	Temperature	• MIL-STD -810G-510.5 Procedure II (High Temperature) • MIL-STD-810G, Method 501.5, Procedure II - High Temperature • MIL-STD-810G, Method 502.5, Procedure I and II - Low Temperature • MIL-STD-810G, Method 503.5, Procedure I - Thermal Shock
Altitude	Altitude	• 50,000 ft. • MIL-STD-810G, Method 500.5, Procedure II - Low Pressure Altitude

table 1

sub-systems that support the ground mission are integrated and controlled using a Ground Mobile Mission Computer. Ground mobile mission computer design requires a mature, rugged, highly reliable, standards-based computing architecture that meets DoD Information Assurance (IA) requirements.

As the singular command and control display computer in a ground vehicle, the ground mobile mission computer is the network and application integration point. A mission computer embeds display controls for all vehicle processing, covering vetronics such as C4ISR and EW payloads, diagnostics, and power management. A mission computer must support multiple display interfaces, as well as Gigabit Ethernet and CAN bus, to fully network the sub-systems and support system scaling and failover. The mission computer must be rugged-MIL-STD-810G of a shock and vibration profile following method 514.6 - yet present the lowest possible power and cooling profile. It must also scale to support myriad displays and control applications and offer connectivity that complies with DoD IA requirements.

I/O and Processing - A ground mobile mission computer must possess I/O flexibility, networking capabilities, and the right level of processing without taxing the available size, weight, and power (SWaP), and cooling available for the task. Driven by the need for specialized I/O to integrate between vectronic functions, a good mission computer must be flexible and configurable to match the ground mobile platform demand. To support flexible mission planning and configuration, removable storage and USB ports are a must. All storage and system functions must also offer the option to support DoD IA requirements. And all of this must be delivered in a ruggedized, standards-based platform with a low power, convection cooled design.

Processing, I/O, and Storage - A mobile payload computer must possess

advanced high performance embedded computing characteristics, flexible networking capabilities, and industry standard I/O without exceeding the available size, weight, and power (SWaP), and cooling. All storage and system functions must be capable of supporting DoD IA requirements. And all of this must be Balanced SWaP2C2 - A ground mobile payload computer is often integrated in a vehicle later in the design cycle and constrained by available space. The choice of a ground mobile payload computer is driven by a balance between its size, weight, and power, performance, cooling, and cost (SWaP2C2), and sophisticated power management that reduces onboard power consumption is a necessity. Ground payload computing solutions should be cost-effective, built on industry standards, and successfully balance the SWaP2C2 equation.

ADLINK in Defense

Sophisticated and diverse technology demands are the hallmarks of modern military systems, featuring endurance, efficiency and connectivity as proven force multipliers across the spectrum of global military operations. ADLINK Technology is a strategic asset to prime contractors and technology integrators competing in this arena - supporting agile acquisition initiatives, and addressing military design challenges fueled by dramatic increases in sensor data volume and processing requirements as well as ongoing mandates for greater integration in manned and unmanned systems. Capitalizing on a rugged design pedigree spanning more than 25 years of military design advancements and leadership, ADLINK's Extreme Rugged products meet the rigors of military deployments with high-tech ready levels providing optimal Size, Weight, Power and Cost (SWaP-C), high bandwidth and proven rugged performance in open architecture COTS-based solutions.

Rugged by Design

ADLINK's Rugged by Design process means all Extreme Rugged products are subjected to MIL-STD shock, vibration, and temperature testing during the product development process, not simply re-qualified after the fact. This purpose-built approach ensures performance, availability and reliability optimized for the rigors of mission-critical embedded environments.

Extensive voltage and temperature margin tests validate ADLINK's Extreme Rugged products during the development process, including full MIL-STD-810 shock and vibration testing. ADLINK's ISO- and TUV-certified development process features Highly Accelerated Life Testing (HALT), and all Extreme Rugged products are available with conformal coating.

ADLINK rugged hardware solution designs are validated to meet MIL-STD requirements during the development process, including:

- MIL-STD-461 is a DoD standard that defines the requirements for the control of electromagnetic interference characteristics of subsystems and equipment
- MIL-STD-810 is a DoD test method standard for environmental engineering considerations and laboratory tests

ADLINK's Extreme Rugged products address the full spectrum of military industrial supply principles, including design revision control, component referencing, and the longevity of supply so essential to military deployments. Further, ADLINK's Extreme Rugged products offer configurability and flexibility to meet the broadest range of military program requirements. Assuring rugged design while protecting development resources and time-to-market, ADLINK can expertly modify existing offerings or develop new solutions to defined specifications using our proven Rugged by Design methodologies and ISO quality assurance process.

Long-Term Military Design Success

Inherited from Ampro Computers, ADLINK's reputation is founded on the design and development of high performance embedded computing solutions for rugged deployment. Our mandate is to solve rugged design challenges, maintaining high responsiveness to military customer needs while enabling value, performance, flexibility and longevity for extended deployments. By offering inhouse design with manufacturing - a service combination as valuable as it is rare in our industry - we maximize rugged design capabilities and capitalize on smart design principles that integrate both hardware and software to facilitate better performance, faster time-to-market and reduced risk and cost of ownership.

Committed Standards Leadership

ADLINK is vigorous in developing standards and then integrating them into market-leading products. Illustrated through ADLINK's comprehensive support of CompactPCI and VPX products, ADLINK has been innovating and delivering standards-based CompactPCI products for more

than 15 years.

ADLINK supports COTS technology and open systems, offering flexible technologies and platforms. Deployable as system ingredients or ready-to-go systems that ensure optimal rugged performance, ADLINK products blend hardware and software elements into intelligent platforms that enable a tangible competitive edge in time-to-market.

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Innovative Embedded Products and Capabilities ADLINK was founded to deliver innovation, value and competitive edge to our customers, capitalizing on our rugged design pedigree and culture of creativity to develop smarter embedded technologies and platforms. ADLINK is your complete supplier of Extreme Rugged products featuring military grade requirements.Our extensive lines of systems, platforms and products deliver optimized SWaP, thermal management and price/ performance value in standards-based COTS and MOTS (modified COTS) solutions.

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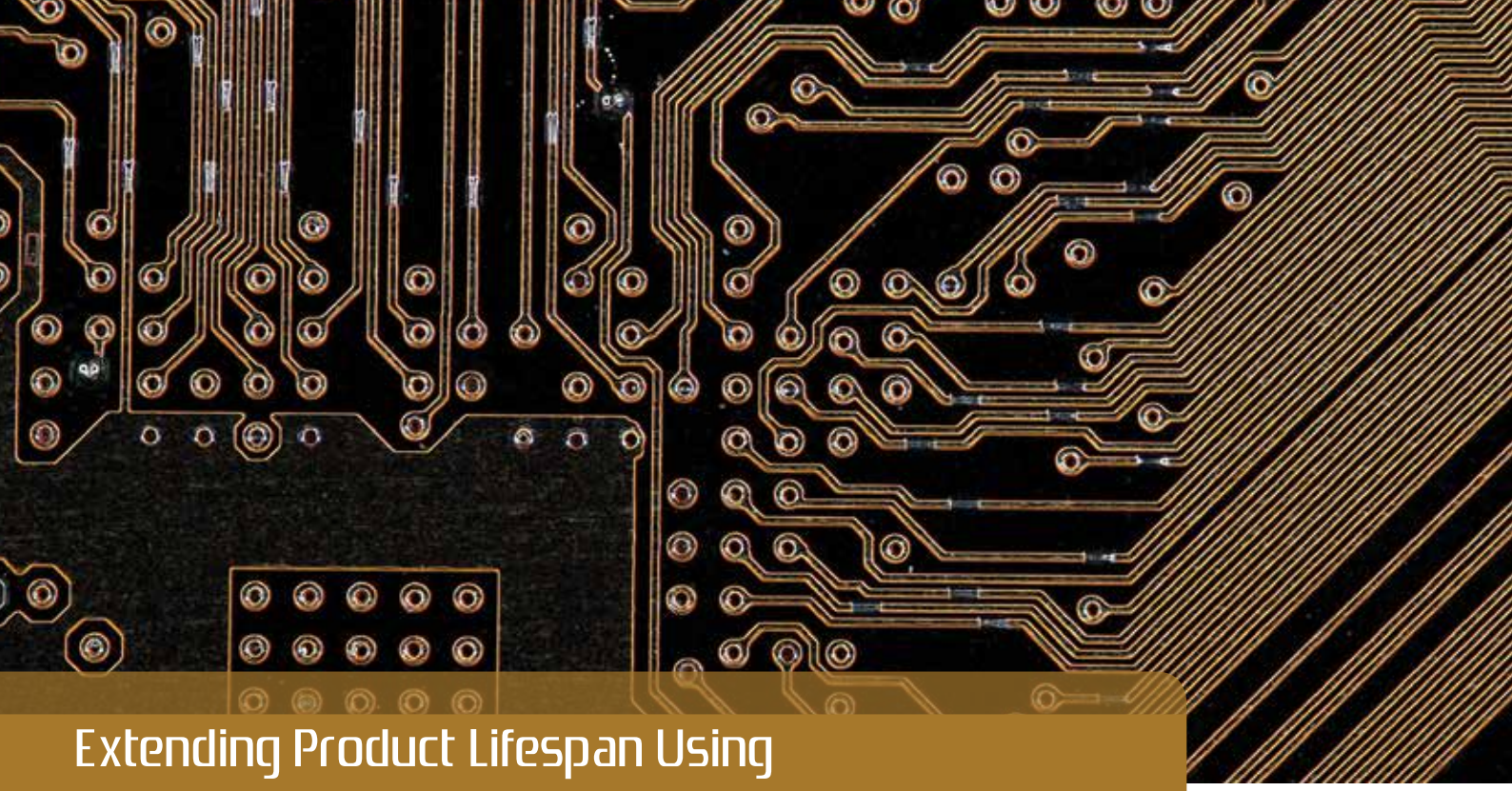

Extending Product Lifespan Using Wear-Leveling

› Datalight Staff

Introduction: Keeping Up with the Data Deluge

Over the past 20 years, flash memory has been widely adopted in mainstream consumer grade products with relatively short lifetimes, sometimes measured in months, as well as more industrial and commercial devices with lifetimes of years or decades. There are many unique characteristics of flash memory that have fueled its growth across these different market segments, such as its ability to retain data when power is interrupted. Unfortunately, flash technology has the downside of finite lifespan and lower endurance. Complicating the issue is the fact that hardware and software technologies designed to improve flash life often take a backseat to other seemingly more pressing issues of system design.

This paper discusses the factors that determine when limitations of flash memory lifetime become significant, and presents test data for several common wear-leveling options in Linux.

Flash Lifetime Metrics

Flash memory lifetimes are described in two primary metrics which are generally touted on the first page of any flash manufacturers' data sheets:

- Data retention
- Endurance cycles

Data retention is often listed at 20 years for a given operating temperature range. Increased temperature ranges reduce the data retention period which further decrease as the flash memory is used at or near the limits of its specified operating temperatures range. It is important to note that data retention is measured from the time data is successfully programmed.

The second metric, endurance cycles, is a measure of the number of write and erase cycles that the flash memory can endure before becoming unreliable.

Flash memory is organized into a number of erase blocks or sectors, and each must be erased prior to writing data. A typical erase block is 128KB in size, however depending on the flash part, it may range from 512B to 4,096KB or even more. A given address within an erase block cannot be rewritten without first erasing it. Erase cycles are cumulative and affect only those erase blocks being cycled. In other words, an error in any erase block is constrained to the data of that block.

Erase cycles of SLC flash range from 1,000 to 100,000. While these ranges have an order of magnitude difference, it is the application the

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CMA-82+	DC-7	15	20	42	6.8	5	8.95
CMA-84+	DC-7	24	21	38	5.5	5	8.95
CMA-62+	0.01-6	15	19	33	5	5	7.45
CMA-63+	0.01-6	20	18	32	4	5	7.45
CMA-545+	0.05-6	15	20	37	1	3	7.45
CMA-5043+	0.05-4	18	20	33	0.8	5	7.45
CMA-545G1+	0.4-2.2	32	23	36	0.9	5	7.95
CMA-162LN+	0.7-1.6	23	19	30	0.5	4	7.45
CMA-252LN+	1.5-2.5	17	18	30	1	4	7.45

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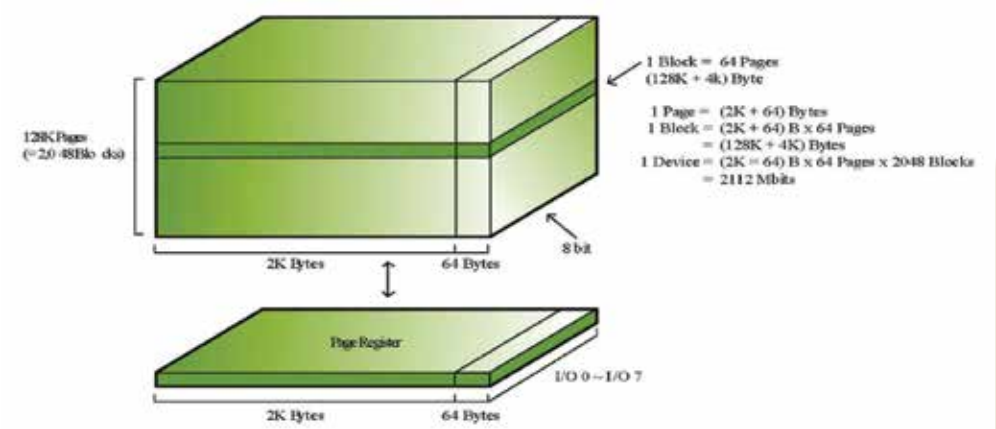

FIGURE 1

flash is placed into that will primarily define the product lifetime.

What is Wear-Leveling?

Wear-leveling is a process to ensure that an entire flash memory device or an array of devices is used in a uniform fashion in order to extend the overall lifetime of the flash.

For a simplistic example of wear-leveling, let's look at a data recorder with these characteristics:

• Application: The device collects and stores the past 24 hours of field data by simply writing and rewriting the data to the same location on the flash.

• File size of data to be recorded: 128KB

• Erase block size (of the flash): 128KB

• Flash memory endurance: 1,000 cycles With one spare erase block, the device is assumed to use one cycle per day each year:

(1,000 cycles ÷ 365 days) * 1 spare erase blocks = 2.74 years

In this example, it would take about 2.74 years to cycle that one erase sector 1,000 times.

For the data recorder device to accommodate the write erase rules of flash memory, it would have to complete an erase operation to start writing the next day's set of data. To make the data recorder more robust - to ensure that it doesn't lose a whole day's worth of data - we can set aside a second erase block, and erase the first block only after the second set of data was recorded. The resulting side effect is the introduction of a simple wear-leveling scheme.

With two spare erase blocks, the device is assumed one cycle every two days each year:

(1,000 cycles ÷ 365 days) * 2 spare erase blocks = 5.48 years

With these parameters, the period of time prior to cycling the flash to its lifetime has just been increased to almost 5.5 years!

This simple example shows how distributing a fixed set of writes across more flash sectors can increase the period of time prior to cycling the flash to its specified limits. The following sections describe how to account for the important variables associated with wear-leveling techniques, and determine the expected lifetime of the flash in any application.

