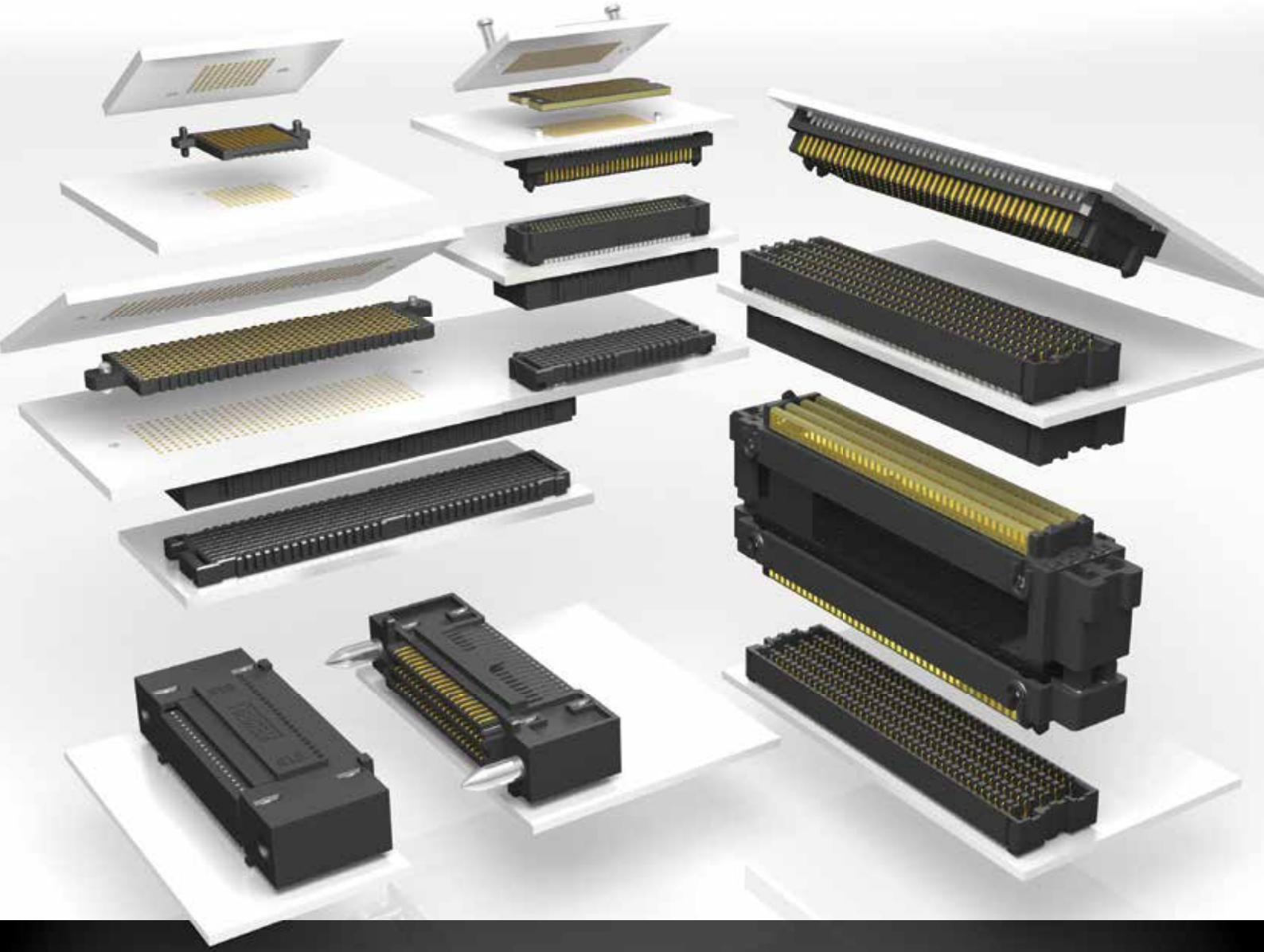
New-Tech Magazine Europe

February 2016

HIGH DENSITY ARRAYS



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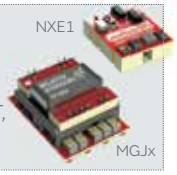

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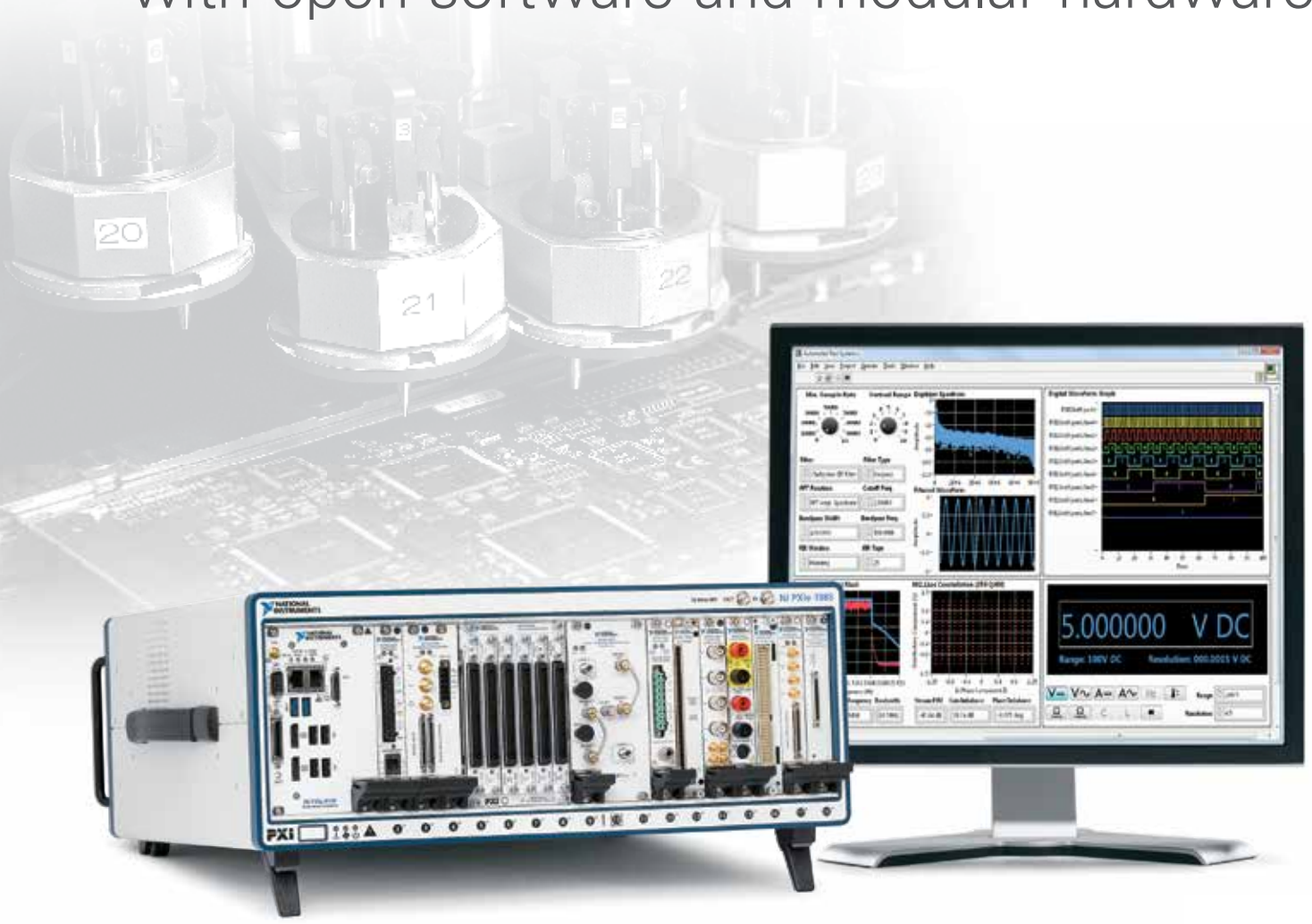

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New-Tech Europe

Read To Lead

February 2016

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About New-Tech Magazines Group

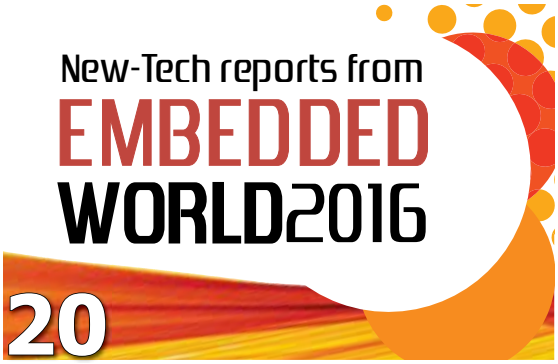
'New-Tech Magazines' A world leader in publishing high-tech and electronics, producing top quality publications read by tens of thousands professionals from all over the world especially from Europe, innovative electronics, IoT, microwave, homeland security, aerospace, automotive and technological industries.

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.

Contents

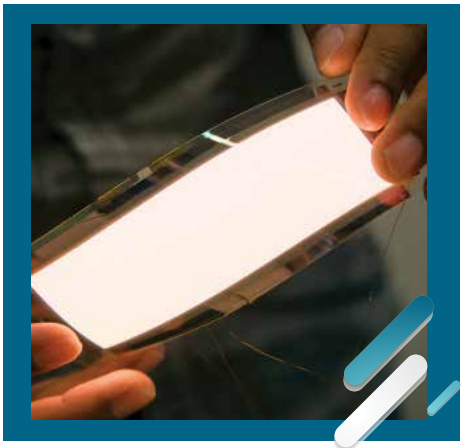


Latest News

Europe's best collaborate to create open access pilot line to accelerate the commercialisation of flexible OLED lighting

Europe's technology leaders in the development of flexible organic light-emitting diodes (OLEDs) for lighting and signage applications have joined together in a consortium to develop an open access pilot line that will accelerate the commercial adoption of this promising new technology.

The project titled 'PI-SCALE' aims to create a European-wide pilot line which will enable companies of all sizes to quickly and cost effectively test and scale up their flexible OLED lighting concepts and turn them into market ready products. The project is supported by the European Commission through the Photonics Public Private Partnership with a contribution of 14€ million.



flexible OLED lighting. Europe's technology

Flexible OLEDs have the potential to be integrated into formed parts or seamlessly bonded onto curved surfaces, and the commercialisation of this technology will open up a host of exciting design opportunities to create new value adding lighting products in many different application areas, such as architecture, automotive, aerospace and consumer electronics. The technology allows for ultra-thin (<0.2 mm), highly bendable, very lightweight, and even transparent, energy efficient lighting solutions that can be made or cut to any shape or size.

PI-SCALE will offer world class capability and services in the pilot production of customised flexible OLEDs and initially focuses on product streams in the areas of automotive, designer luminaires and aeronautics applications. Coordinated by the Holst Centre, PI-SCALE brings together fourteen expert partners from five European countries and includes the Audi AG, Centre for Process Innovation (CPI), VTT, Fraunhofer, M-Solv, FlexEnable, DuPont Teijin Films, Brabant Development Agency (BOM), REHAU, Emdedesign, Pilkington, Coatema Coating Machinery and AMIRES.

PI-SCALE will allow companies unique access to test and develop their specific applications at an industrial scale and thus achieve the product performance, cost, yield, efficiency and safety requirements that facilitate mass market adoption. The consortium will combine and utilise existing capability from each of the partners to create a self-standing, open access European flexible OLED pilot line.

SES-9 SUCCESSFULLY LAUNCHED ON SPACEX'S FALCON 9

SES S.A. announced that its SES-9 satellite was successfully launched into space on a SpaceX Falcon 9 rocket from the Cape Canaveral Air Force Station, Florida. SES-9 roared into space at 6:35 pm East Coast Time (00:35 am on 5 March Central European Time) and separated from the second stage of the SpaceX rocket 31 minutes later.

SES-9 uses a chemical bi-propellant thruster to conduct major post-launch manoeuvers, completing its journey to its orbit at 36,000 kilometers above the Equator with an electric propulsion system. The on-orbit maneuvering throughout the 15 year nominal lifetime of the satellite will be done entirely by electric propulsion. SES-9 is planned to commence its services in the third quarter of this year. SES-9 is SES's largest satellite to serve the Asia-Pacific region. It weighed 5.3 tonnes at the launch and has 57 high-power Ku-band transponders - equivalent to 81×36 MHz transponders' It thus provides significant expansion capacity to serve the buoyant and fast-growing video, enterprise, mobility and government sectors across Northeast Asia, South Asia, India, Indonesia and the Philippines. SES-9 will be co-located with another SES satellite, SES-7, at the prime orbital location of 108.2 degrees East, and will replace the NSS-11 spacecraft at that position. SES-9 was built by Boeing Satellite Systems International.

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	ZVE-3W-183+	5900-18000	35	2	3	1295
	ZHL-4W-422+	500-4200	25	3	4	1160
	ZHL-5W-422+	500-4200	25	3	5	1670
	ZHL-5W-2G+	800-2000	45	5	5	995
	ZHL-10W-2G+	800-2000	43	10	12	1295
•	ZHL-16W-43+	1800-4000	45	12	16	1595
•	ZHL-20W-13+	20-1000	50	13	20	1395
•	ZHL-20W-13SW+	20-1000	50	13	20	1445
	LZY-22+	0.1-200	43	16	30	1495
	ZHL-30W-262+	2300-2550	50	20	32	1995
	ZHL-30W-252+	700-2500	50	25	40	2995
	LZY-2+	500-1000	47	32	38	2195
	LZY-1+	20-512	42	50	50	1995
•	ZHL-50W-52+	50-500	50	63	63	1395
•	ZHL-100W-52+	50-500	50	63	79	1995
•	ZHL-100W-GAN+	20-500	42	79	100	2395
	ZHL-100W-13+	800-1000	50	79	100	2195
	ZHL-100W-352+	3000-3500	50	100	100	3595
	ZHL-100W-43+	3500-4000	50	100	100	3595

Listed performance data typical, see minicircuits.com for more details.

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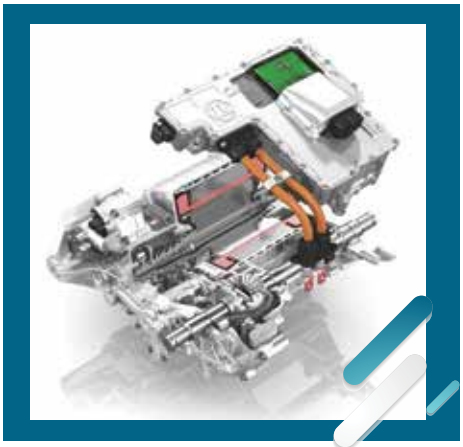
"SES-9 is an important building block in our strategy to grow in dynamic regions and four prime sectors - video, enterprise, mobility and government," said Martin Halliwell, Chief Technology Officer of SES. "Co-located with SES-7, the new satellite will reach 22 million TV homes and is designed to deliver high-performing connectivity to homes, enterprises and institutions across Asia. With its dedicated mobility beams, it will help us to capture new opportunities in the buoyant markets for maritime and aeronautical connectivity. The successful launch of SES-9 also takes us an important step further in our excellent relationship with SpaceX as a launch provider of growing importance, and is further proof of SpaceX's professionalism and impressive performance. I congratulate the SpaceX and SES teams, who together have done an excellent job."

ZF's Electric Axle Drive to Enter Volume Production in 2018

- First volume production application of a fully-integrated electric axle drive
- System for battery-powered, fuel-cell or hybrid electric vehicles
- Application for front and rear-wheel drive
- High power-to-weight ratio thanks to system integration of electric motor, transmission and power electronics



ZF's Electric's new electric drive

ZF has announced that its new electric drive system, which is based on a modular approach, will start volume production with a European vehicle manufacturer in 2018. A drive system which is positioned at the centre of the axle is at the heart of the drive and can be used for various vehicle and performance categories. The system features an electric motor configured as an asynchronous motor (ASM). With up to 150 kW, the unit sets new standards in terms of power-to-weight ratio. An electric motor, a two-stage single-speed transmission complete with differential as well as power electronics form a highly-integrated and extremely compact unit. The technology is suitable as an all-electric drive for battery-powered, fuel-cell or hybrid electric vehicles and is suitable for both front and rear axle applications. Production will take place in Schweinfurt, the headquarters of ZF's new E-Mobility Division; construction of the new production facility is already underway.

"ZF continues to proactively shape the future of electromobility. With the modular approach within our electric drive units, we are providing our customers with a tailored solution which at the same time is based on a high proportion of standard components," explains Jörg Grotendorst, Head of the new E-Mobility Division. "ZF's efficient and compact drive system demonstrates that the system integration of the transmission, electric motor and power electronics reflects a core competence that we can offer our customers from a single source." ZF already produces electric motors, axle drives and electronic control units individually in high volume. "Our first volume production award from 2018 reflects our capabilities and we will continue to consistently expand this systematic approach to solutions from the mild hybrid to the fully-electric drive" says Grotendorst.