Wear-Leveling critical for MLC flash media

For this paper, we measured NAND flash configured for SLC, or Single-Level Cell. Another common configuration is Multi-Level Cell (MLC) which stores multiple bits per flash cell. This technique results in considerably less endurance, ranging from 10,000 down to 300 for the smallest densities. It also consumes higher power and has lower write speeds, though the flash media is often less expensive. With P/E cycles in the hundreds, it is even more critical that effective wear-leveling is used to make MLC an acceptable choice for industrial and commercial uses.

The figures on the next page depict the concept of wear-leveling. The flash disk in this example has a maximum endurance of 100,000 cycles. Figure 1 represents a disk that does not employ any wear-leveling software, while Figure 2 shows a disk that is managed with wear-leveling schemes. Note that the sectors that have exceeded the 100,000 cycles in Figure 1 are no longer able to store data, and have corrupted the data that they were storing. These sectors represent the high-use areas of the disk. On a FAT disk for example, this may be where the FAT table is stored and corruption here would render the entire file system unreadable. Lower use areas of the disk, which may include application and operating

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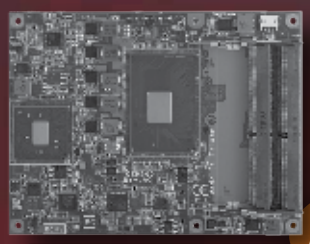

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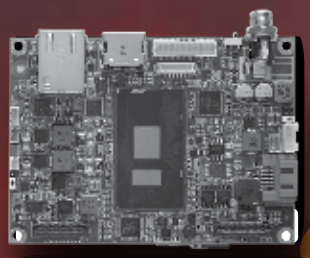

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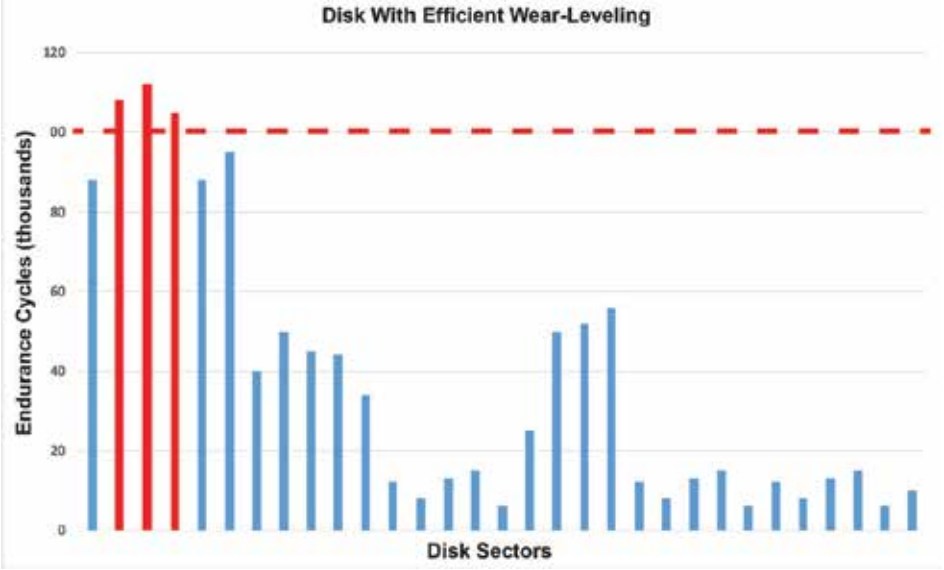
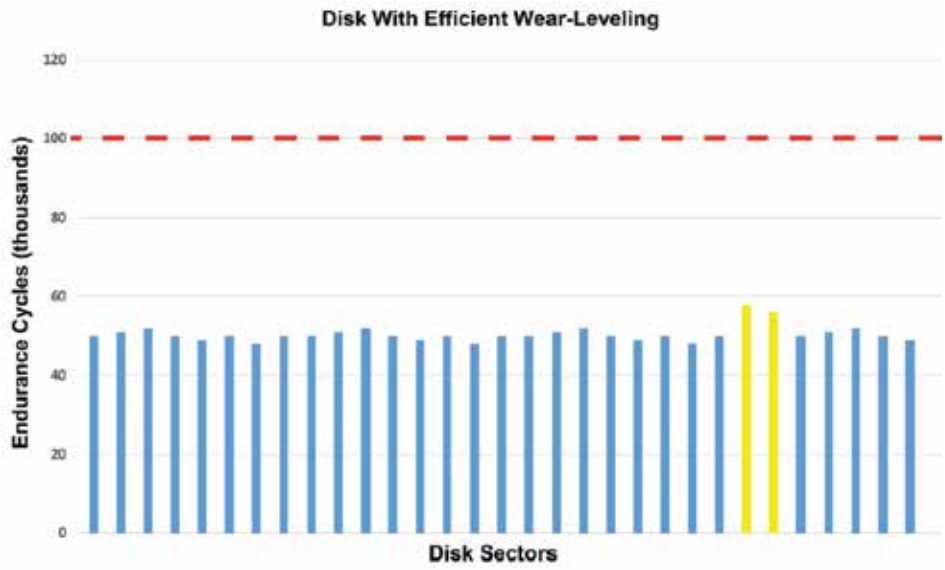


These red sectors above the dashed line have exceeded the maximum endurance cycles. They are now BAD sectors and can no longer be written to or read from.



Advanced wear leveling schemes (like Datalight FlashFX family) keep endurance cycle differences in this example between 700 and 1400, at a maximum.

system code, will never reach the flash memory's maximum endurance. Without wear-leveling, these low-use sectors are essentially wasted flash lifetime. Meanwhile, the disk use in Figure 2 is spread evenly throughout the disk sectors, allowing the flash disk to be reliable for its maximum lifetime.

Professional Wear-leveling Implementation

A properly-executed wear-leveling implementation moves data around in the flash disk to accommodate the fact that flash memory cannot simply be rewritten. The specific algorithms are beyond the scope of this paper, but the idea is to efficiently write throughout the flash before rewriting the same location.

The wear-leveling scheme implemented by an effective flash manager consists of tracking the number of erases incurred on each flash erase block. In other words, both high and low use sectors are monitored. This is often referred to as dynamic wear-leveling. As erases accumulate,

the difference between the highest and lowest counts is audited. If a specific set of constraints are met, a wear-leveling operation - which swaps the least erased block with the most recently used erase block - is completed.

Two parameters control wear-leveling erases; the first is a maximum difference allowed before wear-leveling erases are incurred, and the second limits the frequency of wear-

leveling erases.

Again, considering the necessity to maintain optimal read/write performance in the flash, a flash manager should never incur wear-leveling erases if they are not necessary. It will effectively move high use areas of the flash to low use areas over time and will keep the average erase cycle count within a predefined range. It is important to note that this system utilizes the entire flash disk by forcing static areas of the flash to move, which would otherwise never be rewritten fully.

In order to ensure that the wear-leveling process will not degrade performance or compromise the integrity of fixed file system meta data, the flash manager must begin erases well before the cumulative writes equals the size of the flash disk. Advanced wearleveling schemes (like Datalight FlashFX family) keep endurance cycle differences in this example between 700 and 1400, at a maximum.

Simplistic Calculation of Flash Cycles

In order to determine whether a certain application will challenge the endurance cycles of the flash that are specified by the flash manufacturer, a number of variables must be considerd.

Assume the flash is used efficiently by the application and that all flash described by Stotal is available to be written prior to an erase cycle being incurred. Given this assumption, a single erase cycle will be incurred once the entire flash (Stotal) is written. The period of time elapsed

over a given cycle count, and therefore the period of time before a flash chip wears out, is then calculated with the following formula:

P = C [Stotal ÷ (F * Dwrite)]

Stotal describes the total flash memory available (KB) to be used as a disk.

Dwrite describes the amount of data (KB) being regularly written into the disk.

F is the frequency of Dwrite to the disk per day.

C is a given number of cycles to calculate the period.

Example – the difference with Static Wear-leveling

In this example, we examine a field data recorder that collects and stores coordinates and other statistics at a rate of 1280 bytes per minute, and must maintain the last hour of data (75KB), for a total of 1800KB of writes per day. This device has 1 MB of flash media total, and the application and configuration files will take up more than half of that space - meaning only 256 KB can be used to store data.

With only dynamic wear-leveling, the media will regularly swap between two 128 KB erase blocks – remember, we cannot erase just 75 KB. The chart below shows three different choices for flash media, rated for the total number of erase cycles. The other values are fixed:

S total = 256 KB, D write = 1800 KB, F = 1 day

S_{total} (disk size)	C (cycles)	P (period)
256KB	1,000	142 days
256KB	10,000	3.9 years
256KB	100,000	39 years

If this field recorder's expected lifetime of 12 years, flash rated for 100,000 cycle flash is required.

With both static and dynamic wear-leveling, as implemented by the FlashFX family, the entire media is eventually available for data. This results in one change to the equation values above.

S total = 1024 KB, D write = 1800 KB, F = 1 day

S_{total} (disk size)	C (cycles)	P (period)
1024KB	1,000	1.5 years
1024KB	10,000	15.5 years
1024KB	100,000	155 years

For the same expected lifetime of 12 years, flash rated for 10,000 erase cycles is now perfectly appropriate, though a 20-year lifetime would still require flash with

100,000 erase cycles.

Simulation Tests

For purpose of testing the effectiveness of wear-leveling amongst various flash management software, we used the following test:

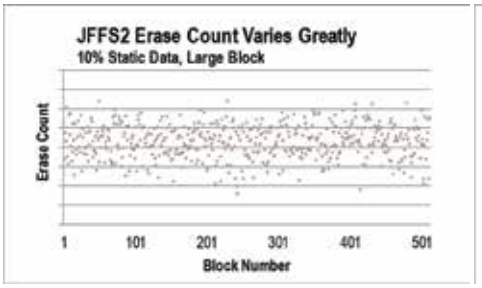
1. 64MB of NAND Flash configured in small and large block configurations.
a. Small Block - 16KB (4096 blocks)
b. Large Block - 128 KB (512 blocks)
*Large and small block NAND were two different hardware configurations available at the time we performed this test. The results show that the variance of wear-leveling can be greater on large block, because the wear-leveling of static data happens less often.
2. Fill part of the volume with a large file that is not modified. This represents the static data on disk. For the first series of tests, we used 10% static data.
3. Fill remaining portion with another file that is constantly modified. This represents dynamic data
a. Copy data in the file
b. Delete data
c. Repeat above steps for 10,000 cycles
4. Measure the variance in the number of erase counts for blocks on the disk. The smaller the variance, the more effective the wear-leveling technique used

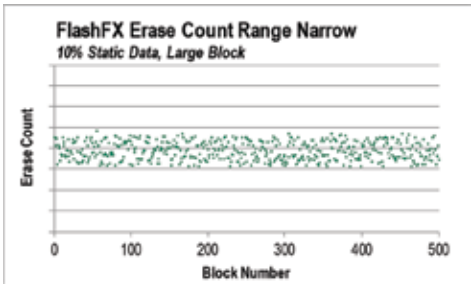
FlashFX Family vs. JFFS2 Results

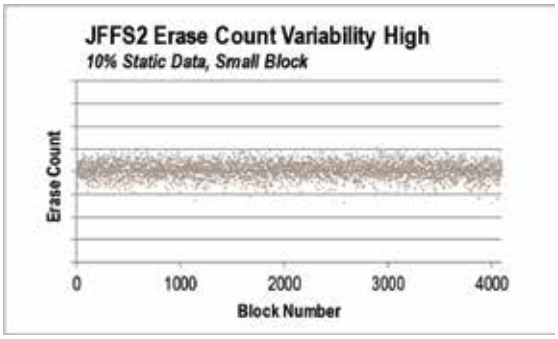
We measure the effectiveness of wear-leveling algorithms by examining the erase count for each block on the media, then comparing the highest value to the lowest value. We measured this in a situation where approximately 10% of the data on the media was static (placed on the media and not written to again) and compared that to a situation with approximately 60% static data.
The variance between the highest and lowest values for each test case are shown in this table.

Configuration	JFFS2 Variation	FlashFX Family Variation
10% Static on Large Block	2393	849
10% Static on Small Block	2473	913
60% Static on Large Block	3893	949
60% Static on Small Block	6964	1051

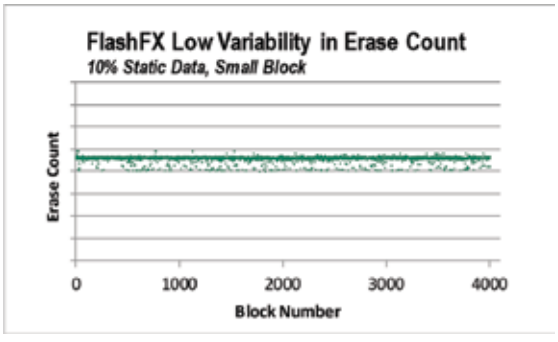
These graphs show the erase count all 512 flash media blocks, over a range of 4000 erase counts. JFFS2 has erase counts which vary greatly within this range, while FlashFX Tera keeps the erase count within a range of roughly 900 erases.



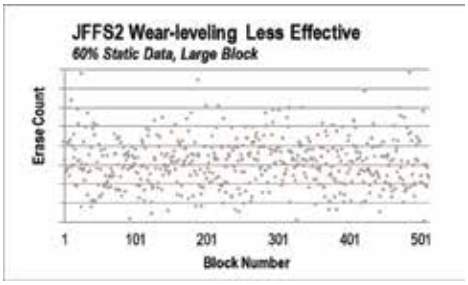


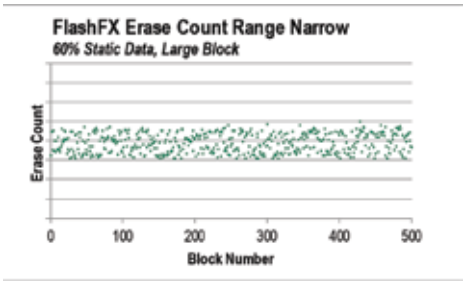


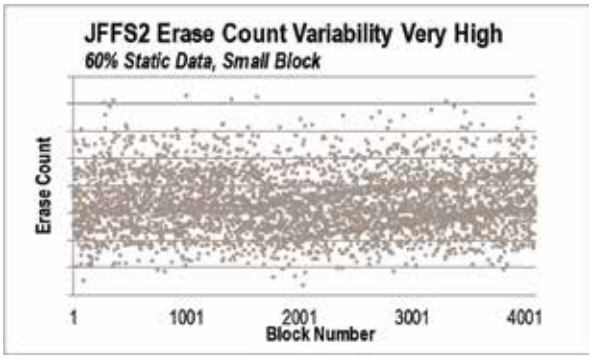
These graphs show the erase count all 4096 flash media blocks, over a range of 8000 erase counts. JFFS2 has slightly better wear-leveling than on large blocks, keeping the erase count within 2500 erases, but FlashFX Tera keeps the erases on a narrow band of roughly 900 erases.



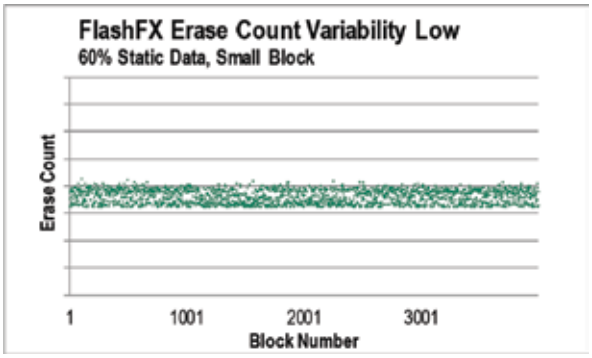
These graphs show the erase count all 512 flash media blocks, over a range of 4000 erase counts. JFFS2 has erase counts which vary greatly within this range, while FlashFX Tera still keeps the erase count within a range of roughly 900 erases.







These graphs show the erase count all 4096 flash media blocks, over a range of 8000 erase counts. Counts for JFFS2 continue to vary greatly over a range of nearly 7000 erase counts, while FlashFX Tera keeps the erases within a window of 1050 erases.



Conclusions

Typically it takes a very write intensive application to cycle flash memories to their limits. However, it is possible for your product to become a brick sooner than you expect it if the flash limitations are not addressed. Different flash management options within Linux have varying degrees of effectiveness as far as wear-leveling is concerned. When designing a Linux-based embedded device, it is important to understand the data profile of your applications (how often they need to write/erase data from the disk) and evaluate the flash management solution (hardware + software) based on this criteria.

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Qormino® is an ultra-compact, 64-bit multi-core, NXP QorIQ™ processor based module integrating DDR SDRAMs for high performance, communication intensive applications. Designed to aid fast time to market, it solves the thorny problem of premature product obsolescence. Thankfully, Qormino is supplied from e2v's SLiM™ expert inventory management program, offering prolonged supply up to 15 years. Embedded designs based on Qormino are guaranteed an extended time-in-market.

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Powerful communication processing and peripherals

Absorbing the feature list for QorIQ T1 series is a major undertaking in itself. These powerful NXP processors have already captured the imagination of a broad spectrum of commercial system designers by virtue of their shear breadth of features, low power, scalability and common pin-outs.

As system on chips (SOCs) go, the QorIQ family has communication processing needs pretty much sewn up. On its initial launch, the T1040 was the first 64-bit multi-core processor to boast an integrated GigE switch. The inclusion of a DDR3 memory controller and a full suite of peripherals rounds out a comprehensive feature set. Surely

Qormino® - Customer Benefits

- Access the multitude of SWaP[1] benefits of NXP's QorIQ™ processor family
- ***No hassle*** DDR3L SDRAM implementation
- **Accelerated time-to-market**
  - Reduced supply risk and costs
- 15 years, managed lifetime (SLiM™ program)
  - Longer **time-in-market**, guaranteed
  - One, instead of 6 components to manage
- Ultra-compact form factor (38 x 25 mm)
  - **50% smaller** than alternatives

[1]Size, Weight and Power

Figure 1- The Qormino substrate

it was only a matter of time before someone smart would see a benefit to packaging these key components in an ultra-tiny substrate. This is exactly what e2v have done.

Taking up less than a quarter of the area of a credit card, the Qormino provides a 50 % space reduction over alternatives (see figure 2).

Those strongly attracted to the QorIQ, based on its SWaP (Size, Weight and Power) benefits may still have concerns over some practical limitations. Two issues invariably emerge - both centre on the critical DDR memories needed to maintain high core performance. The first concerns practical DDR SDRAM interfacing (especially over a wide temperature range) given tiny timing and noise margins. The second is guarding against product obsolescence when key ICs are subject to consumer fads and short lived supply cycles. Handily, Qormino solves both these problems.

The DDR SDRAM interface challenge

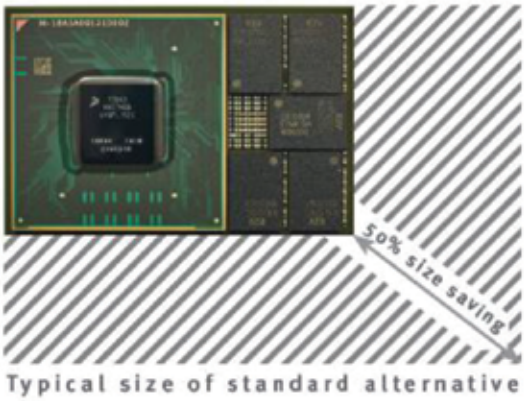
DDR SDRAM provides a dense and fast local data memory to augment the core processor's on-chip caches for data handling. As such, DDR SDRAM ultimately places a maximum limit on the processing capabilities of the QorIQ core.

DDR memory control design proves far from trivial. Each memory block of a DDR3 chip is daisy chained to the next. On the plus side, this helps ensure that memory data lines are properly terminated. On the downside, a time skew is introduced between each block which must be countered by a specially modified memory controller using a technique called levelling.

One can quickly appreciate the raw challenge of optimal DDR3 timing design by understanding the timing skew specifications. Skew between DQS (data queue strobe) and DM (data mask) signals is specified as a maximum of ±10 picoseconds - that's a tiny 1 trillionth of a second! At the PC board level, that works out as a mere 50 mils (or 1.27mm) of trace length difference on an FR4 PCB. That's a real challenge to meet with today's fine pitch PCBs. How helpful then that Qormino eliminates this entirely by including the DDR3 memory on the module. The current Qormino applies 1GB of DDR3L SDRAM, the dual voltage DDR3 variants which operate from either 1.5 or 1.35V supply and can sustain up to 1600 MT/s.

Managed obsolescence planning

As illustrated by figure 3, memory developments have easily outpaced successive processor generations, which in turn have outpaced system development and life time cycles in certain markets. Competitive pressures force SDRAM vendors to focus on rapid migration to further die shrinks to maintain profitability. Products quickly reach end of life (EOL) and disappear



Qormino® Specification Snapshot

- Low power, feature rich, **quad-core** communications processor
  - NXP QorIQ™ T1 series, 64-bit processor
  - 3 DMIPS/MHz per core
- Integrated 1 GB DDR3L SDRAM with ECC
  - Supports data rates up to 1600 MT/s
- Integrated GigE ethernet switch
- Space saving 38 x 25 mm footprint
- -50 to 125 °C operating temperature range
- ROHS compliance or SnPb lead finish options

Figure 2- Qormino delivers significant real estate benefits

from market. Long-term focused customers face continual re-design headaches driven purely by external market forces. In the gap between embedded processor choice and the paired memory lies a major supply chain problem.

Designed for long term product availability, Semiconductor Lifecycle Management (SLiMTM) at e2v is a program focused solely on supporting clients eager to find a stock management system that extends product availability over the project lifetimes demanded by sophisticated customers including governments. SLiM provides a minimum of fifteen years of component supply security. Though semiconductor supply chains are agile, they remain highly profit focused and are designed to support consumer product cycles that run between 6 to 18 months in duration. Aerospace, military and even some industrial programs can ill afford strategic silicon disappearing that quickly; especially when end customers demand component spares and maintenance supplies that must remain available for as long as twenty years.

The SLiM program functions around four primary capabilities:

- Centrally managed, secured supply of original manufacturer's components
- Protected wafer bank stores, matched to customer's lifetime demand profile
- Vendor accredited, final manufacturing (package and test) capabilities
- Trusted re-engineering and re-design capabilities to pre-empt supply chain weaknesses

The benefits arising from SLiM include:

- Guaranteed supply longevity
- Prevention against counterfeiting
- Improved supply integrity - sole supplier
- Significantly reduced supply cost risk

Qormino offers a brand new approach to rapid, low risk embedded design without the traditional headaches of managing the separate, disconnected processor and memory supply chains.

Qormino availability

e2v announced in summer 2016 the initial sampling of its first Qormino family member, the QT10A featuring the QorIQ T1040 teamed with 1 GB DDR3L SDRAM. Fully qualified military and industrial grade versions with lead finish options are set for full production in the third quarter of 2017. Moreover, e2v expect to be sampling other members of the NXP T1 series processors including the T1020/2 & T1042 later this year.

As accredited partners, e2v are committed to a Qormino roadmap tracking developments in NXP's processor family. Future options will also expand the amount of DDR SDRAM provisioned, matching specific needs of each individual processor.

Speed up and SLiM down your embedded designs

Qormino has eliminated two key

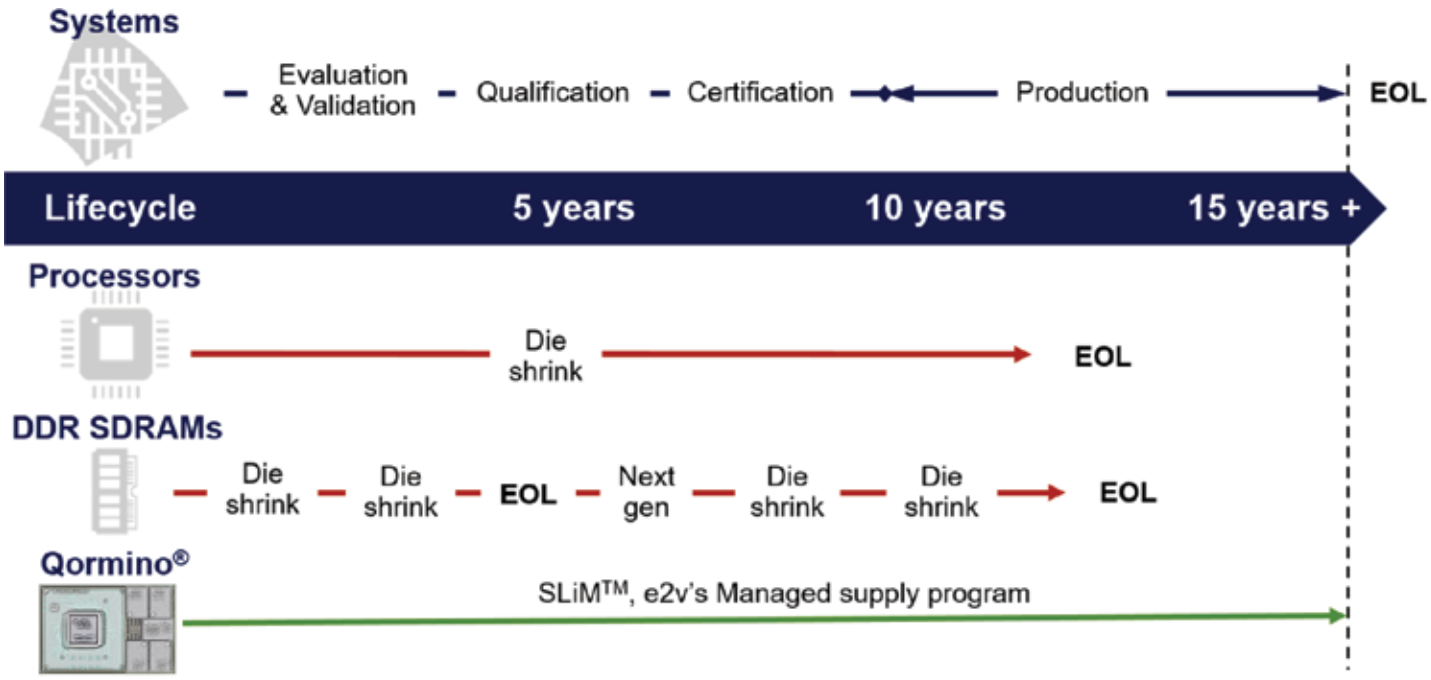
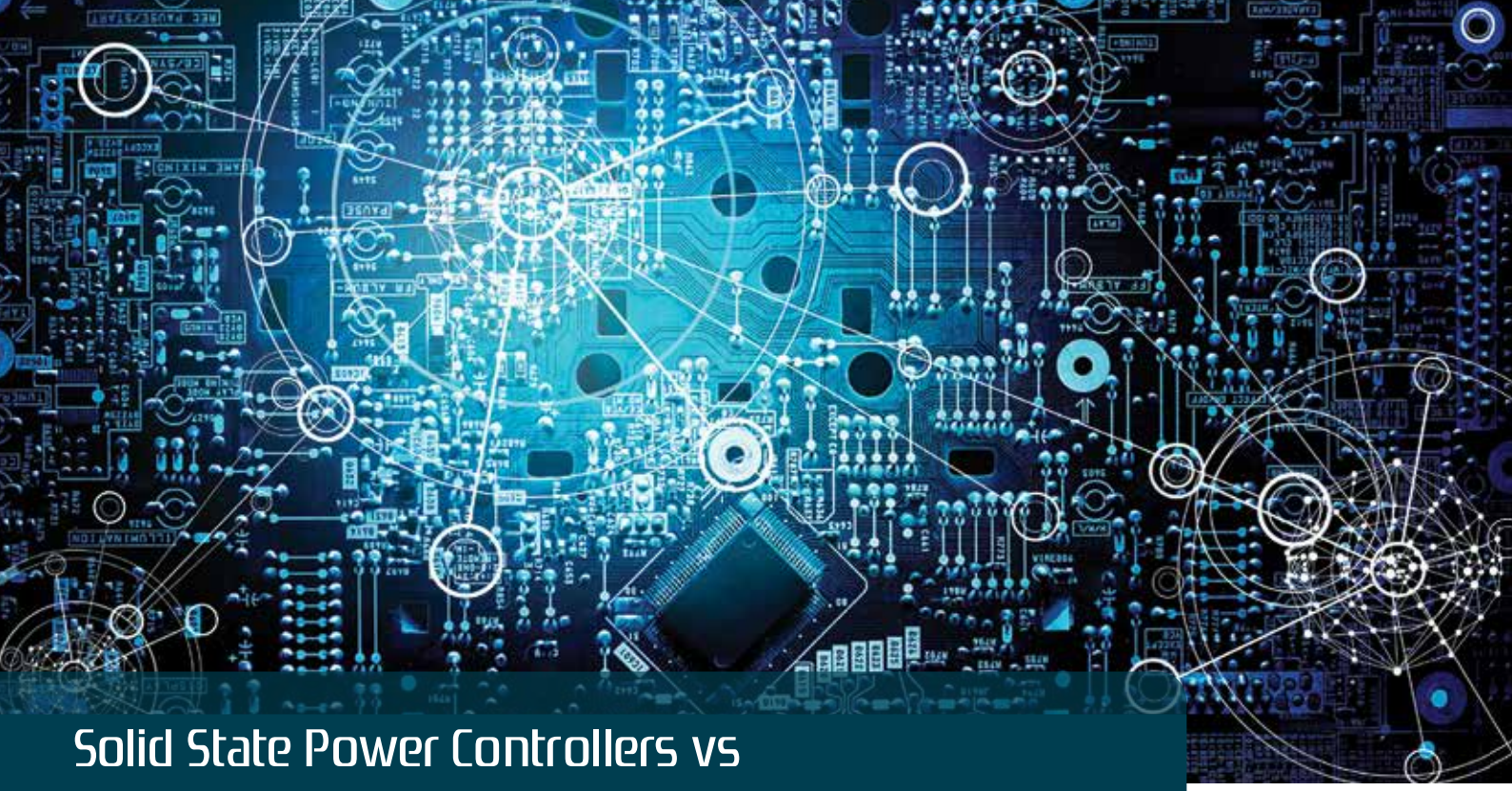


Figure 3 - System and product lifecycles vary considerably adding to the challenge of selecting key components in long life projects

risks when selecting complex core processors and memory components used in long lifecycle projects across military, aerospace, medical and even industrial markets. Customers alleviate supply chain risks associated with the strategic processors and the DDR memories with which they are teamed. Long term module availability is guaranteed under e2v's proven SLiM program.