ZF's new modular approach for electric axle drives covers a range of performance categories and installation lengths and can therefore meet various customer and vehicle segment requirements – from compact cars to light commercial vehicles. The drive systems can be used in hybrid electric, fuel-cell and battery-powered vehicles.

In an axially parallel electric drive module, ZF has integrated an electric ASM and a two-stage single-speed transmission with a differential, a housing and a cooling unit as well as power electronics including software. The motor and transmission share one housing, simplifying production and final assembly. The system generates up to 150 kW and the impressive maximum engine torque of 380 Nm is converted into a 3,500 Nm axle torque. Despite the integrated ASM, the compact drive system weighs a relatively light 113 kg. The entire unit has an axial length of around only 450 mm, a width of 380 mm and a height of 510 mm. Furthermore, the compact design naturally uses fewer materials and requires less installation space. This makes it easier for vehicle manufacturers to integrate the system into different vehicle architectures.

Horizon Nuclear Power Announces the Appointment of Duncan Hawthorne as Chief Executive Officer

Horizon Nuclear Power Limited (Horizon), a wholly owned subsidiary of Hitachi, Ltd. (TSE:6501), announced the appointment of Mr. Duncan Hawthorne as Chief Executive Officer, effective May 1, 2016. He joins as the company continues to progress its lead Wylfa Newydd project, which will generate enough secure, reliable low carbon electricity to power five million homes.

Mr. Hawthorne is an internationally known and widely respected nuclear industry leader who joins Horizon following a 15 year period as President and Chief Executive Officer of Bruce Power L.P. in Canada which operates one of the world's largest operating nuclear facilities. A Scottish born and educated engineer, Mr. Hawthorne has held a wide range of leadership positions in the UK, United States and Canada. He served as Chair of the World Association of Nuclear Operators (WANO) Atlanta Centre and until recently was President of WANO's Governing Board. His contribution to the Canadian energy sector was also recognised when he was awarded Energy Person of the Year by the Energy Council of Canada. In addition, he has been on Horizon's Board of Directors since 2013.

Mr. Hawthorne said, "I am very pleased to be joining this organization which has ambitious plans for the future and I hope to be able to add my experience in plant operations and leadership to help complement the many talented people who already are part of the Horizon workforce. I will be building on the strong progress made to date under Alan Raymant's leadership and I look forward to working with him and the team, to ensure this success continues."

Mr. Tatsuro Ishizuka, Deputy Chairman of the Board, Hitachi Europe Ltd., Chief Executive of the Nuclear Power System Business in Europe and Chairman of the Board, Horizon Nuclear Power Limited said, "We are delighted to have someone of Mr. Hawthorne's experience and background in nuclear operations lead our activities in the UK. Mr. Hawthorne brings to us experience gained from many years in the UK nuclear Industry and this combined with the international operation, project development and commercial activities he has been involved in for the last 20 years makes him the perfect choice for Horizon".

Mr. Katsumi Nagasawa, Vice President and Executive Officer, President & CEO of Power Systems Company of Hitachi, Ltd. said, "With the Horizon project now entering an important new phase, we are delighted to have recruited someone of Mr. Hawthorne's reputation and experience to lead us forward. Our ABWR design is a tried and tested technology and will play a crucial role in helping the UK meet its energy goals of secure, reliable and low carbon power. The appointment of someone of Mr. Hawthorne's calibre is a tangible demonstration of our commitment to succeed in this vital project".

Finnish Electric Buses Serve as Mobile Testing Platforms in the Helsinki Region

Finnish electric buses will soon be acting as development platforms for smart mobility services in the Helsinki region, used for boosting the creation of new user-centric solutions and product development of businesses.

The Living Lab Bus joint project, coordinated by VTT Technical Research Centre of Finland and launched at the beginning of 2016, uses the Finnish electric buses acquired by Helsinki Region Transport as concrete development and testing platforms for businesses to validate their solutions in a real use environment. The buses can be used for testing user-oriented smart services and technologies, ranging from user interfaces and passenger services to sensors and transport operators' solutions.

"The goal is to create a new type of everyday development environment for accelerating the product development of businesses by means of agile experiments, in close cooperation with end-users and research institutions. Potential new solutions include easy-to-use passenger feedback solutions, automated passenger counting, and automated road condition observations," describes VTT Project Manager Raine Hautala.

"Helsinki Region Transport expects the project to provide a flood of fresh ideas that will bring joy to passengers and make bus travel more appealing. Developing smart

mobility services may be the order of the day, but Helsinki Region Transport is equally drawn to innovations designed to go in the cabin space," says Reijo Mäkinen, Director of the Transport Services Department at Helsinki Region Transport.

In addition to the Helsinki region, the City of Tampere is also participating in the project, exploiting the results in its own public transport development.

The project supports the creation of new services for transport service users and providers, and the business operations of companies are promoted by accelerating the cost-effective introduction of new solutions. The Living Lab Bus acts as a display window for showcasing Finnish expertise, while also increasing the attractiveness of public transport and cooperation between various players, as well as producing new research information on the needs of public transport users and service developers.

Identifying utilisation interests and needs of various players associated with implementing and using the development platform and setting some common rules for the operations are scheduled for spring 2016. After that, the project will be expanded by bringing in new players, who will utilise the platform in their development activities.

The three-year Living Lab Bus project comprises the projects of Ajeco (secure multichannel communications), Cinia One (cloud services and interfaces), EEE Innovations (smart transport ICT solutions), Foreca (weather and road weather services), iQ Payments (mobile payment solutions) and Linkker (electric bus), as well as the supporting research projects by VTT, Aalto University, University of Tampere and Tampere University of Technology. The enablers, supporters and utilisers of the project are Helsinki Region Transport, the City of Helsinki, the City of Tampere and Tekes – the Finnish Funding Agency for Innovation.

Intelligent Mobile Access Simplifies Smartphone Use for Vodafone

Vodafone Germany, in cooperation with Cisco and Chemring Technology Solutions, has completed a trial demonstrating how smartphone users can more easily access the Internet via a Wi-Fi or mobile data connection, thanks to a new intelligent mobile access solution solution.

This innovative solution aims to ensure that customers always use the best available access technology. To achieve this, the solution can switch between the mobile and Wi-Fi networks, depending on which provides the best user experience, based on time or location, as well as the load on the mobile or Wi-Fi networks. This also avoids common issues when logging into portals, as well as slow or inactive Wi-Fi connections. This approach will make poor Wi-Fi connection a thing of the past.

Selection of the best access technology is based on intelligent algorithms and rules which take into account location, time and current measurements on the customer's smartphone. Furthermore, it includes historical data, which makes it possible to make a decision based on congestion trends. Customers are also able to set preferences to, for example, connect automatically to his or her preferred Wi-Fi at home or in the office.

The pilot ran in three German cities, leveraging Network Intelligence Software from the Cisco Policy Suite and intelligent device software for Android and iPhone smartphones from Chemring Technology Solutions. The intelligent device is responsible for applying the policy rules, as well as ensuring the connection quality by running performance measurements of potential Wi-Fi and mobile networks in the background. These measurements report back to the network in order to identify trends for the different hotspots. Furthermore, the intelligent device takes care of the login process to Wi-Fi hotspots.

This helps Vodafone, a provider of fast, high-performance fixed and mobile networks, push ahead with the integration of its mobile and Wi-Fi infrastructure. Customers would benefit from simpler, trouble-free use of their devices while maintaining the same high, stable connection quality.

Arrow Electronics at The Embedded World 2016

The Embedded World 2016 was a successful event for Arrow Electronics with more than 2500 customers going through the booth , 8 sessions of technologies and 12 special lectures from top supplier

NEC Honors NXP with "Partner of the Year" Award

NXP Semiconductors N.V. (NASDAQ:NXPI), the global leader in smart connected solutions, announced that NEC Corporation, a leading provider of solutions enabling mobile broadband services for Japan and other major markets, awarded NXP with "Partner of the Year" for 2015 in the Key Components & Modules category. NEC recognized NXP for its contribution to speeding time-to-market for NEC LTE-Advanced base station technology.

NEC leveraged NXP's total solutions approach to helping customers quickly address market requirements. NEC combined NXP's multicore QorIQ communications processors, LTE wireless software stack and extensive technical support to help NEC get to market with next-generation LTE-Advanced base station products six months ahead of schedule.

NXP's multicore QorIQ communications processors deliver optimal blends of performance, power efficiency and scalability, enabling customers to design highly advanced, high-density base stations.

"The mobile market requires high-performance solutions that support rapidly expanding data rates and end-users, and this is driving strong demand for fast delivery of our next-generation base station products," said Nobuhiro Endo, NEC President. "We look forward to continuing to work together with industry-leading suppliers like NXP, which provide valued expertise resulting from its longtime track record of commitment to the networking segment."

Nobuhiro Endo (left), President of NEC Corporation, with Noy Kucuk (right), Vice President, Product Management, Digital Networking for NXP Semiconductors.

"We are honored to receive this prestigious award, as well as NEC's recognition of our commitment to speeding time-to-market," said Tareq R. Bustami, Senior Vice President and General Manager of NXP's Digital Networking business unit. "This award underscores NXP's total product solution portfolio, our outstanding technical support, and our innovative QorIQ processors."

Latest News

Samsung Introduces World's Largest Capacity (15.36TB) SSD for Enterprise Storage Systems

First revealed at the 2015 Flash Memory Summit in August, the 15.36TB SSD is based on a 12Gb/s Serial Attached SCSI (SAS) interface, for use in enterprise storage systems. Because the PM1633a comes in a 2.5-inch form factor, enterprise storage managers can fit twice as many of the drives in a standard 19-inch, 2U rack, compared to an equivalent 3.5-inch storage drive.

the industry's largest solid state drive the "PM1633a," a 15.36 terabyte drive

"To satisfy an increasing market need for ultra-high-capacity SAS SSDs from leading enterprise storage system manufacturers, we are directing our best efforts toward meeting our customers' SSD requests," said Jung-bae Lee, Senior Vice President, Memory Product Planning and Application Engineering Team, Samsung Electronics. "We will continue to lead the industry with next-generation SSDs, using our advanced 3D V-NAND memory technology, in order to accelerate the growth of the premium memory market while delivering greater performance and efficiency to our customers."

The unprecedented 15.36TB of data storage on a single SSD is enabled by combining 512 of Samsung's 256Gb V-NAND memory chips. The 256Gb dies are stacked in 16 layers to form a single 512GB package, with a total of 32 NAND flash packages in the 15.36TB drive. Utilizing Samsung's 3rd generation, 256-gigabit (Gb) V-NAND technology which stacks cell-arrays in 48 layers, the PM1633a line-up provides significant performance and reliability upgrades from its predecessor, the PM1633, which used Samsung's 2nd generation, 32-layer, 128Gb V-NAND memory.

Samsung's new PM1633a SSD provides the opportunity for significant improvements in the efficiency of IT system investments through its high storage capacity and exceptional performance. These performance gains stem from Samsung's latest vertical NAND (V-NAND) flash technology, as well as the company's proprietary controller and firmware technology.

The PM1633a SSD sports random read and write speeds of up to 200,000 and 32,000 IOPS respectively, and delivers sequential read and write speeds of up to 1,200MB/s. The random read IOPS performance is approximately 1,000 times that of SAS-type hard disks, while the sequential read and write speeds are over twice those of a typical SATA SSD. Inside the new SSD lie Samsung's advanced controller units that support the 12Gb/s SAS interface, along with a total of 16GB of DRAM. Samsung also uses specially designed firmware that can access large amounts of high-density NAND flash concurrently.

The 15.36TB PM1633a drive supports 1 DWPD (drive writes per day), which means 15.36TB of data can be written every day on this single drive without failure, a level of reliability that will improve cost of ownership for enterprise storage systems. This drive can write from two to ten times as much data as typical SATA SSDs based on planar MLC and TLC NAND flash technologies.

Xilinx Invests in Neural Network Startup

FPGA vendor Xilinx has invested in TeraDeep Inc. (Santa Clara, Calif.) a developer of convolutional neural network architectures as part of a Data Center Ecosystem development program.

The program is aimed at emerging workload applications such as machine learning, image and video processing, data analytics, storage data base acceleration, and network acceleration. However, the size of the investment by Xilinx Technology Ventures was not disclosed.

TERADEEP develops Deep Learning Software and Hardware solutions to accelerate the runtime of Convolutional Neural Networks and Recurrent Neural Networks resulting in more scalable solutions for datacenter applications.

Nokia malware report shows smartphones now account for 60% of infections in the mobile network

Nokia Threat Intelligence Lab report shows iOS-based malware appears on top 20 list for first time with XcodeGhost and FlexiSpy.

Android malware more than doubled in last six months of 2015 and is becoming increasingly sophisticated and persistent.

Report examines rising threats through mobile ransomware.

Espoo, Finland – Nokia Security Center Berlin, powered by Nokia Threat Intelligence Lab, today released research findings showing that in the mobile networks, smartphones pulled ahead of Windows(TM)-based computers and laptops, now accounting for 60% of the malware activity observed in the mobile space. The Nokia Threat Intelligence Report also reveals an increase in iOS-based malware, growing sophistication of Android malware and the rising threat of mobile ransomware.

The report examines general trends and statistics for malware infections in devices connected through mobile and fixed networks. Data is aggregated where Nokia malware detection technology is deployed, with more than 100 million devices covered.

Click to Tweet: Nokia's Threat Intelligence Lab report shows smartphones responsible for 60% of malwarehttp://nokia.ly/1Qc5SOn #telcosecurity

Nokia Threat Intelligence Report at a glance:

Due to a decrease in adware activity, the overall infection rate in mobile networks declined from 0.75% to 0.49% on Windows-based PCs connected to the Internet via a mobile network in the second half of 2015. Adware is a software that automatically displays or downloads advertising material (often unwanted) when a user is online.

In the same time period, smartphone infection rates increased and now account for 60% of infections detected in the mobile networks.

Android continues to be the main mobile platform targeted

For the first time since the report began, iOS-based malware – including XcodeGhost and FlexiSpy – is on the top 20 list. In October 2015 alone, iPhone malware represented 6% of total infections.

The XcodeGhost malware was injected into apps through a compromised software development kit that was used by Chinese developers to create legitimate apps distributed via the Apple App Store. Apple has removed these apps from the Apple Store, but some malware remains active.

Ransomware – malware that effectively holds a device hostage by encrypting data and then locking it – like CryptoLocker has been around for a while on Windows PCs, but 2015 saw several varieties attacking Android, as well. Recovery can only be achieved by paying the attacker a ransom fee via a prepaid cash voucher or with bitcoins.

Mobile malware is becoming more sophisticated in the techniques it uses to persist on the device. It is becoming very difficult to uninstall and can even survive a factory reset.

DSP Group to see revenue boost from Samsung S7 chip win

Multimedia chip designer DSP Group on Monday confirmed a report by Chipworks that its HDClear chip is a component in the new Samsung Galaxy S7 phone, a deal expected to significantly boost the company's revenue.

The D4A1 HDClear chip allows for more accurate "always-on" voice recognition while suppressing background noise. Handset makers and mobile operators are working to improve the quality of sound through increased adoption of always-on and other advanced processing technologies and DSPG is expected to benefit from this trend.

People look at the new Samsung S7 during the Mobile World Congress in Barcelona, Spain February 23, 2016. REUTERS/ALBERT GEA

Ottawa-based Chipworks, which provides reverse engineering services and technical analysis, did a "teardown" of the S7 last week and posted on its website the components of Samsung Electronics' new handset, including DSPG's chip.

Revenues for DSPG from S7 sales in March alone are expected to amount to $2-$3 million. Analysts estimate DSPG earns between 70 cents to $1.00 for every HDClear chip sold.

BMW Group introduces self-driving robots in Supply Logistics

Munich/Wackersdorf. Plant Wackersdorf supplies the BMW Group's international assembly and production sites with car parts. In the hall of Supply Logistics, a self-driving robot maneuvers itself underneath a roller container with parts. Silently and with flashing lights, it picks up the container and begins to move through the logistics hall. The system is complicated and extensive; nobody can find their way around without a good sense of direction. But this is no problem for the transport robot, which is about the size of a suitcase. Flanked by radio transmitters and equipped with a digital map, it drives independently to the destination of the goods. When tugger train cross its path, a fitted sensor identifies the obstacle and stops the self-driving robot with car parts loaded weighing up to half a ton.