Furthermore, users don't have to involve themselves with the complex memory design, saving significant time and effort. They obtain a SDRAM memory system guaranteed over the operating temperature range of the module. The tiny real estate demands of the Qormino substrate means designers can simply drop it onto their board design to instantly access the myriad SWaP benefits of QorIQ processors.

So finally, a highly capable communication processor is paired with optimal memory and supplied as a single, guaranteed component. Now even the most risk averse projects can rapidly deploy QorIQ safe in the knowledge they have access to a secured supply chain from a trusted, advanced electronic supplier like e2v.interfaces and USB and Gigabit Ethernet ports. ADLINK's world-class technical support ensures convenient accessibility to our team of highly skilled customer hardware and software support engineers. Our support team is expertly trained and knowledgeable in the applications and concerns of our military customers.



Solid State Power Controllers vs Electromechanical Switching

› Mike Glass - Data Device Corporation

Introduction

The design of primary and secondary power distribution systems for modern ground and air platforms entails a number of challenges. These include needs for increased amounts of electrical power for C4I and other equipment; improved reliability and system availability; reduced weight, volume and thermal footprint; along with capabilities to shed loads, and for enabling system prognostics and diagnostics.

SSPCs (Solid State Power Controllers) provide a number of functional and performance advantages over electromechanical circuit breakers and relays. SSPCs provide accurate measurements, digital processing, low loss switching with controlled rise and fall time for reduced EMI emissions, very rapid short circuit protection, along with I2t overload protection. I2t protection protects wiring, loads and the SSPCs themselves against overheating, while reliably avoiding "nuisance trips" when switching into capacitive or incandescent lamp loads. Relays and breakers present reliability problems, as they are subject to arcing, oxidation, erosion, and welding; along with problems associated with moving parts. The latter include contact bounce, and difficulties operating in environments with high vibration, dust, or sand. Relative to electromechanical switching, SSPCs provide an advantage in reliability (MTBF) of an order or magnitude or more, providing increased vehicle and system availability.

Relative to electromechanical breakers and relays, SSPCs increase electrical energy efficiency by providing lower power dissipation, along with higher power weight and volume densities.

By means of bus or network connectivity, SSPCs provide real time feedback to vehicle diagnostic computers. Data reported from SSPCs can be used for system-level diagnostics and prognostics, enabling predictive, condition-based maintenance, thereby providing increased availability and continued mission readiness. Reported data, which includes the status of the on-board SSPCs, allows management computers to make advance determinations of pending failures of generators, batteries, wiring, connectors, and loads.

SSPCs provide a number of functional and performance advantages over electromechanical

DDC 16-Channel Solid State Power Controller Board

Solid State Power Controller Module

table 1

	Electromechanical Relay + Circuit Breaker	SSPC Channel
Voltage	28V	28V
Channel Current	25A	25A
Relay Coil Dissipation	1.86 W	--
Relay Contacts Dissipation	3.75 W	--
Circuit Breaker Dissipation	2.60 W	--
SSPC Voltage Drop	--	0.115V
Total Channel Power Dissipation	8.2 W	2.875 W

Channel Power Dissipation, SSPC vs. Electromechanical Switching

circuit breakers and relays.

DDC 16-Channel Solid State Power Controller Board

Weight and Volume

Relative to electromechanical switching, SSPCs provide advantages in the areas of weight and volume. From a system-level top-down perspective.

At a system level, this provides SSPCs an advantage in power-to-volume density of 7.3 to 1.

This provides SSPCs an advantage in power-to-weight density of about 4.6 to 1.

Avionic Certified

Latest Generation, Multi-Channel SSPC Architecture

Flight-Safety, Critical Architecture, Utilizes Redundancy and Fail-Safe features to ensure reliable Avionic PDU operation.

Reduced Wiring

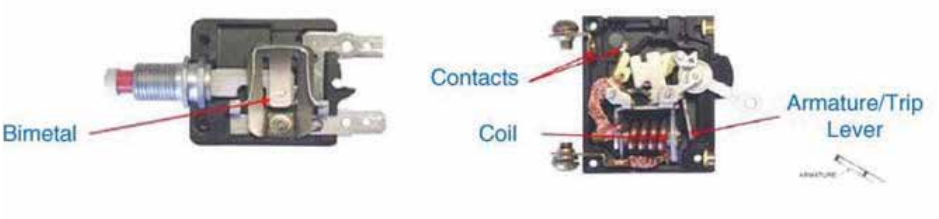
For either an aircraft or a ground vehicle, if load switching is performed using crew-accessible circuit breakers, then these must be located in the vicinity of the pilot or operator. This forces all power wires to be routed both to and from the location of the crew. Since SSPCs can be controlled over a network, their use eliminates the need to run power wires to and from the crew location, thereby saving weight and reducing fuel consumption.

Power Dissipation

SSPCs provide a lower thermal profile than circuit breakers. This is based on the low on-resistance of switching MOSFETs, whose affect can be further reduced by paralleling multiple MOSFETs and/or multiple SSPC channels for switching current to the same load. Further, solid state switching eliminates the power dissipated in the relay coils, solenoids, bimetallic strips, and contact resistances found in circuit breakers and relays. As a result, SSPCs provide a significant advantage in internal power dissipation relative to circuit breakers and relays.

Reliability

In terms of reliability, SSPCs provide significant advantages over electromechanical circuit breaker/



Breaker and Relay Internals

relay- based power distribution. The MTBF of a multi-channel SSPC board is an order of magnitude higher than that of a comparable implementation based on electromechanical circuit breakers and relays. Since SSPCs

Comparison Summary: SSPCs vs. Breakers and Relays			
Parameter	Electromechanical Breakers and Relays	SSPCs	SSPC Advantage
MTBF -- 16 channels (hours)	15,000	415,000	Increased platform power availability, reduced maintenance costs.
Switching power dissipation – one 25-amp channel.	8.2	2.9	Reduced power losses, smaller thermal profile.
System-Level: Power /Volume Density - Load watts per cubic inch	6.9	50.5	Frees up space for crew and/or equipment.
Bottom-up: Power /Volume Density - Load watts per cubic inch	70	219	
System-Level Power/Weight Density - Load watts per pound	194.8	960	Reduced weight translates to fuel savings.
Bottom-up Power/Weight Density - Load watts per pound	2745	6222	
Operation in high vibration environments.	Contacts can chatter, resulting in voltage outages and spikes.	Solid state switching ensures continuity of power to loads.	Improved quality and availability of power to loads.
Time to clear short circuit faults.	Tens of mS.	1 to 2 mS	Fast clearing of short circuits prevents damage to wiring, equipment, and vehicles.
Flexibility	Trip current is fixed. Maximum current varies depending on load type.	10:1 Programmable rated current. The maximum current is the same for all load types. Multiple SSPCs may be paralleled.	Power distribution equipment may be re-programmed for varying load scenarios.
EMI	Abrupt switching of load currents.	Controlled rise and fall times.	Reduced surge currents for switching into inductive or lamp loads. Reduced inductive spikes for power turn-off.
Status reporting.	None or minimal.	Report status, voltages, currents, and temperatures.	Provide inputs to system computers for prognostics, diagnostics, and improved system maintenance.

have no moving parts, they exhibit a far lower number of failure modes than circuit breakers and relays.

Breaker and Relay Internals

Some of the failure modes specific to electromechanical switching include:

- Contact resistances for relays and circuit breakers are subject to arcing, resulting in oxidation, erosion, and pitting, leading to increased contact resistance.
- The arcing resulting from opening breakers and relays switching into inductive loads can degrade contacts, resulting in contact erosion, and possibly welding.
- In high-vibration environments, electromechanical switches can chatter, affecting system operation. In addition, vibration can lead to material failure and misalignment.
- Armatures for thermal circuit breakers and relay coils dissipate power, resulting in additional heat and complicating system thermal design.
- For relays, high on/off cycling rates can lead to wear on moving parts, binding relay armatures, contact erosion, intermittent contact operation, and coil failures.

Short Circuit Instant Trip

The higher reliability of SSPCs relative to switches and breakers provides an improvement in protection and safety. In addition, following the occurrence of short circuit faults, SSPCs will clear in approximately 1 mS, while breakers and relays take 10 of mS to open. This added delay can lead to significant damage to wiring and equipment.

From a system reliability standpoint, the use of SSPCs enables automated redundancy, thereby allowing rapid restoration of power to vehicle and mission-critical loads following failures of generators, wiring, or other power system components.

Cost of Ownership

The use of SSPCs can reduce ownership costs based on multiple factors.

Load Flexibility

As platforms evolve to more electrical and electronic operation, there will be increased need to support multiple equipment configurations with varying power requirements.

Monitoring and Diagnostics

Solid State Power Controllers support multiple aspects of health management for ground vehicle and aircraft power and wiring systems.

- SSPCs provide autonomous circuit protection for faults such as short circuits and overloads. All Data

Survivability and Fault Tolerance

SSPCs provide many features contributing to the survivability and fault tolerance of platform power systems.

- SSPCs provide a significant increase in reliability over electromechanical breakers and relays. This contributes substantially to the survivability of ground vehicle or aircraft power systems.
- SSPCs can provide real time, internal and system-level diagnostics.

Conclusion

As can be seen, SSPCs provide a number of functional and performance advantages.

Nokia's Rise and Fall... and Maybe Rise Again

› Paul McLellan, Cadence

If you live in the US, then it is hard to believe how dominant Nokia was in mobile. For a time, one in every three mobile phones sold was a Nokia. But they were never a major force in the US for various reasons. But they built a million phones a day back when the market was around a billion phones per year.

The story of how Nokia rose from a forest product company to a leader in mobile phones has been written about many times and is a business school case-study.

But, like many other manufacturers such as Blackberry (then called RIM), they underestimated the impact of the iPhone. The mobile world changed in one hour in 2007 when Steve Jobs got on the stage and announced three new products:

The first one is a widescreen iPod with touch controls. The second is a revolutionary mobile phone. And the third is a breakthrough Internet communications device.

Of course they turned out not to be three devices, but just one. And a bewildered Starbucks barista named Hannah Zhang became the first recipient of a real call from an iPhone when Steve placed, and then canceled, an order for 4000 lattes to-go live on stage at YBCA. If you have never watched it, here is the video of the entire keynote, a piece of history captured in a little over an hour.

So what happened? Let's start the story in 2008. Under Nokia's then CEO Olli-Pekka Kallasvuo, Nokia had their first decline in revenue and profits. Handsets were still very profitable, it was their networking division which was struggling (ironically, that networking division is now the largest in the world, having swallowed Siemens' networking business, Motorola's networking business, and Alcatel-Lucent). Nokia's board brought in Stephen Elop from Microsoft to be CEO.

In a period of three years, Elop cratered Nokia's handset business. At the start of his tenure, Nokia's handset business was split 50:50 between smartphones and feature phones (AKA dumb phones). Dumb phones fell by a half during his tenure, which might be expected if everyone was switching from Nokia feature phones to Nokia smartphones. But they were not. Smartphones went down even more, by two thirds. All this during a period when the mobile business was experiencing very strong growth.

One of the really dumb things Elop did was to announce in early 2011 that future Nokia phones would no longer use their internal operating system Symbian (which was probably not up to running a modern competitive

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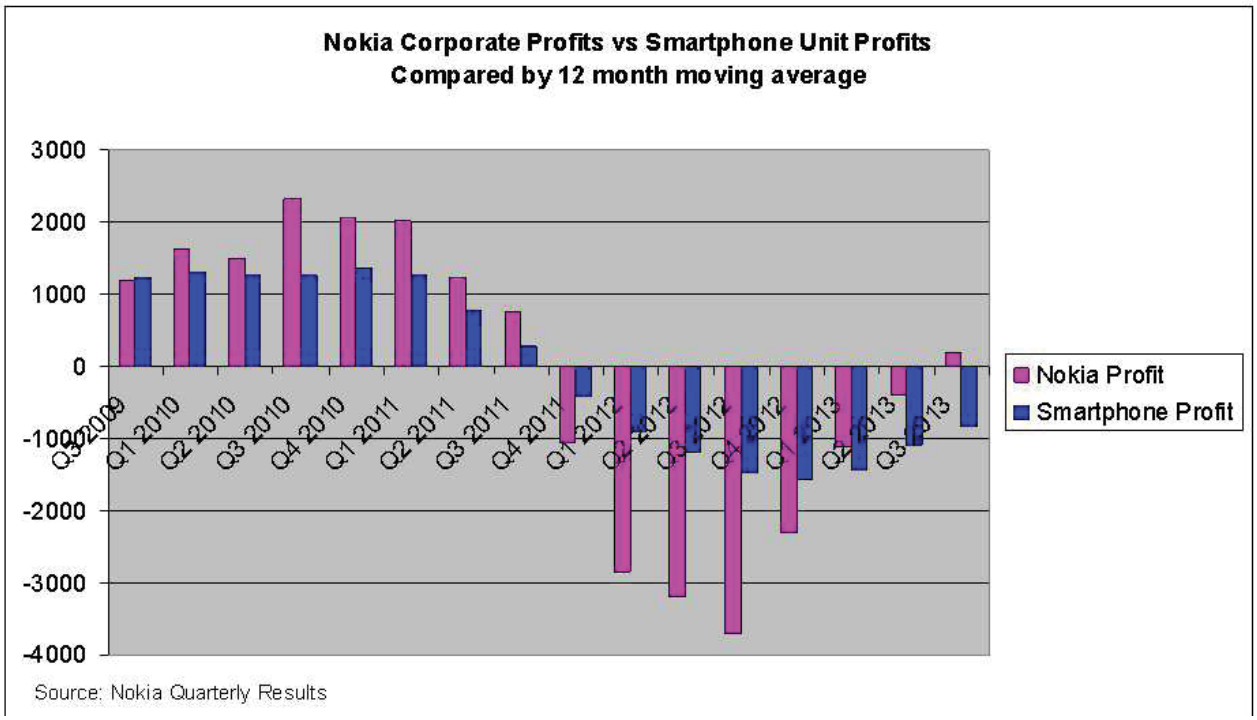


smartphone, which he also announced) but would use Microsoft's Windows Phone. This turned out to be a bad decision for a couple of reasons. The first is that when the announcement was made, Nokia didn't actually have any Windows-based phones available. And if the CEO says the current operating system is not up to scratch, the customers believe him.

Have you heard of the Osborne effect? It even has its own Wikipedia page. If you are old enough, you might remember that Adam Osborne had a very successful product, the Osborne 1, which was the world's first "portable" computer (it only weighed 24 lbs). He announced that the next product would be compatible with the IBM PC. Unfortunately, it hadn't been built, but the promise of it was enough that nobody in their right minds would buy an Osborne 1 in the meantime, and the company went bankrupt before it could deliver.

Well, a similar thing happened to Nokia. While waiting for those Windows-based phones to show up, sales of other smartphone products went down dramatically. People who were loyal to Nokia and wanted a smartphone couldn't get one so they either went to Apple or (mostly) to Samsung.

Nokia Corporate Profits vs Smartphone Unit Profits

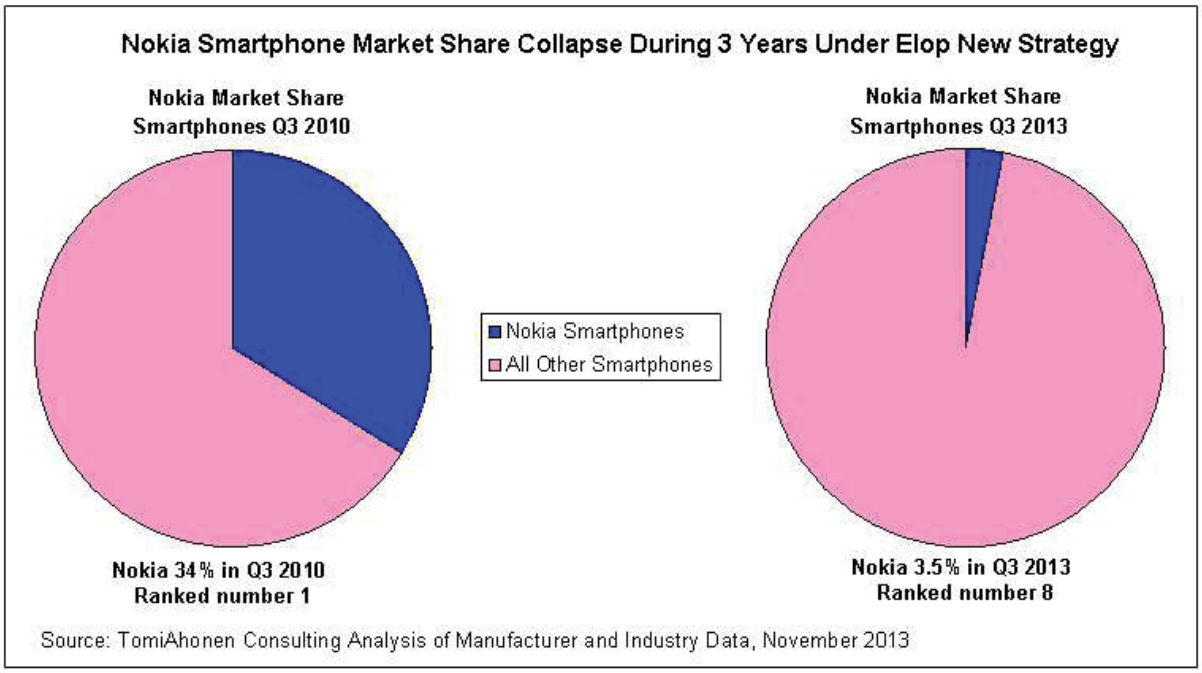
Suddenly Nokia was losing money in smartphones, something it had never done before, and losing a lot of money overall. And look at the date the trouble started, almost exactly to the day when the Windows Phone announcement was made.

But coming from Microsoft, Elop made another mistake. He brought in sales and marketing executives from Microsoft that he had faith in, but they all made the same mistake given their background. If you are selling PCs, then you build a good one and people go to Fry's or Amazon or wherever and buy it. Mobile is not like that. It is mediated by the carriers. Even Apple, when it came out with the iPhone, couldn't just pile up boxes in its own stores and sell them with a line around the block, they had a exclusive deal with AT&T since you can't sell a mobile phone without at least one carrier signing on. In the US, this is especially true since most handset sales take place through the carrier's own stores. The carriers hate Microsoft. They could look at the PC industry and see that control of the industry was lost to Microsoft (and Intel) and they were not going to let that happen to them.

Prior to Elop and his team arriving, Nokia had the best carrier relationships in the world. Afterwards, not so much.

Nokia Smartphone Market Share Collapse During Elop Strategy

Eventually, Microsoft purchased Nokia's handset business (leaving them with networks and mapping) in 2013 (deal closed in 2014) for $7.2B or so. But in some ways that made things worse,



since now the carriers were even less likely to want to work with Microsoft since they were not just the software supplier, they were the hardware supplier, too. The business continued to bleed away. With the obvious exception of Apple, the mobile industry had standardized on Android, and the Windows Phone market share went down to insignificant.

Conspiracy theorists surmise that Elop was "sent" by Microsoft to Nokia with two goals. First, to switch Nokia to Windows Phone so that their huge market share would jump-start Windows Phone and other manufacturers would want to follow. Second, having done that to deliver Nokia's smartphone business to Microsoft with a pink bow on top. Well, both those things happened but that doesn't make any of it a success.

Nokia phone Almost exactly a year ago, Microsoft realized that the acquisition had been a huge mistake. They wrote down the acquisition by $7.6B (around the acquisition cost) and laid off thousands more people.

In May this year, Microsoft gave up on the feature phone business and sold it all to Foxconn (the company that famously manufactures the iPhone, among other products) for $350M. They said they would continue to develop Windows Phone and support the Lumia smartphone brand, but it seems to me only a matter of time before they will be forced to give up on that too. They won't be coming back from their miniscule market share.

So why did I add "and maybe rise again" to the title to this post? Because just last month, Nokia announced that it would return to the smartphone business. Under the terms of the sale of the handset business to Microsoft, Nokia was barred from using the Nokia name to sell mobile phones, since Microsoft had a period of exclusivity. That period is up this year.

CEO Rajiv Suri announced that Nokia could design the smartphone (it still has resources in house, and after all the layoffs there are probably plenty of the old team left in Finland who could be rehired). Nokia doesn't have its legendary manufacturing facilities since Microsoft got those so it would license the design and the Nokia name to as yet unnamed partners. Maybe even, ironically, Foxconn, who could presumably also put the Nokia name back on the feature phone business it just bought from Microsoft. Nokia feature phones were legendary in places like Africa and South America for robustness and that name probably still has a lot of brand equity in emerging markets where smartphones are too expensive (for now).

Moreover, just as the carriers decided Microsoft would not be a success, maybe they will decide Nokia will be.

This story is not over yet.

Thanks to Tomi Ahonen who created the graphs from Nokia data and makes them freely available on his blog.

Samsung Partners with Emerging German Artists to Produce 'The Origin of Quantum Dot' Exhibition at IFA 2016

Samsung Electronics, the global TV industry leader, is elevating its presence at IFA 2016 with a special exhibition designed by a team of rising German artists. The installation, entitled The Origin of Quantum Dot, showcases the beauty of Samsung's SUHD TVs with Quantum dot display, while incorporating video, lighting and musical elements.

The Origin of Quantum Dot is a stained glass-inspired art installation designed by Andreas Nicolas Fischer, Schnellebuntebilder, Christopher M. Bauder and Kling klang klong. The artists came together from different creative backgrounds – including sound, media art and sculpture – to build the unique work of art. The piece contains 45 SUHD TVs and 9,000 shards of stained glass.

"We designed The Origin of Quantum Dot exhibition, the largest we've ever produced, so that visitors at IFA can directly experience the visual excellence of the premium SUHD TV with Quantum dot display," said HS Kim, President of the Visual Display Business at Samsung Electronics. "We are proud to have partnered with such talented, local artists to bring this visual concept to life."

Samsung's IFA Exhibition to Highlight Innovative Home Entertainment Features

The Rethink Zone, which is located in the center of the Samsung booth at IFA, introduces innovative products with convenient, functional features to make day-to-day life easier for consumers. Additionally, the zone will highlight how these products have impacted the home entertainment and appliance industries. Visitors will have an opportunity to learn more about Samsung's

SUHD TV with Quantum dot, the Serif TV and more.

At the Quantum dot Experience Zone, which is located at the entrance of the Samsung booth at IFA, visitors are invited to learn more about the past, present and future of Quantum dot. This will include more information on its durability, size and material, and color efficiency, as well as its future uses. Visitors will also be greeted by 45 SUHD TV models, ranging from 65- to 78-inches in size, as part of The Origin of Quantum Dot art installation.

In the Smart TV Zone, visitors can preview TV PLUS, the Video-on-Demand service scheduled for release in the United States during the fourth quarter, and Europe in 2017. Samsung previously launched TV PLUS in Thailand, Vietnam and Korea.

In addition to TV PLUS, several of Samsung's content partners, including 20th Century Fox, Warner Brothers, Amazon and Netflix, will introduce their HDR and UHD services. Various games that can be played without a console will be introduced as well. Gamefly, a streaming game service, is launching new games dedicated for Samsung Smart TVs every month, and at the upcoming IFA, visitors will be able to enjoy 2K's Borderlands and Bioshock at the site.

The AV Zone will feature a complete 4K entertainment experience, equipped with Samsung SUHD TVs, Ultra HD Blu-ray player (UBD-K8500) and the HW-K950 Soundbar featuring Dolby Atmos® technology. Visitors will have the opportunity to experience cinematic experience and harmony of Samsung's 4K home entertainment devices.

"As display technology and innovation through light emission has progressed over the last century, the utilization of Quantum dot technology has signaled a new era in TV history," said Kim.

The earliest principles of Quantum dot technology can be traced back to the Middle Ages, when stained glass windows were sought after for the way they emitted color through natural light. In the 1980s, Quantum dots were first discovered as display materials, utilizing ultra-fine semi-conductive particles 20,000 times smaller than a strand of human hair to emit different colors through light.

Quantum dots express a wider range of colors simply by varying the size of the particles. This allows Samsung's line of SUHD TVs with Quantum dot display to produce the most lifelike colors yet with a durable foundation that maintains the brightness and color of the displays.

TI reference design adds Wi-Fi capability to electric vehicle charging stations

Industry's first Wi-Fi® enabled EV charger reference design creates unique remote monitoring and charge control opportunities for home and public charging stations

Texas Instruments (TI) introduced the first reference design that adds Wi-Fi connectivity to an electric vehicle (EV) charging station. Electric vehicle owners will now be able to remotely monitor and control the charging of their vehicles from just about anywhere with Wi-Fi, presenting dozens of potential use cases from home automation to checking the availability of nearby public charge points. Download the new EV Charging Station with Wi-Fi reference design.

Battery technology advancements and government regulations have resulted in a growing number of new electric vehicles around the world. But vehicle makers still need more charging stations to make it easier for drivers to charge their vehicles. The new reference design uses TI's SimpleLink™ Wi-Fi wireless microcontroller (MCU) technology that allows design engineers to create stations that intelligently charge at non-peak times or detect and communicate when a charging station is available.

Faster, smarter charging

One barrier to widespread EV charging station adoption is the amount of time it takes to charge a vehicle. The reference design supports Level 1 charging, which is compatible with household outlets, as well as Level 2 EV charging, which helps vehicle owners tap into higher current (15A to 30A and higher) connections available in commercial office buildings. Level 2 chargers typically take up to eight hours to fully charge the vehicle if the owner wants to plug it in while at work.

Later this year TI plans to introduce a Level 3 EV direct-current charger reference design scalable to 600V and 400A that cuts charging time down to only 20-30 minutes - enough time to stop at a Wi-Fi enabled restaurant that has a charging station and charge the vehicle during lunch. Read the blog post, Electric vehicle charging stations are getting smarter and charging faster.

Key benefits of the EV Charging Station with Wi-Fi reference design:

Level 1 and Level 2 charge operation.

Wi-Fi connectivity support from any smartphone, tablet, computer or smartTV thanks to TI's SimpleLink Wi-Fi technology.

Power delivery up to 30 A, but expandable by using larger relays.

Expandable to support other applications such as payment, authentication and home automation design innovation.

Innovation from the vehicle to the charger

TI accelerates innovation for electric vehicles and EV charging stations with its comprehensive portfolio of embedded processors and analog technologies, proven system expertise and reference designs focused on faster time to market. Advancements in TI's battery management, current sensing, power management, analog signal chain and microcontroller products are leading to lighter electric and hybrid vehicles that can travel longer distances without the need to recharge. And once they do, TI helps make charging more convenient by enabling smarter stations that charge faster than ever before.

Find out more about TI and EV charging and wireless connectivity capabilities:

Get more information on TI's electric vehicle service equipment (EVSE) charging solutions for Level 1 and 2 and new designs for Level 3 charging.

Read the blog: Why you can't overlook Wi-Fi: It's the connectivity that's here to stay,

Download reference designs from the TI's reference design library.

1" x 1" Isolated Dc-Dc Converters Offer High Efficiency in a Rugged, Encapsulated Package

CUI Inc today added to its line-up of isolated dc-dc converters with the introduction of three new

encapsulated models ranging from 10 W to 30 W. The PDQ10-D, PDQ15-D and PDQ30-D output 10 W, 15 W and 30 W of power respectively in an industry standard 1" x 1" package, making them ideal replacements for larger 1" x 2" modules. The PDQ-D models also feature a 4:1 input voltage range of 9~36 or 18~75 Vdc with high typical efficiencies up to 90%.

Housed in a compact, low-profile DIP package with a five-sided, shielded metal case, the rugged, encapsulated modules measure just 25.4 x 25.4 x 10.16 mm (1 x 1 x 0.40 in) and come available with single regulated output voltages of 3.3, 5, 12 and 15 Vdc or dual regulated output voltages of ±5, ±12 and ±15 Vdc.

Thanks to its wide -40 to +105°C operating temperature range and encapsulated design, the PDQ-D series is suitable for convection-cooled equipment and harsh environments with target applications that include telecom, industrial, remote sensor systems and portable electronics.

All PDQ-D models offer an input to output isolation of 1,500 Vdc and feature remote on/off control while single output models also offer output voltage trimming that allows for a ±10% adjustment of the nominal output. Protections for over voltage, input under voltage lockout and continuous short circuit are also included.

The PDQ10-D, PDQ-15-D and PDQ30-D are available immediately with prices starting at $21.84 per unit at 100 pieces through distribution. Please contact CUI for OEM pricing.

Visit CUI's booth (Power Hall A2, Booth 613) at electronica 2016 where the company will be showcasing the three new PDQ-D series and the rest of their power portfolio ranging from 1 W to 12,000 W. electronica is the world's leading trade fair for electronic components, systems and applications, and will be held at the Messe München in Munich, Germany from November 8-11, 2016.

Vishay Introduces New Analog Switch Product Families Built on Advanced Silicon Process That Improves Analog Circuit Performance and Reliability

Vishay Intertechnology, Inc. (NYSE: VSH) today announced that it is upgrading several Vishay Siliconix analog switch products to boost device performance and longevity. Replacing aging silicon technology with an advanced process that improves a range of device parameters while ensuring a useful lifetime well into the future, the move signals Vishay's continuing support for its analog switch and multiplexer product lines, which the company pioneered in the 1960s.

The new enhanced family of analog switches and multiplexers introduced by Vishay Siliconix is designed on a high-density 18 V process. The process not only offers an upgrade path for customers using Vishay's current 12 V series products, but also enables Vishay to develop new precision analog products with higher complexity for sensitive analog designs.

Key improvements to device specifications include an increase of the operating voltage from 12 V to 16 V; lower leakage, reduced parasitic capacitance, and faster switching speeds; and enhanced ruggedness, with higher latch-up current and ESD protection ratings. For example, the new DG9408E and DG9409E — drop-in upgrades for the popular DG9408 and DG9409 — feature 20 % lower switch on-resistance, 10 % faster switching speeds, 35 % lower parasitic capacitance, enhanced latch-up capability to 400 mA, and guaranteed ESD protection to 2.5 kV (human body model).