BMW Group's self-driving robots in Supply Logistics

Digitization is essential for production

In terms of smart logistics, the BMW Group is promoting innovative and trend-setting logistics systems: "The development of the Smart Transport Robot is an important milestone for the BMW Group when it comes to digitization and autonomization in production logistics. This innovation project makes an important contribution to the agility of the supply chain in Logistics and Production. It enables the supply chain to adapt to changing external conditions quickly and flexibly," comments Dr. Dirk Dreher, Vice President of Foreign Supply at the BMW Group.

Autonomous navigation in Supply Logistics

Measuring its distance to three radio transmitters allows the robot to calculate its exact position and route. With the help of sensors, it identifies critical situations and can respond accordingly, sharing the route with people and other vehicles. At a later point when the innovation is being implemented in series operation, a 3D camera system will make navigation even more accurate.

The transport robot will be able to function without the floor-mounted induction loops for navigation and will move freely within the space. The battery-powered radio transmitters mounted to the walls of the hall can be expanded to further areas in logistics flexibly without major effort and at low costs.

For the BMW Group, a self-driving robot tailored to meet the demands of the company's supply logistics and production supply is a top priority. Besides custom-fit measurements for the containers to be transported, the vehicle also has sufficient battery capacity as the developers have drawn on the experience gained with BMW i: batteries previously fitted in BMW i3 vehicles are being sustainably reused. This BMW i3 battery module will provide eight hours' worth of energy, covering a full shift.

Pilot project is being transferred to series operations this year

Imec and BESI Successfully Demonstrate Long-Term Reliability of PV Module Based on Ni-Cu-Ag Plated Solar Cells

Drunen (The Netherlands) and Leuven (Belgium), at the SiliconPV conference, nano-electronic research center imec and Besi, a leading manufacturer of assembly equipment for the semiconductor industry, announced that they have demonstrated long-term reliability of their 60-cells Ni/Cu/Ag plated solar module, passing 600 thermal cycles, three times the IEC61215 specification, with only minimal power loss of one percent. The module consists of 60 front side laser ablated and Ni-Cu-Ag plated p-type Cz-Si cells. The plating was done in an industrial Meco vertical plating tool (Direct Plating Line) followed by annealing in an inline belt furnace. Cells were interconnected using a standard solder and lamination process. Thermal cycling tests (-40°C to + 85°C) carried out on the full 60 cell module resulted in an overall power loss of only one percent after 600 hours—three times the standard IEC61215 test protocol. Previous damp heat testing on 30 cells in mini modules successfully passed 1.5X standard IEC61215 specification. These test results prove the long-term reliability potential of imec's and Besi's Cu-plated cells and modules, as they have now outperformed the industrial standard for reliability, which requires less than five percent loss relative to initial power after 200 thermal cycles or 1000hrs damp heat testing.

"We are very pleased with this superb result", says Richard Russell, prinicpal scientist at imec.

Intelligent Systems

DragonBoard™ 410c

This DragonBoard™ 410c based on 96Boards™ specification features the Qualcomm® Snapdragon™ 410 processor, a Quad-core ARM® Cortex™ A53 at up to 1.2GHz clock speed per core, capable of 32-bit and 64-bit operation.

DragonBoard 410c supports Android 5.1 and Linux based on Ubuntu at launch with planned support for Windows 10 and offers advanced processing power, WLAN, Bluetooth, and GPS, all packed into a board the size of a credit card. It is designed to support feature-rich functionality, including multimedia, with the Qualcomm® Adreno™ 306 GPU, integrated ISP with up to 13 MP camera support, and 1080p HD video playback and capture with H.264 (AVC).

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New-Tech reports from EMBEDDED WORLD2016

Hila Bazari, New-Tech Europe

2016 Embedded World Exhibition in Nuremberg, Germany was the world's biggest exhibition of its kind for the international embedded community. As I traveled through the aisles I saw a variety of new products that just got launched by the hundreds of exhibitors, I chose a few to focus on in this article.

MSC

MSC introduced us for the first time with the SMARC 2.0. The SMARC 2.0 module MSC SM2S-IMX6 is based on the NXP™ i.MX6 system-on-chip and ranges from quad-core to single-core performance. The MSC SM2-MB-EP1 platform board comes in the popular Mini-ITX format and allows access to most features of the new SMARC 2.0 standard. MSC Technologies is a member of the SGeT (Standardization Group for embedded Technologies) and has worked with other leading embedded companies to create SMARC 2.0 (Smart Mobility ARChitecture) which is intended to be the best and most future-proof standard for small form-factor embedded modules, and equally suited for ARM/RISC CPUs and x86 processors. MSC is the first to launch the new SMARC 2.0 and more companies are on the way to release similar products.

Congatec

Congatec, a leading technology company for embedded computer modules, single board computers (SBCs), embedded design & manufacturing (EDM) services presented at its booth its new innovations. Later at the press conference Congatec appointed a design service company named Technagon as a sales technology partner to strengthen its portfolio of customer-specific system design & manufacturing services for point-of-sale (POS) and ticketing systems, vending machines and systems, digital signage and eMobility applications.

Samtec

At Samtec's booth I got to see some of their innovations starting from the advanced IC Packaging division, the Z-Ray® micro array interposers which are ultra-low profile, high density, highly customizable solutions for board-to-board, IC-to-board, and cable-to-board applications. I was introduced to the FireFly™ Micro Flyover System™, the first interconnect system that gives a designer the flexibility of using micro footprint optical and copper interconnects interchangeably with the same connector system.

NXP

NXP's Smarter World Tour Started its journey in Europe, Paris on Jan.07. The Smarter World Tour is a highly visible, 36 ton,


AMD


E26


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EMBEDDED

2 level, fully mobile semi-truck trailer designed by Luigi Colani which turns into a large and spacious mobile tradeshow. The aim of the NXP Smarter World Tour in Europe is to allow NXP to engage with their customers, partners, as well as universities and communities, and let them discover and experience first-hand the breadth of innovative solutions and technology expertise of the new NXP. The truck features 138 connected demonstrations on-board, highlighting technologies and products that are driving the Internet of Things (IoT) today and connected products of tomorrow, from the world's smallest microcontrollers to the most complex networking infrastructure through the most secured NFC solutions. At the Embedded World exhibition I got to see this massive truck and all of NXP's innovations. Among all other developments NXP Semiconductors N.V has announced how its Near Field Communication (NFC) solutions can drive innovation for embedded system designs in the smart home, access management and home banking as part of the company's vision to drive a new era in NFC. The company released its NTAG I²C plus, which extends the family of connected tag solutions that combine passive NFC with an I²C interfaces well known for enabling NFC commissioning, simple "tap-to-connect" communications between smart devices to the home network. NXP also introduced the QorIQ LS1012A processor, delivering enterprise-class performance and security capabilities to consumer and networking applications, all in a package size normally associated with microcontrollers, and the AXP family of logic translators, designed for low-power and high-performance applications. Another big news release from NXP was the world's Smallest Integrated Single Chip System for the Internet of Things, Customers can now purchase the i.MX 6Dual and i.MX 6Quad single chip system module (SCM), ideal for space-constrained products which require big processing power and functionality. The SCM line of products integrate the i.MX 6Dual or i.MX 6Quad applications processor, a fully featured power management system, memory and additional design simplifying components into a tiny 17mmX14mmX1.7mm package (1GB version-the size of a U.S. dime.

AMD

AMD announced its 3rd Generation AMD Embedded G-Series SoCs and the Embedded G-Series LX SoC, providing customers a broadened portfolio of performance options. The latest offerings expand developers' ability to scale x86 platforms, starting with the entry-level AMD Embedded G-Series LX SoC, which is pin compatible to the previous generation G-Series SoC devices. in adittion two new, higher performing 3rd Generation AMD Embedded G-Series SoCs, codenamed "Prairie Falcon" and "Brown Falcon," were announced as well, these introduce for the first time pin Compatibility for GSeries processors with the higher performance AMD Embedded R-Series SoC. These new products expand upon the low power capabilities of the award-winning AMD Embedded G-Series SoC platform, bringing scalable performance, power, and price across the CPU, GPU, multimedia, and I/O controller hardware, helping to lower development costs for AMD customers. Together, the new G-Series processors deliver immersive, graphically rich experiences across a broad range of platforms, from entry-level to mainstream gaming, digital signage, imaging, and industrial control.

ANALOG

The leading technologies and embedded solutions that MSC presented were in the fields of; Healthcare - Wearable Health Monitoring and IOT Powered By ADPD103 (Universal Optical Front-End) The Heart Rate Measurement is supported by the ADPD103 Analog Devices' Universal Optical Front-End. It takes care of the entire receive-and transmit-signal chain and communicates over I2C. To reject motion artifacts, the ultra-low power ADXL362 3-axis Motion sensor is included. The sensor board for Ectrodermal Activity (EDA) and Galvanic Skin Response (GSR) is based on a discrete analog front-end to maximize performance at minimum power dissipation. In addition the field of Motor Control and Power Conversion presented A joint Analog Devices and Innovasic effort, this demonstration shows the real-time Ethernet network connectivity for field devices. Analog Devices' reference designs provide precision, high performance measurement and diagnostic capability for the temperature and pressure transmitter designs. In the field of instrumentation they presented Multichannel Data Acquisition System for Ultra Low Power Applications Powered by ADP5090 Energy Harvesting Ultra Low Power Boost Regulator and in the field of Industry 4.0/IoT the launched the Loop-Powered Sensor Nodes Diagnostic and Asset Control with HART-Enabled Data Communications The demo shows a range of 4-20 mA loop-powered, HART enabled field instruments connected to a HART enabled analog input card. It provides the capability at the system level to monitor the process variables as well as assess instrument health with additional diagnostic and status information through HART, all within the tight power constraints of the 4-20 mA loops.

NI AWR Design Environment

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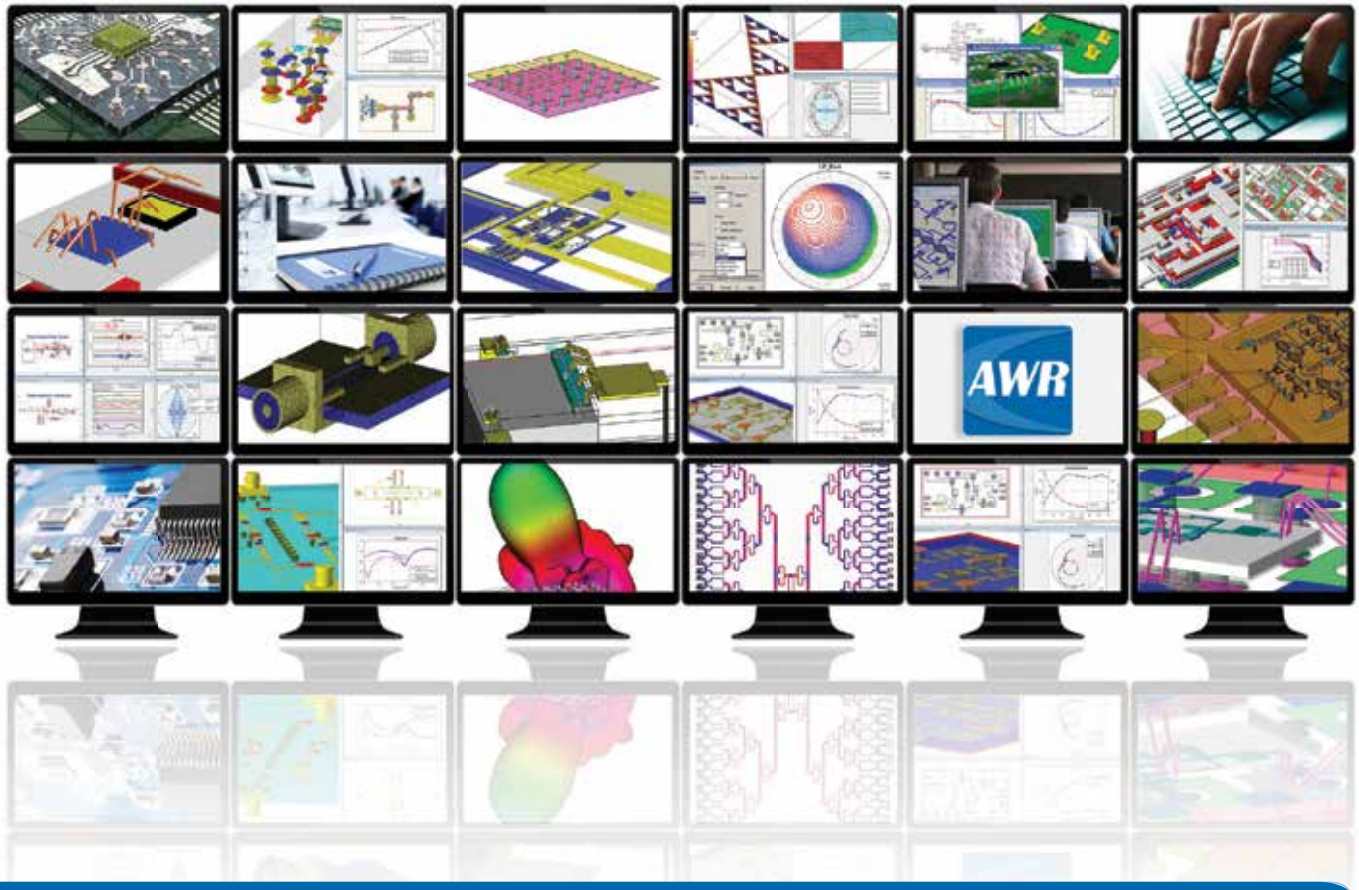

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V12 NI AWR Design Environment redefines the term "user productivity" for designers of MMICs, RF PCBs, modules, and more. With the addition of new amplifier, radar, and antenna specific features, expanded third-party flows for EM, stability analysis, and DRC/LVS, as well as additional speed and ease-of-use enhancements, it's never been easier to streamline your design process, improve your end-product performance, and accelerate your time to market. Display NI AWR Design Environment on your desktop today. Get started at awrcorp.com/v12.

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NATIONAL INSTRUMENTS™

Don't Get Caught Out By Changing Energy Efficiency Regulations

› Jeff Schnabel, CUI Inc.

While the harmonization of energy efficiency standards is an obvious goal that benefits international trade, the existence of various regulatory bodies around the globe continues to make this a game of leapfrog. Currently, in the sphere of external power supply efficiency, Europe leads the world with the most stringent legislation that implements the Level V Marking Protocol. However from February 10, 2016 the baton will pass to the USA whose Department of Energy will then require all domestically manufactured or imported external power supplies to meet the new Level VI Efficiency Standard.

Consequently it is imperative that any manufacturer of equipment that relies on external power supplies, and whose product might be destined for the US market, is aware of these regulatory changes in time to ensure compliance without disruption to its supply chain. This may seem obvious but it's not necessarily the reality of the situation, as we'll see from the case study below of a European manufacturer whose products end up with American customers through a variety of sales channels.

What's Different in Level VI?

This is the immediate question a European manufacturer, aware of EU Phase 2 efficiency standards for external power supplies and the Level VI Marking Protocol, needs to understand. Superficially it might seem that an equipment maker who just bundles an external power supply with its end product simply needs to procure a Level VI compliant power adapter to ship to its US customers after February 10, 2016.

Of course, life's never that simple! The scope of the new regulations is broader and the specifications are more complex than the previous Level IV and Level V requirements. For example, multi-output power supplies and supplies rated at over 250W are now included, meaning the legislation will embrace more applications than before and extend into areas not typically thought of as portable equipment, such as lighting installations that use external power supplies.

Other, less obvious, implications arise from the tighter efficiency limits and the way that Level VI now segments the different classes of external supply, with separate specifications for AC/DC and AC/AC, and distinguishes between low-voltage types that output less than 6V and basic-voltage types with outputs greater than 6V. For the system vendor this may force a different choice of adapter to kit with its equipment, which if nothing else may have different mechanical dimensions to the previous unit even if the essential electrical parameters (voltage and current ratings) remain unchanged. In many instances simply re-engineering power supply designs to meet the tighter efficiency specifications is likely to result in a larger form factor.

Case Study: ASH Technologies

ASH Technologies is an Irish company located in County Kildare, just south

Figure 1. ASH Technologies' Inspex 1080p inspection system uses an external power supply

Figure 2. CUI's Level VI compliant 50 W Desktop and 18 W Multi-blade Wall Plug Adapters

of Dublin, that has been designing, manufacturing and supplying low-vision aids for over 20 years. Its product line includes handheld, portable and desktop magnifiers serving the needs of people with visual impairments. These help with close proximity tasks such as reading, writing and similar activities although devices with integrated cameras can also help with distance vision challenges, for viewing live events or simply watching TV. More recently ASH has applied its technology to industrial applications with digital imaging solutions for product inspection in quality assurance and failure analysis. These include both handheld and desktop digital microscopes, with 90% of its production being exported through distributors to global markets, including the USA.