Vishay is building the new devices on a mature process platform in an established facility with an eye towards shortening lead times and fully supporting the long life cycles of these analog switch products, which are widely used in such market applications as industrial control and automation systems, audio and video signal routing, instrumentation and test equipment, data acquisition, communication systems, and medical and healthcare systems.

"These new products are the first in a series of innovative analog devices that this new process enables. We're confident that customers who adopt these new products will see performance improvements in their precision analog circuit designs," said Roy Shoshani, vice president, power ICs at Vishay. "We know that our customers designing for applications such as industrial,

instrumentation, and healthcare require long product life cycles, and this new platform will support that while providing improved performance and ruggedness. In addition, improved manufacturing will result in shorter lead times, making product more readily available."

Samples and production quantities of the enhanced analog switch products are available now, with lead times of 10 weeks.

Dialog Semiconductor Enters Gallium Nitride (GaN) Market with First Integrated Devices Targeting Fast Charging Power Adapters

SmartGan™ DA8801 providing monolithic integration of GaN power FETS together with analog drivers and logic in an optimized, highly efficient 650V half-bridge design

Dialog Semiconductor plc (XETRA:DLG), a provider of highly integrated power management, AC/DC power conversion, solid state lighting (SSL) and Bluetooth® low energy technology, today announced and is demonstrating its first gallium nitride (GaN) power IC product offering, using Taiwan Semiconductor Manufacturing Corporation's (TSMCs) 650 Volt GaN-on-Silicon process technology.

The DA8801 together with Dialog's patented digital Rapid Charge™ power conversion controllers will enable more efficient, smaller, and higher power density adapters compared to traditional Silicon field-effect transistor (FET) based designs today. Dialog is initially targeting the fast charging smartphone and computing adapter segment with its GaN solutions, where it already enjoys more than 70 percent market share with its power conversion controllers.

"The exceptional performance of GaN transistors allows customers to deliver more efficient and compact power adapter designs that meet today's market demands," said Mark Tyndall, SVP Corporate Development and Strategy, Dialog Semiconductor. "Following our success in BCD-based power management ICs (PMICs), as an early GaN innovator, Dialog once again leads the commercialization of a new power technology into high-volume consumer applications."

GaN technology offers the world's fastest transistors, which are the core of high-frequency and ultra-efficient power conversion. Dialog's DA8801 half-bridge integrates building blocks, such as gate drives and level shifting circuits, with 650V power switches to deliver an optimized solution that reduces power losses by up to 50 percent, with up to 94 percent power efficiency. The product allows for a seamless implementation of GaN, avoiding complex circuitry, needed to drive discrete GaN power switches.

The new technology allows a reduction in the size of power electronics by up to 50 percent, enabling a typical 45 Watt adapter design today to fit into a 25 Watt or smaller form factor. This reduction in size will enable true universal chargers for mobile devices.

"As Dialog's strategic foundry partner for power management ICs for many years, we are delighted to have expanded our relationship to collaborate closely in bringing our GaN process to the mainstream consumer market for high volume applications," said Maria Marced, President of TSMC Europe. "Dialog's first GaN product delivers on the promise of GaN while bringing the integration to a higher level."

The DA8801 will be available in sample quantities in Q4 2016. More information on the DA8801 can be found here: http://www.dialog-semiconductor.com/products/DA8801

ROHM Introduces 16bit 'Tough' MCUs Optimized for Rechargeable NiMH Applications

Class-leading low voltage drive contributes to greater energy efficiency and performance in compact battery-driven industrial equipment

LAPIS Semiconductor, a member of the ROHM group, has announced the development of the ML620130 family of 16bit low power MCUs, optimized for compact industrial equipment requiring battery drive in noisy environments, featuring superior processing capability with low power consumption.

In addition to clearing the ±30kV noise measurement limit, operating voltage has been successfully reduced to 1.6V. Optimizing the operating voltage to an integral multiple of standard nickel metal hydride batteries (NiMH, 0.8V× 2=1.6V) ensures efficient use without wasting battery charge. This contributes to decreased battery consumption, prolonging battery life in portables and battery-equipped industrial equipment. The ML620130 family consists of 9 models offered in a variety of memory capacities, pin counts, and other characteristics that make it possible for users to select the ideal solution to fit set needs.

In recent years, the continued miniaturization of sensors, batteries, and power supplies has increased the demand for compact, low-cost modules (embedded substrates) that support a variety of applications and operating conditions. When considering different situations and usage methods there is a need to ensure stable operation under harsh environments (i.e. excessive noise, heat generation) while at the same time requiring improved performance such as greater communication diversification and generalization.

To provide increased miniaturization and lower costs, many applications are opting to eliminate noise and/or thermal countermeasures. However, this makes it difficult to balance the conflicting demands for increased environmental resistance while maintaining safety utilizing fewer external parts. In addition, reducing the size of the battery mounted in the module while also increasing battery life requires that the power consumption (voltage and current) be optimized for each application.

To meet these disparate needs, LAPIS Semiconductor has expanded its lineup of market-proven 16bit low power microcontrollers to include the ML620130 family of 'tough' MCUs that incorporate multiple functions optimized for battery drive operation.

Key Features

Optimized for ultra-low-voltage rechargeable nickel metal hydride batteries

The minimum operating voltage has been decreased, from the conventional 1.8V to 1.6V. This extends the supply voltage detection range down to 1.63V (typ.) – very close to the voltage of 2 nickel metal hydride batteries (0.8V×2=1.6V) – reducing the number of charge cycles and memory effects while prolonging battery life.[1]

Improves basic performance and reduces current consumption

16MHz CPU and 32MHz (PWM) peripheral clock operations increase performance by 2-fold over ROHM standard lineup of 'tough' MCUs, while operating current is reduced by more than 25%*.*Compared to typical published values

Class-leading high-accuracy on-chip oscillator eliminates the need for an external oscillator

A high-accuracy on-chip RC-type oscillator is built in (±1%@-20°C to ±85°C, ±1.5%@-40°C to +105°C). UART communication (asynchronous method), which has been widely adopted for a variety of uses as an interface for external equipment, is enabled throughout the entire temperature range without an external oscillator, reducing peripheral component costs. In addition, both full-duplex (×1ch) and half-duplex (×2ch) modes are allowed, and in the event that bidirectional communication is not required at the same time the 2 receiving terminals and 2 transmission terminals can be flexibly assigned, making it possible to mount on smaller boards.

Superior noise immunity

High noise immunity inherited from LAPIS Semiconductor's conventional lineup of low-power MCUs makes it possible to clear the ±30kV Level

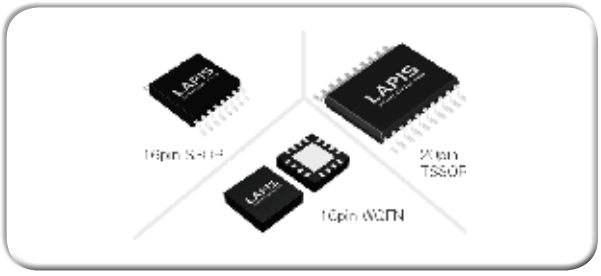
4 measurement limit (air discharge: ±15kV) of the IEC61000-4-2 standard (electrostatic immunity testing standard). In addition, implementing circuit enhancements related to power lines and noise intrusion pathways resulted in a 30% improvement in noise resistance (verified via indirect discharge using LAPIS Semiconductor's reference board under specific conditions).

Applications

Sensor modules, battery charge control, compact electric tools, portables, industrial equipment

Availability

The products are available.



Maxim's Industrial IoT Reference Design Speeds Development of Authenticated Data Chains

Highly secure coprocessor supports Arduino® and ARM® mbed™ platforms, assures easy prototyping

San Jose, CA – August 29, 2016 – Addressing the many issues related to system security in Industrial Internet of Things (IIoT) installations, the MAXREFDES143# embedded security reference design from Maxim Integrated Products, Inc. (NASDAQ: MXIM) provides protection against counterfeit sensor data, guaranteeing its authenticity and integrity along the entire data chain, from transducer to the cloud.

More information: http://bit.ly/MAXREFDES143

Block diagram: http://bit.ly/MAXREFDES143_diagram

The rapid growth of IoT capabilities for industrial applications comes with legitimate concerns about data integrity, due to deliberate corruption of critical sensor data anywhere between a source and the cloud. The reference design's sophisticated architecture and components, Arduino-compatible hardware interface, and ARM mbed libraries support simplifies development of secure, uncorrupted, and authenticated sensor-to-web data. It is ideal for analog sensor node and data authentication in factory automation and industrial processing applications.

The reference design's two-stage hierarchical architecture consists of a shield that communicates to a web server, and a protected sensor node for data acquisition and authentication. The shield includes a Wi-Fi module; a DS2465 secure coprocessor for offloading SHA-256 cryptographic computation; 1-Wire® and I²C interfaces; user-interface LCD, LEDs, and pushbuttons; along with alarm and logging functions. The sensor node contains a DS28E15 secure authenticator, DS7505 temperature sensor, and MAX44009 light sensor.

Key Advantages

Fast Time-to-Market: Significantly reduces development time using the provided hardware and source code to implement an authenticated node solution and web server interface

Ease-of-Use: Free evaluation web server provides an immediate out-of-the box implementation for real-time data collection and storage of sensor data

Secure: SHA-256 coprocessor offloads data authentication task; securely stores node authentication key; each node has a unique key

"The reference design is a powerful, much-needed tool for addressing the genuine issues of data security and authentication for Industrial IoT installations," said Scott Jones, Executive Director, Embedded Security, Maxim Integrated. "The reference design combines the shield and sensor node to offer a solution with a high level of security and minimal development start-up effort, and with low system-overhead burden."

"Enabling robust security and data integrity is critical to the continued adoption of IoT solutions," said Michael Horne, Vice President of Marketing and Sales, IoT Business, ARM. "The MAXREFDES143# simplifies testing with ARM mbed-compatible development boards, allowing designers to rapidly develop resilient industrial IoT platforms."

Availability and Pricing

The MAXREFDES143# IoT embedded security reference design is available for $75 at Maxim's website and select franchised distributors. Hardware and firmware design files are free and available online.

For information on other reference designs, visithttp://bit.ly/ReferenceDesigns.

congatec introduces highly flexible IoT gateway system

congatec, a leading technology company for embedded computer modules, single board computers and embedded design and manufacturing services, introduces its flexible IoT gateway solution. This new, highly flexible IoT gateway system is application ready and easily customizable for rapid field deployment. The congatec IoT gateway offers extreme levels of flexibility in terms of processing performance and software integration, able to host up to 8 wireless antennas that can be connected to 3 mini PCI Express slots and 6 internal USB based slots for wireless and wired connectivity modules. Customized system designs are also available upon request.

OEMs utilizing the conga IoT gateway system benefit from a pre-configured, pre-certified IoT gateway that can easily connect a wide range of heterogeneous sensors and systems to cloud-based services. Target uses include Industrial Internet of Things (IIoT) applications such as smart cities, smart agriculture, connected homes and vehicles, digital signage systems and other IoT applications.

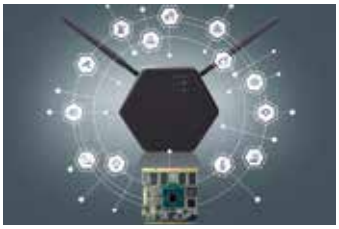
congatec's CEO Jason Carlson explains its application-ready-system strategy for IoT gateways: "The large and fast growing IoT market is well served by congatec's traditional embedded computer boards and module products, but OEMs are increasingly demanding IoT gateways that are complete, application-ready systems. To meet this growing need, congatec has designed a highly flexible and configurable gateway system that can be optimized to meet a wide variety of specific application demands. Together with our embedded design and manufacturing services, we can now meet any specific IoT gateway requirement." As well as the engineering and production of optimized IoT solutions, congatec's embedded design and manufacturing service also includes certification services, an increasingly essential element of deploying wireless technologies and edge devices that connect to carrier grade infrastructures.

The wireless connectivity of the congatec IoT gateway system is extremely scalable: 6 internal USB ports and 3 miniPCIe slots are available and able to support LTE 3GPP modems, 2x WI-FI, 2x LAN with PoE and PROFINET features, low power BlueTooth (BTLE) and 6LoWPAN. Other low power wide area networks including LORA, 3GPP, LTE-MTC, Sigfox or UNB can be supported upon customer request. This allows for maximum flexibility in supporting all major IoT connectivity requirements. The housing is equipped to mount up to 8 antennas supporting multiple wireless standards in parallel, while enhancing signal quality by utilizing antenna diversity. The small size (200x230x40mm³) metal housing is certified to IP53 protection class for outdoor applications.

In order to deliver optimal and rapid IoT gateway designs, congatec developed the system to support scalable computing performance utilizing Qseven modules, which range from the NXP single-core i.MX6 processor up to a quad core Intel Pentium CPU. The gateway also supports the upcoming next generation of Intel Atom processors (Intel code name "Apollo Lake") for deployment in emerging IoT gateway and edge computing application scenarios, up to and including high availability fog computing systems.

The congatec embedded board support packages cover all major operating systems – including Windows 10 IoT – to enable easier software integration. The congatec IoT gateway system also supports all the features of congatec's embedded board controller, which are a must for reliable IoT applications. Amongst other functions, the congatec feature set enables secure boot, management of Multi-Master I²C Bus, Multi Stage Watchdog, non-volatile User Data Storage, Manufacturing and Board Information, Board Statistics, as well as Power Loss Control.

Talk to your congatec sales representative today to discover how your IoT applications can be implemented using the congatec IoT gateway system.



IZT Unveils Next Generation of its High Performance Receivers

IZT GmbH expands its powerful RF receiver family introducing the IZT R5000. The next generation of high performance receivers combines up to 100 MHz instantaneous bandwidth with the proven excellent RF performance of the legacy IZT receivers. The R5000 covers the frequency range between 9 kHz and 18 GHz. Received signals will be available as high resolution spectrum data in combination with up to four configurable wideband I/Q data channels with user configurable sample rates and independent center frequencies.

The wideband channels provide I/Q data between 5 MHz and 100 MHz bandwidth. Additional 32 channels with up to 4 MHz bandwidth each can be used for narrowband monitoring, demodulation or analysis functionality in software. A dual 10-Gbit optical interface ensures adequate throughput in all operational scenarios.

The IZT R5000 gives system integrators direct access to the control and data interfaces, where the received RF signals will be available both in IQ and PSD format. When combined with the IZT Signal Suite Software, the new RF receiver also supports IZT's patented technique for frequency selective and dynamic recording of active portions of the spectrum. This feature results in a substantial reduction of required storage space.

"This new family of receivers uses latest digital signal processing technologies on a compact and robust hardware platform. This puts IZT in a leading position to address demanding applications, for example airborne direction finders or unattended outdoor nodes for spectrum monitoring or Time-Difference-Of-Arrival location finding" stated Rainer Perthold, CEO of IZT.

The IZT R5000 can be configured for TDOA (Time-Difference-Of-Arrival) and DF (Direction Finding) applications. Like the IZT R3000, the IZT R5000 series will be available in various configurations and mechanical form factors ranging from rack-based, single channel indoor applications to multi-channel direction finding receivers for outdoor or airborne applications.

Availability

The receivers will be available in late 2016. Initial models include both a 19-inch 1U unit for rack-based installations and a rugged mechanical variant for harsh outdoor environments.

BAE Systems develops laser airspeed sensor for aircrafts

In an aviation first, British scientists in Chelmsford have successfully trialled a highly accurate laser airspeed sensor for use in the next generation of high altitude aircraft which will increase survivability while improving performance and fuel efficiency.

The Laser Air Speed Sensing Instrument (LASSI) which is being exhibited at this year's Farnborough International Airshow sets itself apart from conventional methods as it accurately measures velocity even at low speeds.

Conventionally, air speed is determined using pitot tubes – which protrude from aircraft and sense variations in air pressure with speed. Although usually heated, these tubes are vulnerable to blockage in icy conditions. They could also be damaged by collisions with birds and when the aircraft is on the ground.

Operating on the same principle as roadside speed-guns, the new technique works by bouncing ultraviolet laser light off air molecules and measuring the change in 'colour' of the reflections caused by the Doppler Effect*. In layman's terms, the further away from the ultraviolet light the reflection is, the faster the aircraft is travelling. Although invisible to the human eye, the detector can identify minute changes in colour – which indicate the aircraft's airspeed.

Dr Leslie Laycock, Executive Scientist at BAE Systems said, "LASSI is a ground-breaking piece of technology which is challenging the conventional method of measuring air speed.

"Conventional air data sensors which protrude from the sides of aircraft must be carefully located to work

properly and are inaccurate at low airspeeds. LASSI can be located completely inside the aircraft and is accurate at low airspeeds. It can even measure negative air velocities. These features should ensure that the equipment is robust against damage, require less maintenance and be easier to operate at lower airspeeds.

"A significant benefit is that LASSI has the potential to detect air speed at a distance, meaning an aircraft could predict oncoming turbulence and change course accordingly."

BAE Systems has successfully trialled LASSI in a low speed wind tunnel and on ground vehicles. Engineers from the Company predict the component technology could be miniaturised and be in use within the next five years and are now investigating how it could be integrated in future aircraft.

e2v releases its first military temperature grade DDR3L memory solution

e2v has announced the release of its first DDR3L memory offering that operates from -55°C to 125°C for demanding applications.

The new memory device, EVMT41K128M16JT, is a 2Gb DDR3L SDRAM and has been repackaged by e2v to withstand harsh environments, usually encountered by aerospace and defense systems. Sized at just 8mm x 14mm with a minimum operating voltage of 1.35V, its impeccable design means that it can support system simplification in modern designs, while remaining backwards compatible with systems operating 1.5V DDR3 memory.

This DDR3L has standard 8n-bit prefetch architecture and is internally configured as an 8-bank DRAM. It has programmable read and write latency, with an incredibly fast access time of 1066 MT/s. Operating with a power consumption decrease of over 10% when compared to DDR3, it dramatically reduces power supply demands, system cooling requirements and potential packaging density.

Mont Taylor, Vice President of Business Development at e2v inc, commented, "We're excited to offer an advanced DDR3L memory solution with a military temperature range. The reduced power consumption and high performance satisfies the harsh demands of ruggedized embedded systems and helps reduce special cooling requirements."

e2v and Adeneo partner to create the world's smallest, multicore computer, for aerospace applications

e2v has partnered with French electronic design specialists, Adeneo, to develop an innovative, powerful and pocket-sized avionics computer weighing less than 300g.

The new computer from e2v and Adeneo, achieves its ultra-compact size by combining e2v'sprocessing expertise and Adeneo's state-of-the-art design and manufacturing capabilities. Adeneo has developed a three layer custom Printed Circuit Board design that integrates e2v's QT10A powerful processing solution to create a rugged, ultra-compact avionics computer.

The new COTS (Commercial Off The Shelf) avionics computer measures just 70 x 50 x 40mm, which offers both size and weight reductions in aerospace systems. Peripheral communications pass through avionic standard connectors that can be used in many aerospace applications, including Unmanned Arial Vehicles, and will be flight ready in 2018.

The QT10A, the heart of the computer, is the first product of e2v's Qormino™ family, combining an NXP QorIQ™ T1040 processor with 1GB DDR3L memory on a custom substrate,

creating a powerful processing solution.

Eric Marcelot, Marketing & Business Development Director, commented, “With the ever-growing SWaP (Size, Weight and Power) constraints within the aerospace market, we are proud to develop a powerful, ultra-compact computer that’s commercially available.”

François Sébès, President of Adeneo, added “Combining our core competencies with the benefits of e2v’s Qormino® in the computer design, we’re able to keep our competitive edge in developing innovative embedded computers.”

TI launches the first DDR memory-termination linear regulator for space applications

Texas Instruments (TI) (NASDAQ:TXN) today introduced the industry’s first double-data-rate (DDR) memory linear regulator for space applications. The TPS7H3301-SP is the only DDR regulator immune to single-event effects up to 65 megaelectron volts per centimeter squared (MeV-cm2), powering space-satellite payloads including single-board computers, solid-state recorders and other memory applications. For more information or to download the radiation report, see ti.com/TPS7H3301-SP-pr-eu.

Integrating two monolithic power field-effect transistors (FETs) for source and sink termination and an internal voltage reference, the TPS7H3301-SP is up to 50 percent smaller than a switch-mode regulator DDR solution. To see a live demonstration of the new regulator and learn about other products from TI’s leading-edge radiation-hardened portfolio, visit Booth 43 during the 2016 Institute of Electrical and Electronics Engineers (IEEE) Nuclear and Space Radiation Effects Conference (NSREC).

Key features and benefits:

Small size: At 0.16 square inches, the device is up to 50 percent smaller than a switch-mode regulator DDR solution, delivering critical weight and launch cost savings.

Superior radiation performance: Along with industry-leading immunity, the device withstands a total ionizing dose of up to 100 krad. Its stable termination power supply ensures that single-event effects do not impact read-and-write operations.

Easy design-in: Designers can pair the TPS7H3301-SP with the TPS50601-SP buck converter to create the smallest complete power solution for DDR memory. As with TI’s entire space portfolio, designers have access to a full suite of support resources, including comprehensive radiation reports, on-demand training and Simulation Program with Integrated Circuit Emphasis (SPICE) models.

Maximum export: The device is controlled under U.S. Department of Commerce Export Control Classification Number (ECCN) EAR99.

Tools and support to jump-start designs

Designers can reduce development time and quickly complete worst-case circuit analysis by downloading a full-capability linear regulator SPICE model.

Package, availability and pricing

The TPS7H3301-SP is available now in a 16-pin dual-ceramic flat package that is Qualified Manufacturer List (QML) Class V and 100 krad (silicon) radiation hardness assurance (RHA) qualified (5962R1422801VXC). You can obtain more information about this device from the Defense Logistics Agency. Please contact spacesample@list.ti.com for suggested retail pricing.

Learn more about TI’s proven space portfolio:

View the TPS7H3301-SP data sheet.

Watch a video about using the TPS7H3301-SP evaluation module to jump-start your design.

Read more about TI at NSREC on the Analog Wire blog.

Find helpful training content in the space and high reliability learning center.

Check out TI’s entire portfolio of leading-edge radiation hardened and assured products for space flight..

New NANO Li-Ion Battery Does not Catch Fire, Designed for Defense Missions

Many battery cells experience thermal runaway, a condition that results in damage from overheating. Kokam Company produced a new battery, composed of Nickel Manganese Cobalt (NMC), Lithium Titanate Oxide (LTO) and Lithium Iron Phosphate (LFP), to overcome this problem.

NANO battery technology is a new kind of lithium-ion battery that passed ballistic testing and was made to withstand temperatures between -40° and 60° Celsius. Batteries can experience thermal runaway from specific temperatures, but Kokam created a design that surpassed many factors.

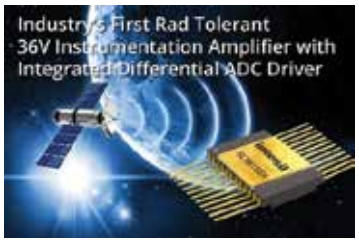
Kokam promises a longer life expectancy, greater safety, less recharge time, greater power delivery, and the ability to withstand harsh temperatures for its new battery. The real-world applications are endless, making the battery a good choice for government defense measures.

The lithium-ion battery was specially constructed for defense and aerospace missions. Its silent nature makes it a safer substitute for diesel and other types of engines, all while being available for volatile operations. The energy it provides makes it useful for many other applications as well.

The Kokam company has provided many other batteries as well over the past 26 years. In fact, it is widely respected across the world as being an environmentally-friendly provider of energy efficient solutions. Kokam also offers the Ultra High Power Nickel Manganese Cobalt (NMC) and Ultra High Energy NMC battery solutions for other types of government applications.

The Ultra High Power NMC battery solutions are applicable to high-tech weapons and military operations that garner a lot of power, while the Ultra High Energy NMC battery solutions are better suited for unmanned aerial vehicles, drones, and similar applications.

The cost productive NANO battery technology will hopefully open up other paths to safer battery alternatives in the near future. Especially with the rise of government-directed drone use, society might benefit from Kokam's future chemistry applications.



Intersil Introduces High Efficiency, High Current Buck-Boost Regulators for Battery-Powered Portables

Up to 96% efficiency and industry's lowest quiescent current makes new ISL91127 and ISL91128 ideal for low-voltage, battery-operated systems

Milpitas, Calif., Aug. 15, 2016 – Intersil Corporation (NASDAQ: ISIL), a leading provider of innovative power management and precision analog solutions, today announced the ISL91127 and ISL91128 high efficiency buck-boost regulators. The latest in Intersil's industry-leading buck-boost family, the new devices feature 4.5A switches, best-in-class efficiency up to 96%, and a compact footprint ideal for providing system power or powering the peripherals in battery-operated devices. They offer the industry's lowest quiescent current of 30µA for superior light load efficiency.

In hand-held device applications where the input voltage may be higher or lower than the output voltage, buck-boost regulators improve efficiency and provide longer battery life compared to a boost regulator plus bypass solution. With increasing demands for smaller and smaller footprints, Intersil's ISL9112x compact QFN and WLCSP packages enable power designs that maximize efficiency while providing flexibility and ease of design.

The ISL91127 and ISL91128 operate in buck, boost or buck-boost mode, depending on the relation between input and output voltages, and provide smooth transitions between modes to prevent noise and glitches. This capability, combined with patented Intersil technology for delivering superior light load efficiency with ultra-low quiescent current, maximizes efficiency under all conditions. This is essential to improve battery life by reducing power drain and heat dissipation in portable and mobile applications.

The new buck-boost regulators' wide input voltage range of 1.8V to 5.5V supports multiple battery topologies, and their wide output voltage range of 1V to 5.2V combined with 3A output current provide the ultimate in design flexibility. The ISL91128 also features I2C programmable dynamic output voltage adjustability, which eliminates feedback resistors and allows the reuse of the same design for multiple output voltage needs.

"Hand-held device designers are constantly challenged to create smaller, more efficient products whether it is the latest wearable, a portable medical device or next-generation smartphone," said Andy Cowell, senior vice president of Mobile Power Products at Intersil. "Intersil specializes in providing the most efficient power delivery with excellent transient response. Our latest buck-boost regulators leverage generations of experience in the most demanding mobile applications to provide customers with extended battery life in a compact, easy-to-use package."

Key Features and Specifications of ISL91127 and ISL91128 • 30uA typical quiescent current: the lowest of any high current buck-boost in the industry

• Up to 96% efficiency (PVIN = 3.6V, Vout = 3.4V~4V, Iout = 200mA)

• Output current up to 3A in boost mode (PVIN = 3V, Vout = 3.3V)

• Input voltage can range from 1.8 to 5.5V, output voltage can be adjustable or fixed at 3.3V • Full protection for under-voltage, short-circuit, and thermal faults to ensure safe operating conditions and reliable system operation

• ISL91128 offers I2C dynamic voltage adjustability for output voltage, and ringing suppression for superior EMI performance

The ISL91127 and ISL91128 can be combined with the ISL9003A, ISL9016, ISL9021A, and ISL9001A LDOs to support multiple output rails with improved ripple. They also work with the ISL9113 sync boost converter and ISL91133 boost regulator if additional higher voltage rails are required, and lower voltage rails are supported with the ISL9104 and ISL9103 sync buck converters.

Pricing and Availability

The ISL91127IR is available now in a 4mm x 4mm, 20-pin QFN package and is priced at $1.29 USD in 1k quantities. The ISL91127 is also available in a 20-bump, 2.15mm x 1.74mm WLCSP package priced at $1.25. The ISL91127IRN-EVZ fixed 3.3V evaluation board and ISL91127IRA-EVZ adjustable voltage evaluation board are available for purchase. For more information, please visit:http://www.intersil.com/products/isl91127.

The ISL91128 is available now in a 20-bump, 2.15mm x 1.74mm WLCSP package and is priced at $1.25 USD in 1k quantities. For more information, please visit: http://www.intersil.com/products/isl91128..

STMicroelectronics Introduces New Super-Junction MOSFETs including World's First 1500V Device in TO-220FP Wide Creepage Package

STMicroelectronics has introduced a portfolio of TO-220 FullPAK (TO-220FP) wide creepage power transistors, including the world's first 1500V super-junction MOSFET in this new important arcing-resistant package.

The TO-220FP wide creepage package is ideal for the power transistors of open-frame power supplies commonly used in equipment such as television sets and PCs, which are vulnerable to surface contamination by dust and particles that can cause high-voltage arcing between transistor terminals. The new package's extended lead spacing of 4.25mm eliminates the special potting, lead forming, sleeving, or sealing needed to prevent the arcing when using conventional packages with 2.54mm lead spacing. Power-supply manufacturers can now meet applicable safety standards and minimize field failures without applying these additional processes, thereby simplifying manufacturing and enhancing productivity.

While providing superior arcing resistance, TO-220FP wide creepage retains the outstanding electrical properties of the popular TO-220FP. Moreover, similar outer dimensions help streamline design-in and ensure compatibility with established assembly processes.

ST developed the TO-220FP wide creepage package by collaborating with its customer SoluM, a leading power manufacturer based in Korea. SoluM is using the

superior package to create new power solutions that are more robust and cost-effective than competing products. ST is currently ramping up production of TO-220FP wide creepage power transistors to support a major global television manufacturer. The product portfolio includes four fully qualified 600V low-RDS(ON) MDmesh™ M2 MOSFETs with current ratings from 8A to 34A. The 1500V STFH12N150K5 and 1200V STFH12N120K5, MDmesh K5 devices, will be qualified by the end of Q3 2016.

For further information please visit www.st.com/mosfet.

XP power launches high efficiency 40/50 Watt DC-DC converter series in compact 2 x 1 inch footprint

XP Power today announced the JWL and JSK series of regulated, highly efficient, typically up to 92%, metal cased 40/50 Watt DC-DC converters. Offering a variety of input voltage range and single or dual output combinations, both series fit the industry standard 50.8 x 25.4 mm footprint and pin outs. With their compact dimensions they are ideal for use in a broad range of mobile and portable board mounted applications that require a high power density, up to 50 Watts output and 1,500 VDC input to output isolation.