As many of ASH's products, especially the desktop units, either require or can be used with external power supplies it is clear the company needs to offer Level VI compliant adapters if it is to continue serving the US market. And it probably makes sense to bundle the same compliant adapter regardless of where the product is shipping to minimize stock-keeping issues and the risk of a non-compliant kit ending up in the wrong place.

However it wasn't until early-September this year (2015) that ASH became aware of the impending Level VI regulations. As ASH's Design Engineer, Brian Heffernan, explained, "It was only when a CUI sales representative paid us a visit that we first heard about Level VI. The immediate concern this raised was what we needed to do to ensure continuity of supply to our customers, knowing that aside from how long it might take us to qualify new adapters our normal procurement lead-time is 12 weeks."

What was also of concern to ASH was subsequently learning that its incumbent suppliers were both aware of Level VI yet seemingly had neglected to inform ASH about the changing legislation and how it might affect them. Indeed those suppliers showed no sense of urgency in terms of developing compliant adapters - their respective sales people both assuming they would have product in time.

Needless to say, ASH has not been so complacent. It has worked closely with CUI to identify suitable Level VI compliant replacements for the 50 W desktop and 18 W multi-blade wall plug adapters that it ships with its digital microscope products. ASH currently has samples of these new units being tested in its laboratories. As its R&D director, Martin Cahill, told us, "We have satisfied ourselves that these units meet all our normal performance requirements and are comfortable we have a solution with CUI. We still have EMC testing to conduct and ASH also needs to complete self-certification for safety, load testing and regulation but none of these requirements should be an issue. Then we will be in a good position to seamlessly transition to Level VI compliant kits without any disruption to supply."

Conclusion

There are various "takeaways" from this story. First is the concern that the message about the upcoming legislation relating to changes to the energy efficiency regulations for external power supplies isn't reaching the systems companies who are buying in adapters to accompany their equipment. Secondly it's evident that some manufacturers of such power supplies seem to have a rather laid-back attitude towards the timeline dictated by the new standards. But on the plus side CUI at least has been championing the cause for some while now, having begun introducing Level VI compliant adapters since late 2014. So, the final message is, "Don't be complacent, act now and don't be caught out by the new rules."

Three new developments for smarter sensor chips

› Nick Van Helleputte

Sensors have evolved from simple measuring tools to smart appliances that are connected through the internet to the cloud and to each other. At the recent ISSCC-conference, researchers from imec & Holst Centre have presented a number of remarkable developments. These may pave the way to a world where sensors assist us to drive more safely, live more healthy, and make the planet more sustainable.

Sensors become the senses of our environment

Our environment will slowly but surely evolve into an 'Internet of Things', where chips and sensors are integrated invisibly in the environment to assume their manifold tasks. Think of sensors that detect the presence of individuals and adapt the light in a building accordingly, resulting in serious energy savings. Those sensors will be, in a sense, the eyes, ears, and noses of our environment.

Ubiquitous sensors will make their mark in many domains. Smart buildings, of course, but also self-driving cars and automated industrial and logistic processes. And, essential for a more sustainable future, sensors will be of great help to tackle environmental issues. If we are able to measure the quality of air and water continuously and in a fine-grained way, and we can collect the data centrally, it may be possible to take better-directed actions, and immediately measure the results.

But also in the domain of healthcare, there are great opportunities. Think of simple tools such as weighting scales, blood pressure monitors, or heart and activity monitors that will send their data (secured!) to the cloud. There, the data may be analyzed and become the basis for new services to coach patients to lead a healthier life. This type of connected healthcare is already applied on a small scale with high-risk patients. But as the technology becomes smarter and cheaper, it could serve many more.

Sensors will have an influence in many sectors. Here are some artist impressions of possible applications of integrated sensoring: smart food labeling, personal signage using LEDs, thermoflex patches, air quality necklace, water poution monitoring, plant health monitoring.

Sensor Fusion: combining sensors for a better result

Sensors won't have an easy time. As they have to function day in, day out, they will have to leave their comfort zone and get used to highly variable temperatures, humidity, aridity, and

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The K8x MCU family offers the security, scalability, and flexibility to address the challenges of creating smart devices for the Internet of Tomorrow.

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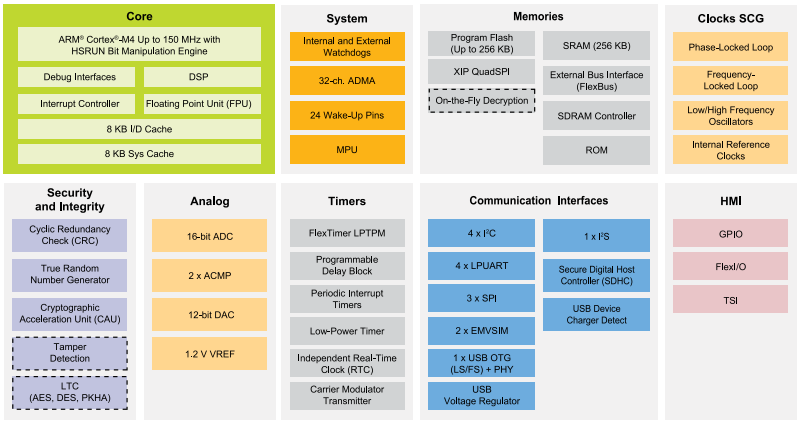
KINETIS K8x MCU FAMILY BLOCK DIAGRAM



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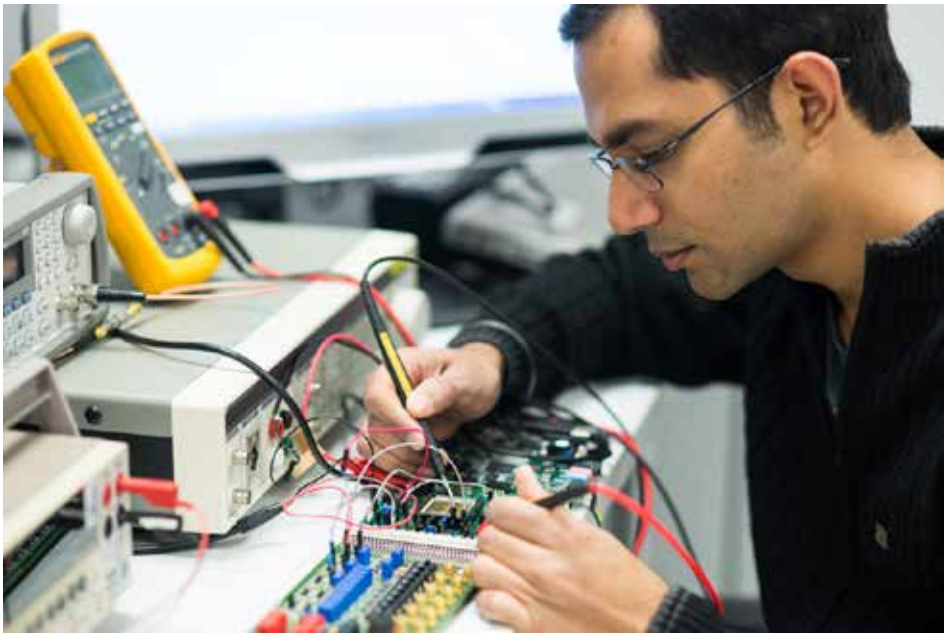
vibrations. They will have to keep on working in harsh conditions and still deliver reliable results.

One of the possibilities is sensor fusion: measuring the same physical parameter with a number of different sensors. Someone's heartbeat, e.g. can be monitored electrically, optically and even acoustically. By combining the results of the sensors and interpreting the result, it is possible to arrive at a robust and reliable result. Also context awareness could be added. E.g. a sensor that 'feels' that a person has started sleeping, communicates this result to a second sensor that has the task to monitor the heart at rest. So one sensor flags the ideal moment for the other sensor to start work.

At ISSCC, researcher Mario Konijnenburg from Holst Centre/ imec presented some remarkable results. Together with a colleague, he developed a chip that is able to measure several body parameters at the same time: an electrocardiogram (ECG), bio-impedance (BIO-Z, electrical conductivity of the body revealing the composition of body tissues), galvanic skin response (GSR, changes in the electrical properties of the skin due to e.g. stress), and photoplethysmogram (PPG, changes in the blood circulation in tissues due to changing light absorption). Because these data are collected on one chip, it is perfectly possible to synchronize them and look for correlations. The combinations of measurements allows e.g. a reliable way to deduce heartbeat and heart rate variability. And (relative) blood pressure can be deduced by interpreting the ECG- and PPG measurements.

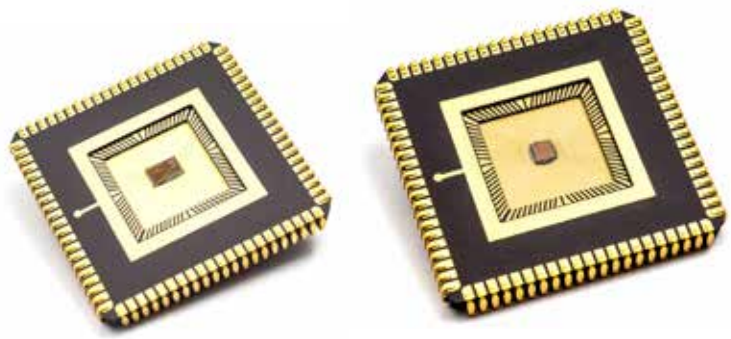


Rachit Mohan with his sensor readout chip made in 40nm CMOS, operating with a time-based technique

Local Processing: processing data on the chip is energy efficient

Data from the sensors chip are wirelessly sent to the cloud (e.g. through a smartphone or laptop). In the cloud, the data are processed and interpreted. Presently, 80% of the energy consumed by the sensors is used by the wireless link. So if the sensor has to be made more energy-efficient, it should send less data. This can be done by processing and interpreting the data partly on the sensors, only sending the results to the cloud. Of course, processing on the chip will also consume energy, so part of the researchers' task is to find the optimal balance between on-chip processing and sending data to the cloud.

If the sensor has to do more local



Readout chip for photoplethysmogram measurements using compressive sampling

processing, it will need one or more additional processing cores. Advanced chip technologies are ideal to integrate more powerful processing on an already very small chip. But, as the world is analog, we still need to add analogue interfaces to our sensors. And these don't scale so well into the newest technology nodes. In his ISSCC paper, imec researcher Rachit Mohan describes a sensor readout chip made in 40nm CMOS. The new chip operates with a time-based technique instead of the traditional voltage- or power-based techniques. Such time-based circuits may operate on a lower supply voltage. Also, the transition to the digital domain in the amplifier chain is much faster, and filtering can be done digitally. This makes the technique attractive to implement in the deeply-scaled technologies that also allow implementing more powerful data processing.

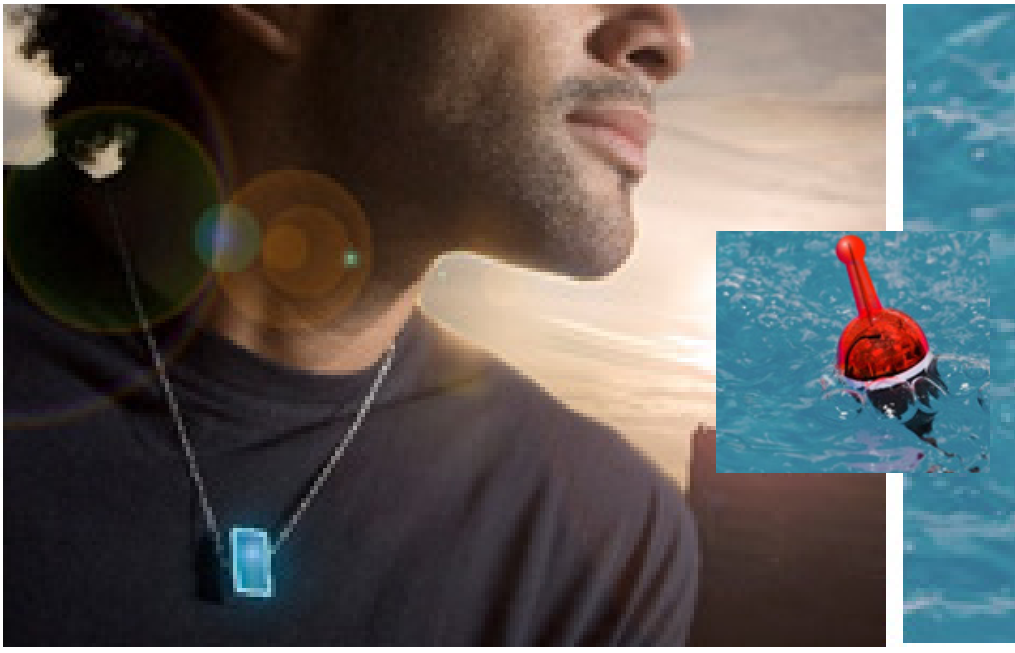
Adaptive & Compressive Sampling: monitoring only when it is needed

Another technique to save energy and send as little data as possible through the wireless link of a sensor is adaptive and compressive sampling. With this technique, signals are not measured and sent at fixed time intervals, but according to the characteristics of the signal that is monitored. Consider e.g. the ECG heart monitoring. At the moment of the ECG peak, there is much more information to measure than during the intervening intervals between the peaks. As a result, the sensor can sample the heart signals at short intervals during the peak and at longer intervals in between. All in all, there will be a reliable ECG monitoring with fewer measuring points and fewer data to send.

At ISSCC, imec researcher Pamula Venkata Rajesh showed a readout chip for photoplethysmogram measurements (PPG) based on LED-light and using compressive sampling. The PPG results allow to deduce both heart beat and heart rate variability. They are a nice alternative for ECG monitoring because they don't require the use of electrodes on the patient's chest. On the minus side, the sensor's LED light that shines through the skin needs additional energy, which is a serious drain on the energy budget of the small sensor chip. Therefore, it is important that the measurements can be done with compressive sampling, measuring less but smarter data points.

The future

Thanks to these and other developments, sensors improve every day, ready to take their place in our environments and lives. Other technologies that will be needed in this IoT-scenario are collecting and interpreting big data in the cloud, flexible electronics, and new standards for low-power radios. Looking at the 16 ISSCC-contributions, we are well on our way to bringing the Internet of Things to reality.



How ultra-low power Bluetooth Smart radios are revolutionizing shopping for customers and retailers

› Mr. Mark de Clercq, Dialog Semiconductor

Bluetooth-enabled smartphones and tablets are now the constant companions of many shoppers, including those that shop regularly in retail malls. As it's now possible to track shoppers within malls and within individual stores using Bluetooth electronic beacons, this has created a golden opportunity for retailers to deliver sales messages – advertising to them when they're most likely to be responsive. As one provider of this new shopping technology words its own sales pitch: "Target your customers with personalized recommendations - in real-time, at the perfect moment to encourage purchase." This is one of the most exciting of several new location-based services enabled by the latest Bluetooth technology and the market for such services is expected to grow from $8.12 billion in 2014 to nearly $40 billion by 2019, according to analyst MarketsandMarkets. Other services include indoor navigation, asset tracking and mobile payments.

If they decide to engage with the technology, consumers can be confident that they don't miss a shopping opportunity. And they can choose whether to have their phones switched on, as well as whether to run the apps that respond to the electronic messages retailers push at them. Consumers must have Bluetooth switched on and must allow "push' messages, so they remain in control. The retailers benefit from a low cost, context-aware way to deliver sales offers. Perhaps more importantly, they are able to gather and analyze data about customer journeys - physical journeys through their stores and commercial journeys that capture buying habits. When that data becomes available for thousands of customers, the information becomes very powerful - this is the essence of "big data".

So what's the technology that underpins this revolution? In almost every instance, it's Bluetooth Low Energy, often referred to as "Bluetooth Smart". The same technology is also found in proximity tags that simply send an alert to your smartphone or other receiver when you come within range.

Bluetooth Smart - why it's the smart choice for beacons

Bluetooth has been with us for a few decades now but what is now called "Classic Bluetooth" is too power-hungry for beacon applications, which need to operate for months, if not years, on a single coin cell battery if they are to offer the required "place and forget" deployment capability. Bluetooth Smart radios are built into battery-powered, stand-alone beacons that broadcast advertising messages to shoppers as they come

within range, typically somewhere between 5 metres and 50 metres of the beacon.

Key design criteria for beacons are that the infrastructure around them does not restrict where they can be placed, so they need to be small and unobtrusive. And, as with most consumer electronic devices, low cost is crucial.

Bluetooth Smart differs from Classic Bluetooth in a number of important ways that make it an attractive option for beacons:

- Classic Bluetooth radios typically draw around 40 mA at 3 volts but best-in-class Bluetooth Radios producing 0 dBm output (a power level perfectly suited to most beacon applications) can draw less than 5 mA at 3 volts while still offering a range of up to 50 m in many environments.
- Average power consumption in some applications may be only 100th of that of Classic Bluetooth, due to the relatively long periods during which a Bluetooth Smart device will be in sleep mode.
- Wake up time is just 6 ms, versus around 100 ms for Classic Bluetooth.
- It can send authenticated data in just 3 ms, versus up to 1 second for Classic Bluetooth.
- It offers 128-bit banking-level (AES-128) security to keep data safe.

Not all Bluetooth Smart implementations are created

equal Despite the energy savings promised by Bluetooth Smart, how the technology is implemented can have a dramatic affect on system energy consumption and battery life. The primary criteria for choosing a Bluetooth Smart radio system-on-chip (SoC) to form the heart of a beacon are peak current consumption, energy consumption over time (taking into account the requirements of the application), receiver sensitivity (the beacons need to receive a signal from your smartphone to know that you're in range), and the ability to work from a single small battery, usually a coin cell, to keep the size down. In real-world applications, battery life will also depend upon the advertising interval - how often the beacon is required to transmit data - so when comparing device data, you need to ensure that the operating conditions under which the figures are quoted are the same, or at least very similar.

To gain a more detailed understanding of how energy is consumed while a beacon is operating, you need to determine the charge consumed versus time for each advertising operation. These parameters include:

- The advertising interval and charge per advertisement
- The time taken and charge consumed from cold boot until the first advertisement
- The time, peak current and charge consumed by each of the

Feature	Bluetooth Classic (basic rate/enhanced rate)	Bluetooth Smart (Low Energy)
Maximum TX power	+20 dBm (Class 1); +4 dBm (Class 2)	+10 dBm (regulatory limit (10 mW)
Typical range	10 m to 300 m, depending on Class	10 m to 300 m (30 m to 50 m with 0 dBm radios)
RF channels	79 (1 MHz spacing)	40 (2 MHz spacing)
Maximum usable data throughput (typical)	2 Mbps	100 kbps
Typical wake up time	100 ms	6 ms
Typical authenticated data TX time	Up to 1 second	3 ms
Typical peak current draw	40 mA or more	15 mA (<5 mA achievable with best-in-class 0 dBm radios)
Maximum number of simultaneously connected devices	8	8
Security	Safer+	AES-128

Figure 1: Bluetooth Classic and Bluetooth Smart compared

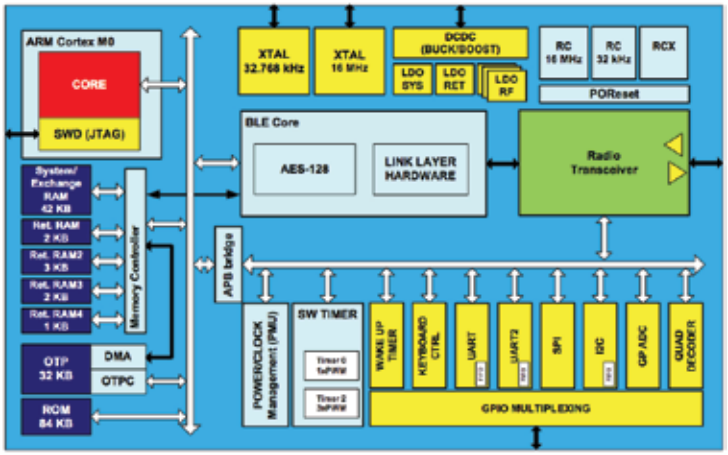


Figure 2: Dialog Semiconductor DA14580 simplified block diagram

three advertising channels normally used.

Also, you need to consider the processor resources that may be available for application code within the Bluetooth Smart SoC. If it's possible to produce a completely hosted solution without resorting to an external microcontroller, this will again save design time, cost and space.

In selecting a Bluetooth Smart radio, other important considerations are sometimes overlooked. Functional integration will determine how many external components are needed to create the beacon. The fewer you need, the less design effort is required and the lower the cost of the end product. Fewer components also means you can make smaller products that will be more reliable. Design effort is also reduced if the Bluetooth Smart vendor offers a reference design and proven software.

A Bluetooth Smart beacon reference design

Dialog Semiconductor's DA14580 "SmartBond" SoC integrates a Bluetooth Smart radio with an ARM® Cortex™-M0 application processor and intelligent power management. The processor and on-chip digital and analogue peripherals are accessible via up to 32 GPIOs. The device block diagram is shown in Figure 2.

Excluding any current limiting resistors needed for buzzers or LEDs, Dialog's DA14580 beacon reference design needs only 12 external components: 6 capacitors, a 16 MHz crystal, 3 inductors and 3 resistors.

The device, which is available in either a 2.5x2.5x0.5 mm WL-CSP or 5x5x0.9 mm QFN40 package, has a peak current consumption of 4.8 mA at 3 volts when transmitting at 0 dBm and this falls to 1.4 µA in extended sleep mode and less than 0.7 µA in deep sleep mode with memory retention. Each advertising event consumes 9.53 µC (total for all 3 channels). Receiver sensitivity is -93 dBm.

Figure 3 shows the reference design implemented in a polyurethane enclosure measuring 20.3x39.9x5.8 mm. Inside the enclosure, is a

Figure 3: DA14580 Bluetooth Smart beacon reference design implemented in a small, tough polyurethane enclosure

16.9x23.7x1.00 mm printed circuit board and a 70 mAh CR1016 coin cell battery.

About the author: Mr. Mark de Clercq, Product Marketing Group Manager at Dialog Semiconductor

Mark joined Dialog Semiconductor in 2007 as Product Marketing Group Manager. Prior to this he was a design engineer at Phillips Electronics and held research and teaching posts at McGill University, where he took his Masters in Microelectronics. He has also studied strategic marketing at the Harvard Business School.

In his spare time Mark enjoys getting out on his bike, self-tracking his progress using the latest app-enabled Bluetooth® accessory.

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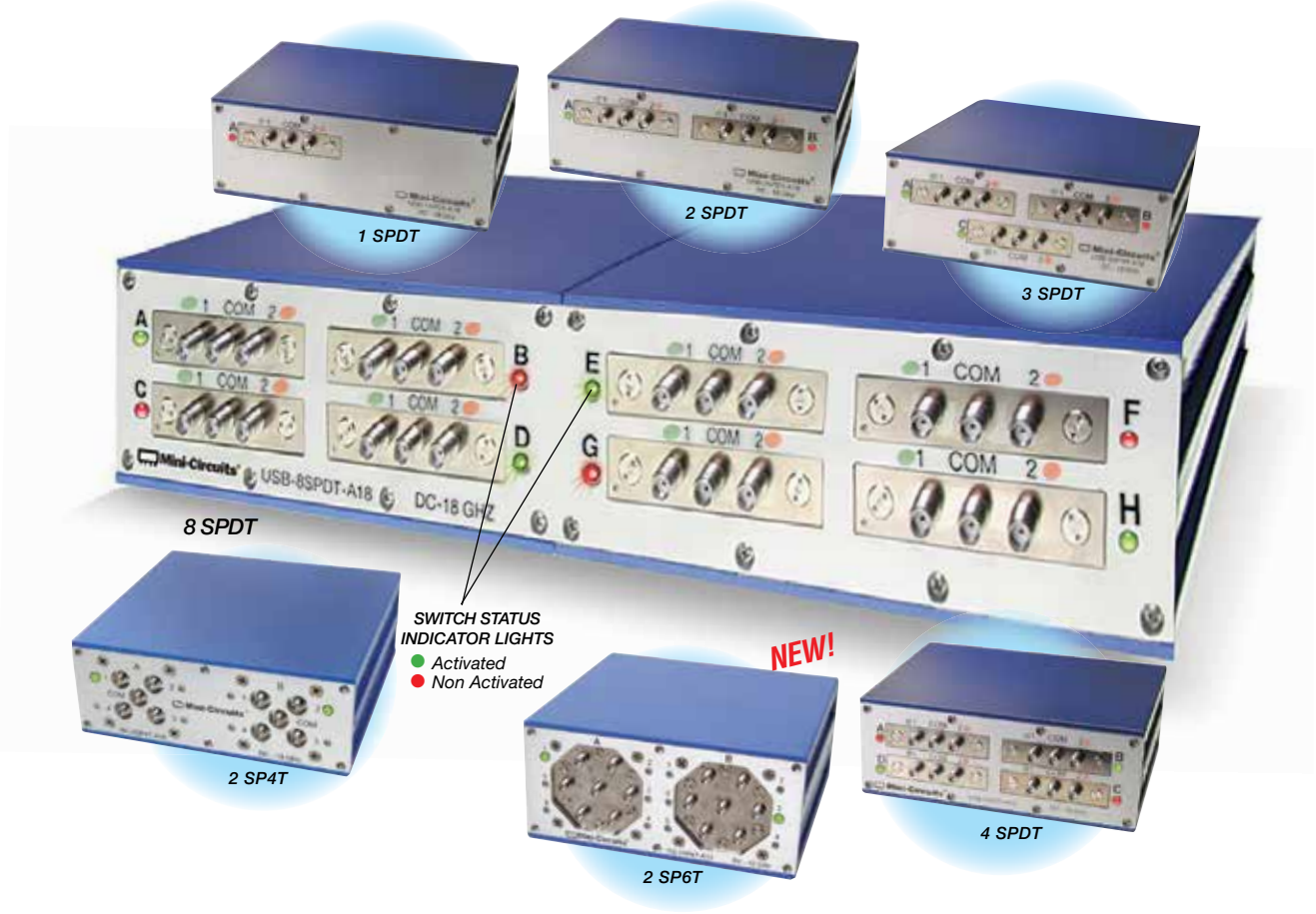

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Networked Approach To Improving Energy Efficiency In Manufacturing Automation Systems

› Stefan Hacker, Analog Devices Germany

There is currently a lot of discussion surrounding energy efficiency in modern production plants, and manufacturers of systems solutions are continually unveiling new concepts to address the issue. One concept includes introducing a greater degree of automation, which is somewhat surprising but it takes into consideration the demand for energy efficiency and improves it by providing a stronger, interconnected network.

Directives on energy efficiency are documented in European Union standards and set out in provisions such as those of the EuP (energy using products) directive. New regulations came into effect on January 1, 2015, with further measures planned for January 2017, when new energy efficiency classes will be introduced and smaller power units will be in scope. The goal is to reduce energy consumption further by 20% by the year 2020.

Electrical energy accounts for a considerable proportion of production costs, so it is hardly surprising that there is a drive to improve energy efficiency. Motors in production plants currently consume approximately 46% of the electrical energy produced and a motor's energy consumption accounts for around 90% of total costs over its entire service life. Electric motors are the main power units behind almost all automation devices in our production plants and it is hard to imagine a future without them.

As a result, the focus of new developments is now to improve efficiency in an effort to reduce total costs. Furthermore, we are seeing a general industry trend toward greener, resource friendly, and networked production. Figure 1 depicts a block diagram of such a power unit.

New product developments are constantly improving system performance and quality. The permanent magnet synchronous motor (PMSM) is the new standard, replacing the brushless dc (BLDC) motor in many areas. The design of the synchronous reluctance motor (SynRM) has also become the subject of further investigation and research. The motor concept has been somewhat consigned to the history books since sufficient access to rare earths was available for magnets. Furthermore, the SynRM places high demands on the temperature range of the components used and requires new control concepts and PWM driver stages. Full digital control is key in the catalogue of requirements for all

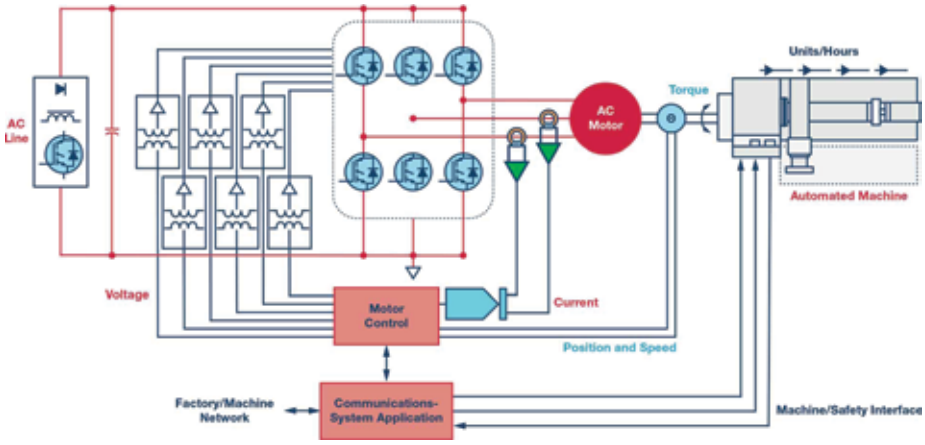


Figure 1. Block diagram of a networked power unit/servo.

new systems since the specifications cannot be met without it.

Semiconductor manufacturers who produce the components used are being directly influenced by trends set by the systems manufacturers.

They are calling for innovative developments in signal acquisition, signal conversion, and signal conditioning. Better prepared signals are fed to application specific processors, which drive faster servo loops with higher voltages. Higher voltages in the intermediate circuit require more voltage proof insulation devices and gate drivers for IGBTs.

In addition, new insulated interface modules, which offer greater stability in the long term, are required to protect the system and users from hazardous voltages-as is the case with hardware. Software is also being improved: new, faster algorithms push the more powerful processors to the max while a model-based design (MBD) approach allows systems to be parameterized, optimized, and tested prior to construction.

It is clear that the energy efficiency of manufacturing automation systems is a complex, multidimensional problem. The following are some key design challenges involved with optimizing energy efficiency:

- Firstly, increasing the system's output and/or the number of units processed at the plant per hour. This requires new and more accurate algorithms, that deliver results in a faster computing time, reduce tool positioning time, and enable higher tool head speeds.
- Secondly, developing new components such as more integrated, powerful, and energy saving processors, in addition to new gate drivers, which can be deployed in current systems but are designed especially for new high voltage IGBTs using GaN or SiC technology.
- Thirdly, making the best possible use of energy in practice through energy saving measures in the entire inverter or servo drive, as well as reducing losses in standby mode, utilizing the power unit's brake energy, and finally extensively networking the process modules within the production plant.

Analog Devices has new components that provide solutions for the previous challenges and make achieving optimal energy efficiency a reality:

- Powerful, yet efficient, processors (240 MHz clock rate) from the ADSP-CM40x family based on the ARM® Cortex®-M4F architecture, with large internal memories (2 MB flash, 384 kB SRAM) and flexible interfaces. The arithmetic unit with floating-point support is able to quickly and accurately process the model-based algorithms in the native data format. High precision, multichannel, 16-bit ADCs (14-bit ENOB) and fast sinc filters with programmable decimation rates for reconstructing Σ-Δ sampled currents, in conjunction with fast switching PWM units, increase the precision of the current servo loop. The sophisticated integration of the units reduces latency and computing times. The flexible memory integration and a unit for computing network harmonics (HAE–harmonic analysis engine) enable additional algorithms, especially for use in the active front end, returning energy from the dc bus into the local power grid. The appropriate interfaces guarantee easy integration into existing industrial networks. Figure 2 shows the block diagram of the ADSP-CM408F.
- The AD740x family of the insulated 16-bit Σ-Δ ADCs has been upgraded with more accurate components (14.2 ENOB) and an increased signal noise interval. They are specified across the entire frequency range and meet the increased insulation requirements of the sampled voltage up to 1250 V. High surge and ESD stability ensure that the component has a long service life. The clock can be generated internally (AD7402) or applied externally (AD7403). The Σ-Δ modulated signal obtained can be directly fed to the sinc filter in the ADSP-CM40x processor and does not require an FPGA for the reconstruction

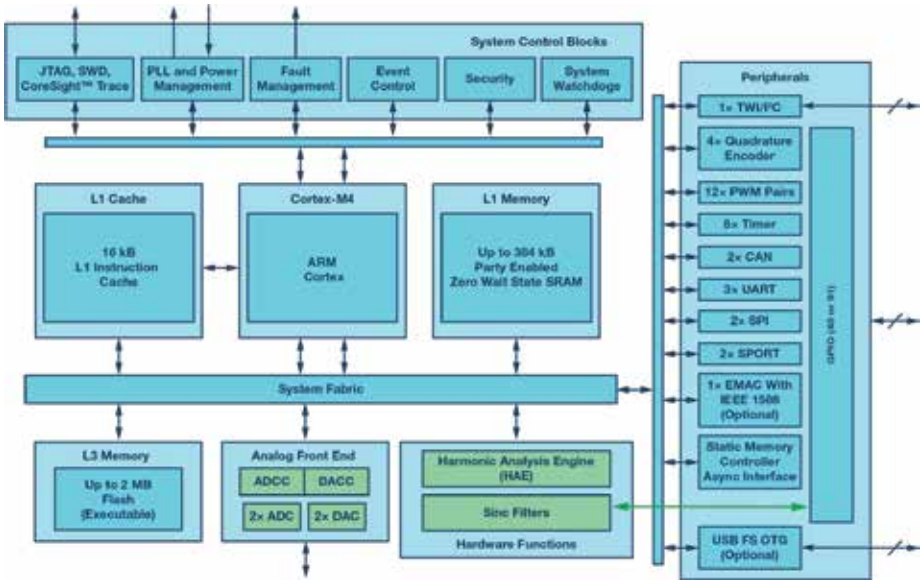


Figure 2. Block diagram of ADSP-CM40x architecture

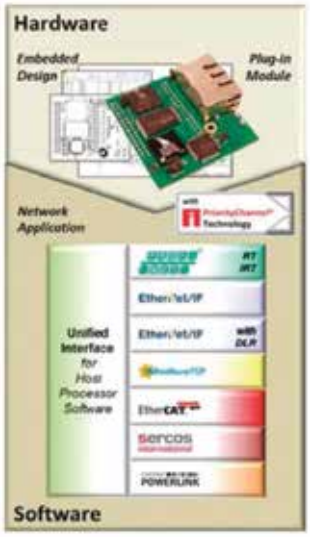


Figure 3. RapID module-based on the fido5000 REM Ethernet switch

filter. There is also a component with differential output signals on LVDS lanes (AD7405), should the trace length be increased considerably.