The 40 Watt JWL40 and the 50 Watt JWL50 both have two ultra-wide 4:1 input ranges offering 9 – 36 VDC or 18 – 75 VDC that cater for all popular nominal input voltages. The JWL40 features single or dual output models. Singles cover all popular output voltages in the range 3.3 to 24 VDC, and duals +/- 12 VDC or +/- 15 VDC. The JWL50 is a higher power single output version of the JWL40.

The JSK50 is a 50 Watt single output device that has wide 2:1 input voltage ranges of 9 – 18 VDC, 18 – 36 VDC and 36 – 75 VDC. Like the JWL40/50 series output models cover most standard requirements in the range from 3.3 to 24 VDC. The JWL50 and the JSK50 are equipped with a voltage trim function that allows adjustment of the output +/- 10% of nominal output in order to accommodate line losses or non-standard voltages.

All models can operate over the extended operating temperature range from – 40 to + 105 degrees C. An optional clip-on heatsink, specified when ordering (-HK), enables full power at an extended temperature range. Input to output isolation of 1,500 VDC is standard across the range. A remote on/off input pin allows control and sequencing of the converter from host applications.

The JWL/JSK series is available from Farnell, element14, Digi-Key, approved regional distributors, or direct from XP Power and come with a 3 year warranty.

Compact 1 W and 2 W DC-DC converters target medical applications

XP Power today announced the IMM series of 1 and 2 Watt DC-DC converters. The IMM01 1 Watt and the IMM02 2 Watt converters are designed for use in medical applications. Providing a 1500 VAC input/output isolation at a 250 VAC working voltage to facilitate a 1 x MOPP the single and dual output units are approved to the international medical safety standards ANSI/AMII ES60601-1, CSA 22.2 No 60601-1 and EN/IEC60601-1.

The IMM01 and IMM02 are available with a choice of two 2:1 input voltage ranges based around a nominal 5 VDC (4.5 to 9.0 VDC) and 12 VDC (9.0 to 18.0 VDC) inputs. Single output models provide the popular nominal outputs of +3.3, +5, +12 or +15 VDC. Duals provide the combinations of +/- 3.3, +/- 5, +/- 12 or +/- 15 VDC.

Packaged in industry standard SIP-7 or SIP-8 formats the units occupy very little PCB. The IMM01 uses a SIP7 footprint and measures 19.50 x 10.60 x 9.20 mm. The SIP8 2 Watt IMM02 is 21.85 x 10.60 x 9.20 mm. Capable of operating in most environments over the extended operating temperature range of – 20 to + 100 degrees C, the convection cooled units can deliver full power up to + 60 degrees C.

A remote On/Off input pin allows external control of the converter operation from a host application such as to sequence startup.

The IMM series is available from Farnell, element14, Digi-Key, approved regional distributors, or direct from XP Power and come with a 3 year warranty.

TI introduces the industry's highest performing reinforced isolated amplifier

Texas Instruments (TI) (NYSE: TXN) today introduced a reinforced isolated amplifier with the highest reliability, lowest power consumption, highest DC accuracy and improved overall efficiency compared to competitive devices. The AMC1301 is the newest addition to TI's reinforced isolation portfolio, which features the industry's highest working voltage specifications. With the lowest offset drift of 3 uV/C over the widest temperature range, -40C to 125C, the AMC1301 delivers the most accurate solution for shunt-based current sensing in high-voltage equipment, such as industrial motor drives, solar inverters, battery management systems and uninterruptible power supplies. For more information, see www.ti.com/AMC1301-pr-eu.

Key features and benefits

Highest reliability and longer lifespan: The AMC1301 is the industry's first isolated amplifier with a working breakdown voltage of 1,000 Vrms for a minimum insulation barrier lifetime of 64 years, which exceeds VDE0884-10 requirements. Like all of the isolated devices in TI's portfolio, the AMC1301 has no relevant lifetime degradation, unlike optical components.

Lowest power consumption: At 55 percent less high-side supply current and 45 percent less low-side supply current than competitive devices, the isolated amplifier improves power efficiency, simplifies power supply design and reduces thermal drift issues for a more efficient system design and improved performance.

Highest DC accuracy: With the lowest offset error maximum of 200 uV, the lowest offset drift and the best linearity of 0.03 percent, the AMC1301 enables engineers to design the most accurate system using an isolated amplifier over the widest temperature range, without having to compensate for DC and temperature drift errors.

Tools and support to ease design

TI offers the following tools to help designers quickly select, evaluate and design with the new AMC1301 reinforced isolated amplifier:

ATINA-TI™ SPICE model and TINA-TI reference design are available for the AMC1301 to help designers verify board-level signal-integrity requirements.

The AMC1301EVM evaluation module (EVM) is priced at US$49 and enables engineers to quickly and easily evaluate device features and performance to help speed time to market.

A TI Designs reference design is available, which allows designers to use the AMC1301 to jump-start design of a cost-efficient reinforced isolated power stage in three-phase inverters, with the benefits of reduced power supply requirements and protection against DC bus under- and over-voltage.

Technical support for the AMC1301 is available in the TI E2E™ Community Precision Amplifier forum, where engineers can search for solutions, get help, share knowledge and solve problems with fellow engineers and TI experts.

Package, availability and pricing

The AMC1301 is available today in a 5.85-mm-by-7.5-mm small outline integrated circuit (SOIC) package for US$2.90 in 1,000-unit quantities.

Optimize reinforced isolation design

For motor control or solar inverters, which require a signal and power across the isolation barrier, and a small form factor, the AMC1301 can be paired with TI's SN6505B, the industry's smallest transformer driver, to simplify isolated system design.

When used in conjunction with an isolated power supply, such as the LM5017 100-V dual-output DC/DC Fly-Buck™

converter, the AMC1301 prevents noise currents on a high common-mode voltage line from entering the local ground and interfering with or damaging sensitive circuitry.
The AMC1301 joins TI's broad isolation portfolio which combines highest isolation and performance for next-generation industrial and automotive systems that demand the highest voltages, reliability, immunity and performance.
Learn more from TI's reinforced isolation experts
Watch the "Industry isolation standards and the AMC1301 reinforced isolated amplifier" video to learn more about reinforced isolation.
Read the blog post, "Reinforced Isolation: When 1 is greater than 2" for more information on reinforced isolation basics.
Download the Isolation Glossary to learn common isolation terminology.
Read the white paper, "High-voltage reinforced isolation: Definitions and test methodologies" to learn more about high-voltage isolation.

The next level in operating cost savings – the new high-power transmitter from Rohde & Schwarz

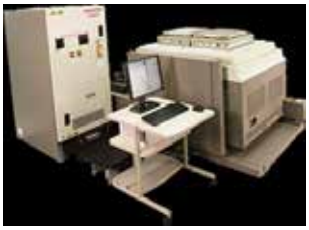
The R&S THU9evo UHF transmitter from Rohde & Schwarz represents the next level of development for the company's successful family of high-power transmitters. The new transmitter comes with further improvements in both energy efficiency and power density, allowing network operators to achieve even greater operating cost savings. The R&S THU9evo delivers maximum energy savings even during channel changes or when adjusting the output power. The intelligent R&S Efficiency Optimization feature automatically provides the most economical operation possible for every operating scenario.
Rohde & Schwarz is committed to making network operators' lives easier. Over the years, the company has incorporated innovative ideas and concepts into transmitter development, and the new R&S THU9evo liquid-cooled UHF high-power transmitter represents the next step toward minimizing operating costs. Rohde & Schwarz was able to leverage its many years of experience in Doherty technology, which is the key to the new transmitter's improved efficiency: up to 40 percent for COFDM standards and up to 43 percent for ATSC. The result is a reduction in energy consumption, which in turn lowers network operator costs. The transmitter delivers output powers from 1.5 kW to 96.5 kW for COFDM and from 1.65 kW to 106 kW for ATSC. At 17.4 kW (COFDM) and 19 kW (ATSC) per rack, it offers the highest power density on the market, which translates into enormous space savings.
The new R&S Efficiency Optimization feature minimizes energy costs for all types of operating scenarios. This feature proves its worth especially when adjusting output power or during channel changes. An intelligent algorithm, deployed at the press of a button or adaptively, optimizes amplifier parameters so that the transmitter achieves maximum energy efficiency at all times, resulting in the most economical system operation for every scenario.
The new R&S PHU903 high-power amplifier is the key to the excellent system efficiency. Unmatched by any other amplifier on the market, the R&S PHU903 provides maximum efficiency, combined with the capability to operate across the entire UHF range without any modifications. This is made possible by the R&S Multiband Doherty technology, which has been even further improved by Rohde & Schwarz. This technology ensures that network operators are optimally prepared for 700 MHz spectrum clearance and reallocation.
The new transmitter carries forward all of the proven strengths of the market-leading R&S THU9 platform. The R&S THU9evo retains the successful and proven R&S MultiTX concept along with the R&S Tx9 generation's intuitive GUI, which is closely aligned with user requirements and work habits.
The R&S THU9evo liquid-cooled UHF high-power transmitter is now available from Rohde & Schwarz.

Advantest's T5851 Tester Wins Best of Show Award at Flash Memory Summit

Leading semiconductor test equipment supplier Advantest Corporation (TSE: 6857) earned a Best of Show Award with its T5851 tester at the 11th Annual Flash Memory Summit, held August 9-11 in Santa Clara, Calif. The awards presented at the summit provide the highest honors in the flash memory and solid-state storage industry.

In the category of Most Innovative Flash Memory Technology, Advantest's T5851 system was recognized for changing the way flash memory is tested to improve the performance, availability, endurance and/or energy efficiencies of electronic products. The T5851 provides multi-protocol support in one tool for high-performance universal flash storage (UFS) devices and PCIe BGA solid-state drives, minimizing customers' capital investments and deployment risks. Its tester-per-DUT architecture and proprietary hardware accelerator deliver the fastest test times in the industry, contributing to a lower cost of test.

The T5851 is designed for high-volume testing, as well as reliability and qualification testing, of protocol NAND devices. This flexible system can be configured to test up to 768 devices in parallel by using an automated component handler such as Advantest's M6242 system.



Tektronix Begins Delivery of the IsoVu™ Optically Isolated Measurement System

Tektronix, a leading worldwide provider of measurement solutions, today announced that the IsoVu™ Measurement System previewed earlier this year at the APEC 2016 show is now shipping and available for worldwide delivery to customers. Pricing for the optically isolated measurement system starts at $12,000. For full details, go to http://www.tek.com/isolated-measurement-systems.

IsoVu Technology Combines 1 GHz Bandwidth, Wide Common Mode Range, with Superior Common Mode Rejection to Make Previously Hidden Signals Visible

The IsoVu™ platform uses an electro-optic sensor to convert input signals to optical modulation, electrically isolating the device-under-test from a Tektronix oscilloscope. The system incorporates four separate lasers, an optical sensor, five optical fibers, and sophisticated feedback and control techniques. The sensor head, which connects to the test point, has complete electrical isolation and is powered over one of the optical fibers. Ten patent applications have been filed for this ground breaking technology.

A critical advantage this technology offers for designers, such as those working on power devices involving GaN and SiC technologies, is superior common mode rejection that makes signals previously buried in common mode noise visible for the first time. IsoVu offers 1 Million:1 (120 dB) common mode rejection (CMRR) up to 100 MHz and 10,000:1 (80 dB) CMRR at 1 GHz. By comparison, competitive solutions at 100 MHz offer approximately 20 dB CMRR at 100 MHz, making IsoVu 100,000 times better. Using IsoVu, engineers can accurately measure small differential signals (5 mV – 50 V) in the presence of large common mode voltages from DC to 1 GHz. IsoVu is the first signal acquisition product where the common mode voltage capability does not de-rate over bandwidth. IsoVu technology is available in 6 models of the TIVM Series Isolated Measurement Systems with 200 MHz, 500 MHz and 1 GHz bandwidth configurations with either 3-meter or 10-meter fiber optic cable lengths. The 10-meter cable option offers the same performance specifications as the 3-meter option and allows users to move their test system away from the interference and radiated emissions of the device under test. With this option, IsoVu is well-suited for such applications as remote testing and EMI validation.

Tektronix Brings New HDR and WCG Support to Industry Leading Waveform Monitors

Tektronix, an industry-leading innovator of video test and monitoring solutions, today announced a field-installable software upgrade for its popular WFM/WVR 8000 series of waveform monitors and rasterizers, adding new support for monitoring High Dynamic Range (HDR) and ITU-R Recommendation BT.2020 Wide Color Gamut (WCG) formats. The upgrades, which will be demonstrated at the upcoming 2016 IBC exhibition in Amsterdam, assist camera operators, editors and colorists in easily and accurately capturing and reproducing highly realistic video image content that ultimately enhances consumers' viewing experience.

HDR/WCG formats are gaining new importance when it comes to acquiring high resolution 4K content. However, it can be challenging to adjust gamma levels for correct processing of high fidelity signals throughout the broadcast chain. A series of new graticules included with the HDR upgrade allow users to correctly set camera white points and adjust specular highlights to fully use the dynamic range of their content.

"Tektronix continues to expand the capabilities of the industry's most comprehensive waveform monitors and rasterizers while protecting our customers' investments in video monitoring equipment," said Charlie Dunn, general manager, Video Product Line, Tektronix.

The premier annual event for professionals engaged in the creation, management and delivery of entertainment and news content worldwide, the IBC exhibition is being held 9-13 Sept., 2016 in Amsterdam and is expected to draw more than 55,000 attendees from 170 countries and will feature products from over 1,600 exhibitors. Tektronix will be demonstrating its full range of industry leading video test and monitoring solutions in Stand 10 D41.

NI Announces World's First Application Framework for Massive MIMO to Speed Innovation in 5G Prototyping

NI (Nasdaq: NATI), the provider of platform-based systems that enable engineers and scientists to solve the world's greatest engineering challenges, today announced the world's first MIMO Application Framework. When paired with NI software defined radio hardware, this software reference design provides a well-documented, reconfigurable, parameterized physical layer written and delivered in LabVIEW source code that enables researchers to build both traditional MIMO and Massive MIMO prototypes.

The LabVIEW Communications MIMO Application Framework enables wireless designers to develop algorithms and evaluate custom IP to solve many of the practical challenges associated with real-world multiuser MIMO deployments. Scalable from 4 to 128 antennas, the MIMO Application Framework, when used with the NI USRP RIO and NI PXI hardware platforms, enables users to create small to large scale antenna systems with minimal system integration or design effort. Researchers can use the system out of the box to conduct Massive MIMO experiments and seamlessly integrate their own custom signal processing algorithms in a fraction of the time compared to other approaches, thereby accelerating the overall design process as the wireless industry races to define 5G.

As participants in NI's RF/Communications Lead User program, researchers at Bristol University have used NI's flexible prototyping platform for 5G research and recently announced in conjunction with Lund University a world-record 22-fold increase in spectral efficiency over modern day 4G networks.

Find more information on the new Massive MIMO Application Framework at www.ni.com/sdr/mimo.

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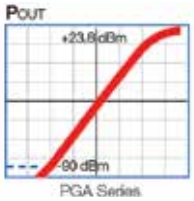

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