- In addition, there are new insulated gate drivers, which are suitable both for existing MOSFET and IGBT technology, and have been specially developed for the new GaN and SiC power semiconductors.
- New product developments in the isolation space for simple digital interfaces, and more specifically for USB, CAN, RS-232, and LVDS, address the safety issue of interface insulation. These developments fulfill the stricter insulation requirements and are accordingly stable in the long term.

The new components make it possible to save energy locally. However, the individual inverter still contains one major loss factor: standby times without energy saving measures needlessly consume large amounts of energy.

Greater and smarter integration of the manufacturing system would allow proper scheduling of operation times with high levels of activity. The corresponding energy saving mechanisms could therefore be activated at times when the power unit is not in use. Constant progress is being made in terms of networking the individual systems using industrial Ethernet, and this is replacing fieldbus systems with lower data rates. As such, it is not only manufacturing data that is transferred via Ethernet; positioning data is also sent and the entire production line is synchronized. The ADSP-CM40x processor is integrated into industrial Ethernet networks via Innovasic's RapID module, which uses the fido5000 real-time Ethernet, multiprotocol (REM) switch, which supports the industrial Ethernet's most widely used standards and protocols: POWERLINK, Modbus, EtherNet/IP (DLR), PROFINET RT/IRT, SERCOS, and EtherCAT, each with growing requirements in terms of real-time capability and system synchronization.

Figure 3 shows the module and the network protocols made available by Innovasic as stacks.

Figure 3. RapID module-based on the fido5000 REM Ethernet switch.

Through the improvements set out previously, ADI intends on promoting a sustainable concept for improving the energy efficiency of production plants and is implementing a vision, that places powerful components in a networked environment. Achieving the ambitious targets regarding precision and the sound integration of the new components will provide a breeding ground for innovation. Now it's up to you to turn these ideas into new concepts for both individual parts and entire system solutions, as well as implement an even better approach using these components and modules.

New-Tech Europe

Read To Lead

Ethernet/Ip Links Plant Productivity To Business Intelligence

› George Kairys, Molex

Industrial-grade Ethernet Switches are designed to provide reliable connectivity in harsh environments with extreme temperatures, moisture, and vibration.

INDUSTRIAL

Plants are replacing proprietary protocols with integrated communication protocols using Transmission Control Protocol/ Internet Protocol (TCP/IP) and Ethernet network structures to link plant floor productivity to business intelligence. Device-level networks utilise controllers to communicate machine- to-machine using popular open and proprietary protocols.

Implementing Ethernet as a link-layer protocol to legacy applications can future-proof the network and boost ROI by improving uptime and optimising workflow and production. High-density Ethernet/ IP is compatible with most versatile fieldbus automation technologies. Ethernet/ IP provides the scalability needed to economically integrate the plant floor with offices enterprise-wide-and beyond for secure remote access.

A networked Ethernet/IP architecture deploying industrial-grade components can enable total integrated connectivity with sophisticated control automation at the machine level, while mining multiple data streams from the plant floor to inform enterprise-wide business strategies. Able to meet data traffic demands, without sacrificing reliability and security, Ethernet/IP has become a gold standard in commercial industrial environments. Facilitating rapid, accurate dataflow, Ethernet/IP provides shared communication on a single local area network, with access to the Internet, and the ability to integrate plant machinery and process data via Ethernet or other compatible protocols.

The physical infrastructure of a networked plant floor is substantially different from office environments. Building an enterprise-wide network requires integration of cabling, connectivity, controllers, switches and other components, and software interfaces for data transmission and mining. Plant level connections frequently span longer distances, necessitating more stringent, higher speed real-time data transmission rates. Ethernet/IP excels in the need for speed and longer runs without performance degradation.

Rapid technology enhancements have made Ethernet the mainstream enterprise-wide communication

technology. Every technology offers strengths and weaknesses. Enterprise-wide integration offers business intelligence, including real-time dashboards and data snapshots for production planning, while providing advanced diagnostics and tools for quality control.

Ethernet/IP indeed delivers on the promise of near real-time machine-to-machine and machine-to-enterprise communication. The downside is commensurately higher bandwidth resource demands. Ethernet has the power and potential for creating vast raw data requiring filtering controls, segmentation, and analyses, in addition to efficient management to meet storage, redundancy, and security needs.

Ethernet/IP requires strategic planning to ensure current and future data management requirements can be met with minimal integration cost and effort as a company's network expands. Leading machine manufacturers provide non proprietary, cost-effective Ethernet I/O plant controls and equipment, which makes for greater interoperability. Close evaluation of plant floor equipment, PLCs and other controllers, as well as protocol implementation and software, are essential to a smooth network transition.

The benefits of an enterprise-wide convergence vary depending on company goals-and network configuration. Leveraging the full value of Ethernet/IP requires the right components, including rugged industrial Ethernet switches, IO blocks, twisted pair or fibre optic cable components. Unlike networks in environmentally controlled finished office spaces, industrial-grade components are designed for harsh environments with extreme temperatures, moisture, and vibration. Improved reliability and longer service life offset the higher initial cost of industrial - grade components. Industrial-grade RJ-45 connectors or newer M12 circular connectors are commonly found in lengthy Ethernet/IP, ProfiNet and EtherCat network runs in plants. Particularly well suited for remote locales and spanning distances, wireless Ethernet has gained traction in some process industries. Pricier industrial- grade fibre optical cable provides high speed, bandwidth, and noise protection over longer distances than traditional copper cable.

RIGHT TIME FOR ENTERPRISE-WIDE ETHERNET

Some manufacturers and processors are taking an overly cautious approach to enterprise-wide network convergence. Many have used the same machine-level or network architecture for decades and hesitate to upgrade, even to a better solution, until outdated equipment breaks down. But the need to employ more advanced plant floor networking technologies is becoming clear as manufacturers look to increase operational efficiencies and bottom line profits.

As evidenced by the steady proliferation of automation and machine control over industrial networks, the right technologies-at the right time-can provide significant competitive advantages to process and manufacturing industries. Large manufacturers and process control operations are trending toward operating on enterprise-wide Ethernet platforms. A well-designed infrastructure mitigates network security risks, while providing transparency to assess what's happening on the plant floor.

Plant equipment performance and production metrics are widely recognised as important strategic business tools to help reduce expenses and optimise uptime. Ethernet/IP and industrial-grade connectivity is at the right stage in evolution to deliver proven reliability and accessibility at an attractive price point.

At the plant level, Ethernet/IP delivers improved:

- Equipment performance
- Workflow speed
- Energy efficiency
- Quality control
- Data transmission speeds over legacy platforms
- Flexibility to add remove network nodes

Advanced Ethernet/IP technologies can link machine processes, control systems, and plant-level information to the enterprise with unparalleled scalability, functionality, and options. The right architecture can incorporate wired and wireless connectivity to provide enterprise-wide access for improved business intelligence, closer monitoring and control over production, resource management, and streamlined operations.

Who's the Better Decision-Maker: Self-Driving Car or Human?

› Christine Young, Cadence

Will self-driving cars be able to react better than a person can when something unforeseen happens on the road? That's just one of many questions that auto manufacturers and the electronics industry will need to address in the coming years.

Sensors are essential technology for making it possible for vehicles to act independently. Automakers are now integrating into their systems a variety of key sensor types: LiDAR for generating 3D maps of the environment, sonar for short-range sensing, cameras for short-/mid-range sensing, and radar for mid-/long-range sensing. For many advanced driver assistance systems (ADAS) functions, decisions are made by fusing or aggregating data from multiple sensors. For instance, an obstacle or pedestrian detection function will typically fuse data from cameras as well as radar sensors.

But, of course, sensors are only a part of the equation. Just as important are the sophisticated algorithms that bring intelligence to the aggregated data and the DSPs to do all of the processing.

At Cadence, there's a team of engineers in the IP Group that spends its time defining and developing such algorithms and DSPs for ADAS and communications applications. Recently, I had the opportunity to chat with two of the team members: Pierre-Xavier Thomas, design engineering group director, whose team develops software product collateral for Cadence Tensilica DSPs, such as DSP libraries, application use cases, and software signal processing example kernels; and Pushkar Patwardhan, design engineering architect.

Aggregating Data: in the Cloud or in the Car?

Now, while advances in algorithms and DSP and sensor technology have been impressive, the act of aggregating and then extracting useful insights from collected data remains a work in progress. According to Patwardhan, who leads development in radar algorithms, automotive electronics engineers are trying various approaches. "One of the main challenges for ADAS functions is to decide how to distribute the processing and data aggregation between the vehicle and the cloud," he said. "In one school of thought, more data aggregation and processing are done in the vehicle, with lesser data communications overhead. Another approach is a more cloud-centric mechanism, with the vehicle requiring more communications with the cloud to obtain information about the environment, with lesser processing done within the vehicle itself. It's not clear yet which approach is a winner."

There's also discussion in the industry about who owns the cloud-based elements of this system. Notes Thomas, "A car is a moving IoT application and if you have a lot of these cars with multiple types of sensors, the information from each car could be aggregated and shared to help all drivers and other end users. This would place different constraints on the full system and also raise questions around who owns, controls, and can benefit from the information. Who will differentiate their products with the aggregated information from the cars moving around and sensing and monitoring their close environment? The car manufacturers, the system company offering the sensors…?"

Indeed, we could even see a mix of the cloud vs. in-vehicle approaches that Patwardhan mentioned. One viable approach, he noted, would be a vehicle-to-infrastructure communication model providing broad access to the information needed. These are among some of the questions that will need to be ironed out as theautomotive ecosystem evolves.

So, Self-driving Car or Human Driver?

So, getting back to that question of who makes better decisions: self-driving cars or humans? As Thomas notes, with the integration of ICs into cars, manufacturers are putting in more processing capability than a person has to sense the environment and detect things. The challenge, he said, is to ensure that the machines are delivering better decisions from all the available information than a human can.

Certain convolutional neural network algorithms, which are used in pattern and image recognition, have demonstrated a detection rate accuracy higher than that of humans. And, as Patwardhan pointed out, our senses don't provide the precise estimates of distance and speed that radar sensors can offer. What might happen in the face of something unexpected remains unknown. "We know humans, based on their experiences, can handle certain situations. It remains to be seen how automobiles can handle these situations," he said.

We may see self-driving cars rolled out via a zoned approach where they're allowed only in areas that are well mapped out to support them, said Patwardhan. Once these vehicles are out of the designated zones, he said, they may be required to turn off certain features and operate more like regular cars.

Establishing a Chain of Trust

› Pascal Herczog, u-blox

Everybody is talking about security these days. For the embedded developer, getting the system running as the marketing specification stipulated and on time, used to be a challenge in itself. Today, the need to build security into every aspect of the design, whether it is a simple IoT sensor communicating with a server or a more sophisticated multicore application, requires thought and a careful appraisal of potential security attack points. In a perfect world, a design could be built from scratch with every functional block designed and developed within one team. However, the pressures of time-to-market and embracing a higher level of integration using, for example, pre-certified and type approved wireless modules, means that a more holistic approach to security needs to be considered.

When we look at, for example, an IoT sensor using a microcontroller and a wireless module, it is necessary to establish a chain of trust, from the sensor to the host, via the wireless antenna to the end application. Building a secure solution requires a holistic viewpoint to take into account all the technical and operation aspects of the system components and is not only limited to the wireless communication. The application might also encompass and utilise GNSS positional data, which has its own security consideration.

One potential approach to implementing the chain of trust is to divide it into a number of trusted domains. By investigating the fundamental methods necessary to protect each domain, the following define the areas of potential attack; device firmware, communications to the server, interface security, enforcing API control and robustness that includes handling spoofing/jamming.

Ensuring that your device is executing the code it should be requires a secure boot method to be implemented. When booting the system, it is crucial that each stage is authenticated prior to booting the next set of processes. When reviewing firmware security you also need to be mindful of how it might be updated. For many physically

dispersed sensors the favoured approach is to enable an over-the-air method. While the concept is fairly straightforward, the chances of this becoming an attack point is high. Ensuring the downloaded firmware image or patch is validated prior to being flashed is essential. This must include a process that ensures the resulting image can be authenticated and integrity-checked before use; with an ability to back-track to the previously authenticated image should a security breach or hardware problem be encountered during the update process, whilst also preventing older versions from being accepted.

The next consideration is that of the communications or transport layer. There needs to be a mechanism for the device to be able to authenticate itself with the server, and vice versa. Whatever the method used, the device should be able to sign or encrypt any data communicated with the server. The ability to securely manage the keys used for the signing, decryption and encryption processes will ensure that these can be changed whenever necessary, even on a per session basis. Data being communicated is always open to the potential of being intercepted or compromised by man-in-the-middle attacks, including at the device interface level. Hence taking unauthorised control of the device is another possibility that needs to be avoided at all cost.

Access to device functionality is often via a number of defined APIs. Unfortunately, the access to device features and the implications for security can often be overlooked. Those wishing to exploit or compromise a device, even if for the fun of it, usually have a lot of time available to probe for open APIs and experiment with the interrelationship between them and device functionality. Sometimes APIs incorporated within code provide access not only to standard features and capabilities but also to premium or paid-for services. Developers also frequently provide undocumented APIs for their own testing and configuration so it is imperative that these are protected as well. Hence, formal authentication and authorisation techniques should be employed to allow access to or enable such API's.

The final consideration is that of robustness for those applications that source data from external devices, such as a GNSS receiver, with location potentially an intrinsic part of the value of the sensor data. The concern here is how robust the solution is in detecting and handling failure cases. For example, either through jamming the GNSS receiver, or spoofing the input to the GNSS receiver, it is just as important to detect that the reported position is different to reality as it is to protect against a direct attack on the rest of the system. Man-in-the-middle style attacks on the sensor data passed to the host will also be another consideration. Being able to detect both this and spoofing attacks and alerting the end-application are important aspects of incorporating security into your design.

As the IoT era advances forward security can no longer be an afterthought. Implementing a security regime into your product is as essential as the device's core function.

Introducing Cortex-A32: ARM's smallest, lowest power ARMv8-A processor for next generation 32-bit embedded applications

› Dave Kinjal, ARM Processors

The announcement of the ARM® Cortex®-A35 processor marked the beginning of a new family of ultra high efficiency application processors from ARM. Today, ARM announced the second member of that family, the Cortex-A32, a new 32-bit processor. Highlights of the Cortex-A32 include:

- ARM's smallest, lowest power ARMv8-A processor, optimized for 32-bit processing (supports the A32/T32 instruction set, and is fully compatible with ARMv7-A)
- Provides ultra efficient 32-bit compute for the next generation of embedded products including consumer, wearable and IoT applications.

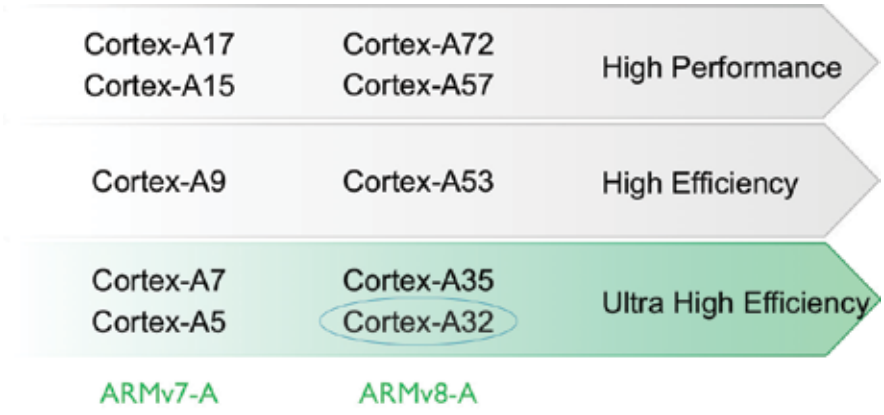
In Article, I'll provide the market context and some highlights of the Cortex-A32 while answering the question: Why did we create the Cortex-A32?

Embedded Markets

The embedded market is incredibly diverse. It covers innumerable products - almost everything that is not a phone, a PC, or a server - and spans a huge range of processing requirements. The diversity of requirements in embedded is well served by the three major processor families from ARM: Cortex-A, Cortex-R and Cortex-M. The fundamental differences between the A, R, and M families are shown next page.

Much has been written about Cortex-M processors in the embedded market - they are incredibly prevelant. Less attention has been given so far to the growing use of Cortex-A processors in embedded applications. This blog focuses on these rich-embedded applications, where a full OS is required. These are the sweet spot for Cortex-A.

Two fundamental aspects make rich-embedded applications different than the traditional embedded applications using Cortex-R and Cortex-M processors. The first is rich operating system support that requires virtual memory and memory management unit. The vast majority of Cortex-A based embedded products run full virtual memory based OSes like Linux, Android, and Windows. The second aspect is higher performance. The performance needed is again very diverse, and in some cases embedded applications need



performance approaching that of smartphones and laptops, which of course Cortex-A processors can deliver.

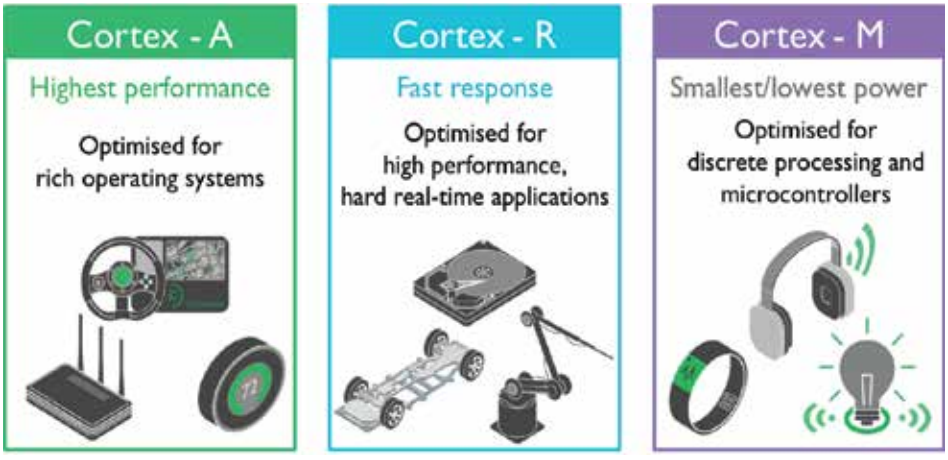
The rich embedded market is already well established. According to VDC estimates, ARM based devices occupy over 70% market share in the rich embedded segment (SoCs). Just like the embedded market as a whole, the rich embedded market is extremely diverse. There are many use cases, some high performance and others more cost and power sensitive. Let's look at a few examples - industrial devices, smart watches, smart glasses, and a whole range of products for the home - from thermostats to media hubs. These devices all use Cortex-A, and deliver a richer experience to users.

The rich embedded market is growing rapidly, fueled by two key drivers:

- a wide choice of affordable silicon platforms delivering low cost, and high performance
- the largest rich embedded software ecosystem

Today, more than 100 Cortex-A based Single Board Computers (SBCs) are available in various performance and cost points. Rich operating systems, open source and proprietary, have become more accessible, and this has opened up embedded development to a wider range of developers. The software ecosystem for Cortex-A processor also includes support from the leading RTOS and embedded tools vendors. Their interest in Cortex-A is driven by demand from their customers, who want to take advantage of Cortex-A performance, compatibility, wide availability, and the benefits of multiple suppliers and price/performance points.

Much has been said lately about 64-bit, which is driving in smartphone and open compute markets, however in embedded the majority of the software ecosystem is focused on 32-bit software. While there are some embedded applications that are moving to 64-bit, like high-end SBCs, NAS, and ADAS systems, many embedded applications are sticking with 32-bit to keep costs and complexity low. We can expect a significant number of embedded devices to remain 32-bit for the foreseeable future.



Highlights of Cortex-A32 Processor

We built the Cortex-A32 for embedded, first and foremost. Embedded is an exciting market and wanted to continue to processors that accelerate the innovation in this market. So, what benefits does the Cortex-A32 processor offer for rich embedded?

1. ARMv8 architectural enhancements
2. Higher efficiency and performance
3. Scalability to target diverse embedded markets

Let us look at some details for each one of these key offerings.

1. ARMv8-A architectural enhancements

Cortex-A32 is the only ARMv8-A processor optimised for 32-bit compute. As such, the Cortex-A32 offers an ARMv8 upgrade path for applications that today use ARMv7-A processors like Cortex-A5 and Cortex-A7 or classic ARM processors like ARM926 and ARM1176.

The ARMv8-A architecture supports both 32-bit and 64-bit compute capabilities in the AArch32 and AArch64 execution states. Cortex-A32 is optimized to support the A32/T32 instruction set in the AArch32 execution state, which is ideal for 32-bit rich embedded applications that need the lowest cost and power. Even in AArch32, ARMv8-A adds more than 100 new instructions – and the Cortex-A32 benefits from all of these.

2. Higher efficiency and performance

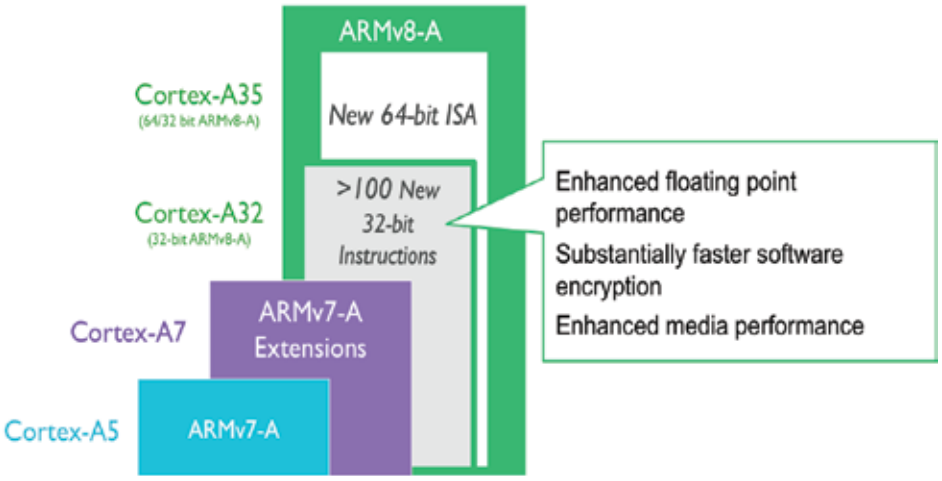
Cortex-A32 is 25% more efficient (more performance per mW) than Cortex-A7 in the same process node. Cortex-A32 delivers this efficiency through performance improvements and power reduction, two often conflicting design goals that the Cortex-A32 team managed to deliver in tandem.

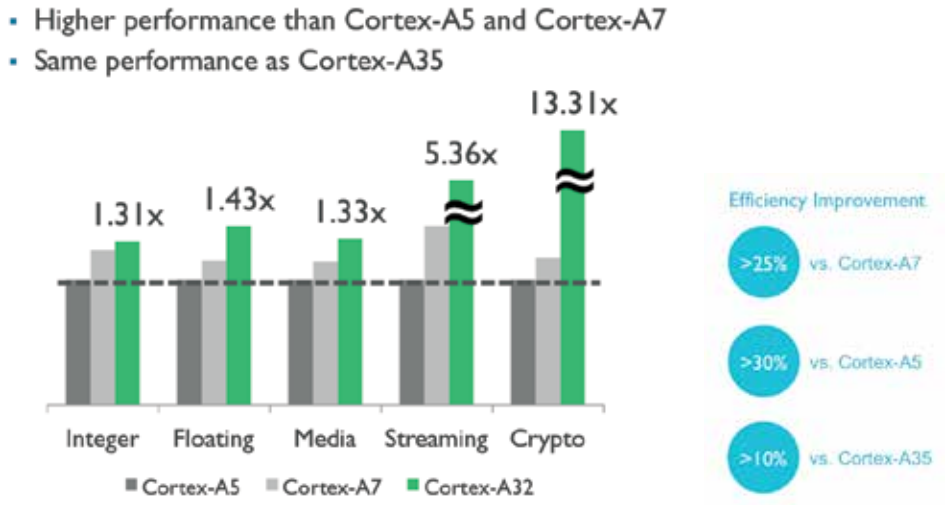
The Cortex-A32 also delivers performance improvements compared to Cortex-A5 and Cortex-A7 processors. The performance improvements relative to the Cortex-A5 range from 30% to a massive1300% across a range of benchmarks relevant to embedded markets. Streaming and crypto are key benchmarks at the top end of this scale. Compared to the Cortex-A7, the Cortex-A32 offers 5% to 25% higher performance. To put things in perspective, the Cortex-A32 delivers similar performance to the Cortex-A9, which was the premium smartphone standard just a few years ago. That performance is coming to the lowest cost rich embedded devices now, and at significantly less power.

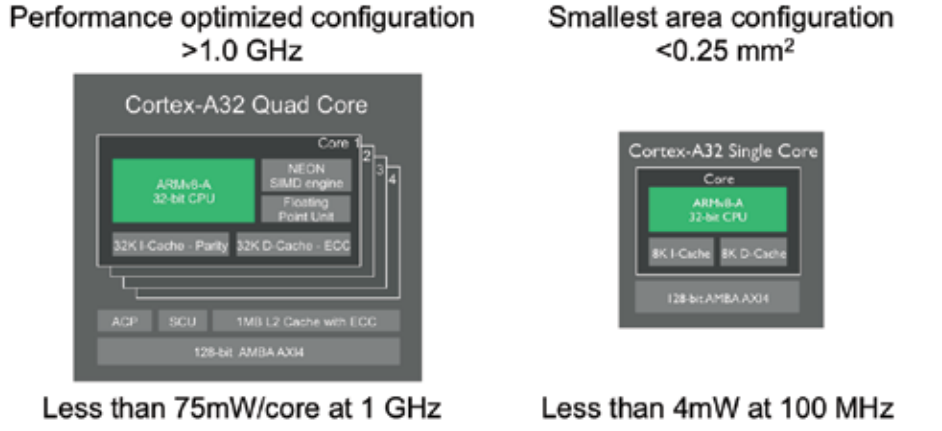
For integer workloads, the combination of performance improvements and power reduction provided by the Cortex-A32 translates into a greater than 25% efficiency gain over the Cortex-A7 and more than 30% efficiency gain over the Cortex-A5. Compared to Cortex-A35, the Cortex-A32 offers same 32-bit performance but consumes 10% less power and has a 13% smaller core. This means that Cortex-A32 is 10% more efficient than Cortex-A35 processor in the 32-bit world.

Scalability

Given the diversity of embedded







applications, we knew we had to make the Cortex-A32 scalable. Cortex-A32 therefore offers a wide range of configuration options. The diagram below shows two configurations of Cortex-A32 but there is a range of possibilities in between.

The configuration on the left in the diagram above shows a typical performance optimized multi-core configuration - quad core, larger cache sizes and includes optional features like NEON and Crypto engines. This configuration provides excellent performance for most rich embedded applications and retains ARM's low power leadership - consuming less than 75mW per processor core, when running at 1.0GHz on a 28nm process node. At the other extreme, the smallest configuration of the Cortex-A32 processor, with a physical implementation optimized for area, occupies less than quarter of mm2 and consumes less than 4mW at 100MHz in the same 28nm process node. With this scalability, the Cortex-A32 is suitable for a wide range of rich embedded applications.

In summary,

the lowest cost rich embedded applications are about to get a lot more exciting. Cortex-A is already the number 1 CPU architecture for rich embedded. The Cortex-A32 expands the Cortex-A family and adds our most efficient 32-bit application processor yet. The Cortex-32 is set to drive future innovation in rich embedded and IoT - I can't wait to see what our partners will build with it.

A Motion Tracking Module for Your Application

› Marcel van Hak and Arun Vydhyanathan, Fairchild Semiconductor

A motion tracker with advanced motion sensing technology is ubiquitous in applications from image stabilization in miniature cameras to control and navigation applications for UAVs. A MEMS-based IMU is the preferred motion sensing technology in industrial applications. The MEMS-based IMU's increasing adoption rate and ever growing list of possible applications is a direct result of the technology's versatility – high achievable target performance, highly reliable solid state technology in a very small form factor with very competitive pricing. The technology is also very attractive for high-volume consumer applications.

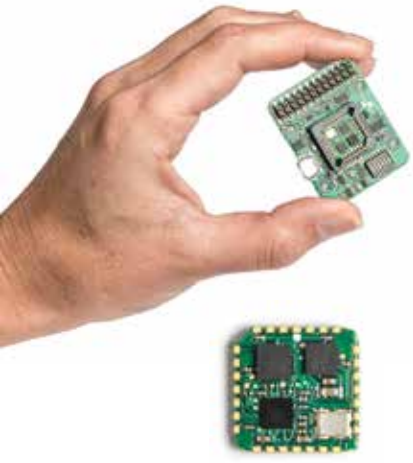
The various facets of the MEMS-based IMU motion sensing technology offer a plethora of possibilities – it can be both a boon and a bane! While a wide range of sensing components with varying grades of performance, size, integration levels and costs is very attractive, it can be very counter-productive for a team and the execution of the project. Opting for a MEMS-based IMU with the desired specifications and developing peripherals from scratch can take time and resources away from the actual development of the target product. This blog explains the thought processes that go into delivering a state-of-the-art motion tracking module with different integration possibilities designed to suit your application needs.

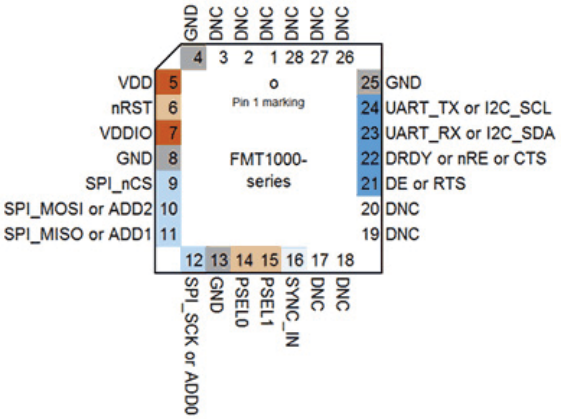
Sensor characterization and sourcing

Integration of inertial sensing starts with finding the right technology for the application. MEMS-based IMU motion sensors are available in chips at far less than $1 per axis, but the price range can exceed more than $100,000 per axis for optical inertial sensors. Next to the cost, there is also the aspect of suitability for an application. Even when considering MEMS-only inertial sensors, there is a huge variety of sensors. Some sensors have better performance under vibration, some have a good long-term stability and others may have low noise. The key is to find the sensor that best fulfills the need.

Simply understanding the sensor level specifications needed for a certain application can pose the biggest challenge. Often an application oriented development team can state (and get) requirements in terms or orientation accuracy needed or other high level functional specifications. Breaking these down to sensor level specifications is often much more difficult because of lack of time to dive into the specifics of the underlying technology.

There are several ways to find the best sensor, from comparing data sheets to doing a full characterization. As data sheets are not uniform and data is not always available for all conditions (e.g. vibrations, lateral acceleration), a full characterization targeted to your functional level





specifications is often required. Next is the need for knowledge of MEMS, sensors and sensor fusion, which is also time-consuming.

Another challenge in the quickly changing landscape of MEMS sensors is that keeping track of changes and EOL/PCN-notices by vendors also consumes valuable time.

Dedicated MCU

Retrieving data from the MEMS sensors is the first step. The next step is to find an MCU to process this data. This requires making estimations to determine the required RAM and program memory, necessitating advanced knowledge of the sensor fusion algorithm, OS, drivers and signal processing. The type of processor selected has a significant impact on system architecture, and without experience in designing an IMU and associated signal processing and sensor fusion, this can be a long and complex process.

Signal Processing

Signal processing is the next step in converting the MEMS signals to a sensible output. For motion tracking, the user is often interested in low-bandwidth signals. Yet, a high bandwidth is required to compensate for vibrations and coning/sculling errors. A signal processing pipeline needs to be optimized for the anticipated motion. Also, since every MEMS sensor is different, the signal processing pipeline should be tailored to the specific MEMS sensor to make the best use of its capabilities. An incorrectly designed signal processing pipeline will negatively affect the performance of the module's output.

OS drivers and communication

To communicate with the module, there needs to be drivers for the host, typically an application processor. Such drivers are specific for the module and include the communication protocol as well. Choices need to be made for the hardware layer (e.g. I2C, SPI, UART) and the communication protocol. The communication protocols used by some modules are flexible in terms of output configuration and/or integration level. For example, the communication protocol of Fairchild's FMT1000 series is implemented for low-level binary communication, for C/C++ interfaces and as DLL/.so for Windows/Linux. Ready-to-run sample code is available for ARM® mbed™.

Test and Calibration

System integrators face several challenges when mounting MEMS on a board. For instance, the soldering process may influence the factory (statistical) calibration. A module, in which the inertial sensors are mounted, doesn't have these detrimental effects.

The calibration parameters in discrete inertial sensors are statistical values. This means that the variability is significant. Accelerometer biases of

30 mg (~2 deg roll/pitch error) are not an exception in low-cost MEMS sensors. Gyroscopes biases of up to 30 deg/s are also possible, although most gyroscopes biases are between -5 and 5 deg/s. A calibration improves the gyroscope bias repeatability up to +/- 0.5 deg/s, whereas accelerometer biases are limited to 2 mg (0.1 deg roll/pitch error). Mounting a module on another board does not influence the calibration parameters. As modules are simultaneously tested during calibration, production yield of the end-user application is significantly improved.

The capital investments for a calibration and test setup are significant, especially when the number of sensors per year is limited (under 10,000 units per year). In cases in which fewer than 10,000 units per year are required, the test and calibration costs already justify the higher price of a module.

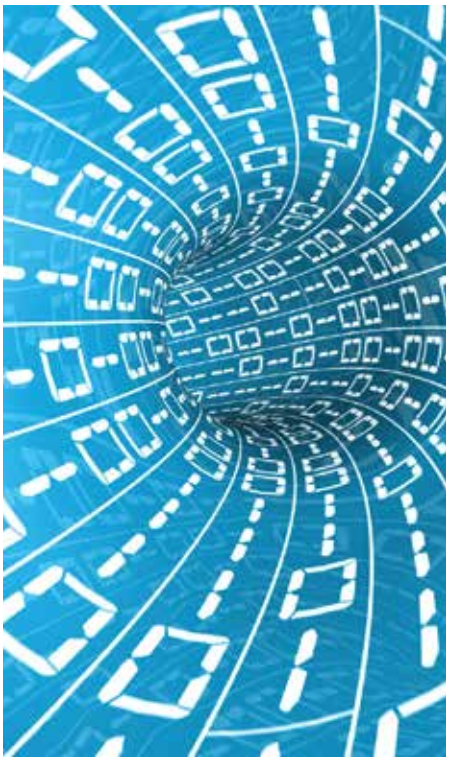
Electronics and Mechanical Design

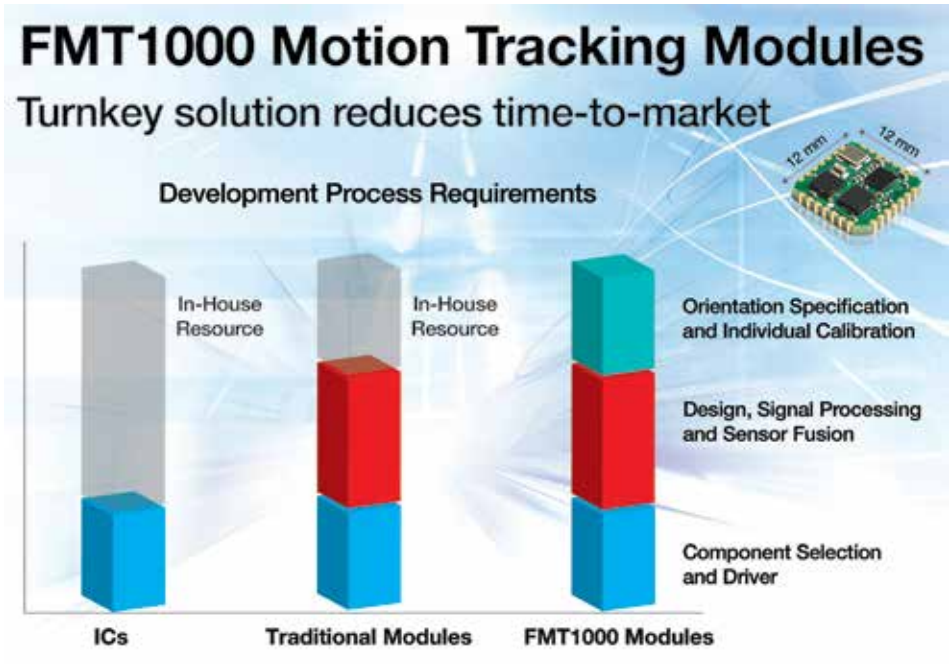
With magnetometers in many IMU designs, and with sensitive MEMS, the electronics design cannot be overlooked. Mechanical stress is often specified for the relatively large MEMS sensors components, so this should be taken into account. When something changes in the MEMS sensor component itself, the PCB of the end-user application may need to be redesigned. A turnkey module solves all these issues as it comes on a PCB that does not change interface and pinning and relieves the user from mechanical stress calculations.

Sensor Fusion Software

Sensor fusion software is required to interpret MEMS sensor data as useful orientation data, should the application demand this. Although sensor fusion algorithms are documented in literature, it is not as straightforward as just taking data and applying a filter. The sensor fusion algorithms of Fairchild's FMT1000 series modules are optimized for several different use case scenarios based on the decades of application experience of Xsens, an industry leader in motion tracking acquired by Fairchild. The sensor fusion algorithm can be processed with different sets of settings, such as dynamic, human motion or high magnetic dependency. Performance testing on a wide range of test platforms ensures the best performance for many different applications. An added benefit of using Fairchild's sensor fusion software is that the sensor fusion algorithm outputs different data in selectable output formats. Examples are free acceleration, where gravity is already subtracted; reference coordinate frames, for use in arbitrary alignment; and several fixed point and floating point output formats. Getting all this in a tested package will save you a lot of time and risk in the execution of your project.

The motion tracking module was designed keeping in mind user requirements and application needs. The design and development process took into thorough consideration the various aspects of producing and delivering a robust and high performance motion tracker module.





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The P9038-R-EVK (transmitter) and P9025AC-R-EVK (receiver) reference kits form a turnkey wireless power solution that can be used for immediate prototyping. An associated layout module enables direct instantiation on to a system board, while an optimized and fully-tested Bill-of-Materials (BOM) takes the guess-work out of component selection. Foreign Object Detection (FOD) tuning is supported via selectable pre-programmed curve settings and technical documentation.

The 5 Watt, 5 Volt solution is suitable for a wide range of applications, including PC peripherals, furniture, medical devices, and other portable devices still hindered by traditional contact-based charging bases or cables.

PB_WPREF-KITS_REVA_0815

Solving the Wireless Bandwidth Crunch with 60GHz Millimeter-Wave Technologies

› Pei ju Chiang, SiBEAM, Inc.

Millimeter wave technologies can provide the solution to the bandwidth crunch created by a growing number of Internet connected devices attempting to move ever-larger volumes of multimedia content across existing wired and wireless media. Operating at the unlicensed 60GHz frequency spectrum, a new breed of devices with integrated multi-gigabit transceivers are already delivering more bandwidth than those currently using the overcrowded 2.4GHz and 5GHz unlicensed bands. With multi-gigabit throughput, these devices are already delivering better services than the few hundreds of Mb/s available from today's most advanced wireless products.

Many applications are expected to benefit from 60GHz millimeter-wave solutions. These include adding new capacity to the traditional Wi-Fi networks in your home and between office buildings for wireless data access and video streaming. And the same technologies are also demonstrating great promise as a wireless replacement for mechanical connectors in consumer electronics and mobile devices. These short-range wireless connectors enable sleeker, more robust products by eliminating bulky conventional connectors while purging the susceptibility to damages caused by exposure to water, humidity, dust, and other contaminants.

Manufacturers are already beginning to migrate to millimeter-wave-based technologies. But risk factors must be considered for adoption, both in terms of selecting the right emerging standards, and choosing the right technology partner to assist in their implementation. This article provides a concise overview of the technologies, applications, and implementation challenges facing manufacturers as they attempt to design products which will satisfy the needs of a bandwidth-hungry world.

60GHz: The Next Frontier

Wi-Fi and Bluetooth wireless technologies, which made the mobile data revolution possible, have become victims of their own success. Originally intended to operate in the unlicensed 2.4GHz band, Wi-Fi's widespread acceptance quickly forced the Wi-Fi Alliance to define its operation for a series of channels located in the next globally available unlicensed band located at 5 GHz. Thanks to steady improvements in efficient 5GHz wireless protocols and radio architectures, Wi-Fi has been able to keep pace with the growing demand for bandwidth from laptops, tablets and other mobile devices.

IoT: the Game Changer

Excitement is growing as smart

devices from DTVs to coffee makers, to refrigerators will now be connecting to the Internet. As the number of wirelessly connected devices continues to skyrocket, the growing demand they create for both access and capacity will quickly outstrip what's available on the existing wireless spectrum. The problem is being compounded as wireless carriers offload increasing amounts of their multimedia traffic—their slices of the licensed cellular spectrum—to the 'free' spectrum available in the Wi-Fi bands.

As a result, both of today's commonly-used ISM bands are rapidly approaching overload. Technical improvements under development can mitigate the problem, but cannot ultimately solve congestion issues, especially in apartments, offices, public spaces and other areas with high user density.

The logical solution to the growing congestion is the adoption of technologies and products capable of operating in the 60GHz (millimeter wave) region where the regulators such as FCC have designated a wide band of spectrum for unlicensed use by industries. With more than 7GHz of spectrum, broken down into four 1.8GHz channels, this new airspace provides 20X more bandwidth than its 5GHz counterpart.

Wireless Connectors: Not an Oxymoron

60GHz millimeter wave also gives device designers an innovative solution to the annoying problems caused by mechanical connectors. When used with low power RF with the appropriate antenna, a millimeter-wave data interface can serve as a so-called 'wireless connector' which, at close proximity, provides more robust connectivity and can replace today's mechanical connector solutions. In fact, SiBEAM has introduced a

wireless connector solution that has demonstrated transfer rates of up to 12Gbp/s (full duplex). Known as Snap technology, it is intended as a replacement for most conventional data and video connectors, including all variations of USB 2.0, USB 3.0, HDMI, and DisplayPort.

Wireless connectors are especially valuable in mobile devices such as smartphones, tablets and cameras because they eliminate mechanical connectors, one of most failure-prone components in those products. Besides creating an entry point for the pocket lint, sweat and other common contaminants, most mechanical connectors have a tendency to wear out or shear off from their PCB mounts well before a product's batteries or electronic components have a chance to fail. Eliminating mechanical connectors allows designers to "life-proof" their products against water, dust, dirt, moisture and the occasional spilled coffee.

More, using wireless connectors allows designers to create sleek, stylish products which would not be possible if they had to compromise their industrial designs by sacrificing precious space to mechanical connectors. In fact, mechanical connectors have already become a stumbling block in the design process as manufacturers struggle to meet the demand for ever-thinner tablets, mobile phones and other electronic devices. Even today, connectors can take up as much as half the height of a CE device.

Close proximity wireless connectors also help to eliminate EMI problems. Often, mechanical connectors are the largest source of unwanted radio 'noise', and at Gigabit speeds, suppressing connector-induced EMI becomes a major system level challenge. This adds to both the overall system design effort and the unit cost of each device.

So, wireless connector solutions such as SiBEAM's Snap technology help designers to develop sleeker, more functional mobile electronic products which are better able to survive the real-world conditions.

Applications & Markets

Millimeter-wave radio's unique propagation characteristics include:

RF signals behave much more like

light than conventional radio waves at millimeter-wave frequencies. Because of this, early implementations in the band were limited to line-of-sight applications. However, recent innovative techniques such as adaptive beam-forming and beam-steering have been implemented to provide a robust non line-of-sight communication.

60GHz signals are attenuated by oxygen, a phenomenon that can severely limit range. This problem must be overcome in order to deliver the wireless experience consumers expect, a task which requires system-level knowledge as well as radio and antenna design know-how.

Unlike 2.4 & 5GHz signals, 60GHz RF cannot penetrate most walls. This makes 60GHz technologies suitable for consumer experience that is contained in the same room.

At first glance, these issues might seem to limit the utility of the millimeter-wave band, but properly defined applications deliver unique advantages to both users and manufacturers. These applications fall into three general categories, defined primarily by the distances they must span.

Gigabit Wireless Connectors

Wireless connectors, aka Close Proximity Data Links, provide high-bandwidth I/O in consumer electronics and computers at distances up to 10mm. One promising implementation of millimeter-wave interfaces is already available with SiBEAM's wireless Snap technology. Its high data throughput makes it ideal for creating wireless docking solutions or device-to-device synch connections. Boasting a 12 Gb/s aggregate throughput, Snap can completely replace the USB, HDMI, or DisplayPort connectors for data and video transfers. Snap is complementary to wireless power charging technologies, and when combined, Snapallows designers to create device form factors which are truly connector-free (Figure 2).

Indoor Wireless Connections

Millimeter-wave technology can also be used to enhance today's Wi-Fi networks by adding much-needed wireless capacity. In fact, one of the most active standards efforts for these applications is IEEE 802.11ad, formerly Wireless Gigabit – or "WiGig" for short. The standard defines a new physical layer for 802.11 networks in the 60GHz spectrum and is poised to become the next-generation Wi-Fi to alleviate the anticipated congestion in current 2.4GHz and 5.0GHz spectra.

The current 802.11ad specification includes an enhanced version of the standard 802.11 Media Access Control (MAC) layer to support data rates of up to 7Gbits/s. With a complete standard in place and early-market products already available, 802.11ad certification programs are now being implemented by the Wi-Fi Alliance.

While the up and coming 802.11ad standard can carry video streams over IP-based packet protocol, products based on the 60GHz WirelessHD standard have been shipping for almost a decade. Created to stream video content between HD audio/video devices such as HDTVs, DVRs, PCs, mobile and other consumer electronics, products supporting the WirelessHD standard provides the same 1080p60 Full HD video and multi-channel audio experience at near zero latency expected from cables. WirelessHD technology's high capacity and low latency is well suited for uncompromised wireless video entertainment and highly interactive experiences such as wireless gaming and virtual reality applications. WirelessHD enables a "cable like" HDMI experience without the wires and utilizes the 7GHz channel to support data rates of up to 28 Gb/s while carrying both 2D and 3D formats as well as 4K video streams.

The first wave of WiHD-enabled laptops, smartphones, DTVs, video projectors and VR headsets have been well-received, thanks to the ease-of-use and performance they offer. For example, the LeTV's MAX1 smartphone has garnered accolades and popularity in China, largely due to its integrated WiHD interface which lets users wirelessly beam games, movies or other video content playing on the MAX1 over to a video projector, LCD screen or other HD display. Users with non-WiHD-capable equipment can also enjoy the easy set-up and convenient operation afforded by a wireless connection with a WiHD-to-HDMI adapter, currently available from several manufacturers.

Both 802.11ad and WiHD compensate for the 60GHz band's line-of-sight propagation characteristics through the use of beam forming and beam steering between the transmitter and receiver ICs. Network processors along with RF IC integrated with phased array antennas increase the signal's effective radiated power and allows the wireless system to select the best available Tx/Rx path. In the case of WiHD, this technique has enabled products to support point-to-point, non-line-of-sight (NLOS) connections at distances of up to 10 meters.

While created to support different protocols and applications, WiHD and 802.11ad products are expected to peacefully co-exist in the same home, and even the same room (Figure 4).

Gigabit Wireless Outdoor Links

Millimeter-wave technologies will also play an important role in future backhaul infrastructure applications that include next-generation 5G mobile broadband infrastructure, fixed access backhaul extension, and point-to point on-campus links where the 60GHz channel's wireless capacity and highly optimized RF link make it an ideal 'wireless fibre' to replace today's fibre-based backhaul applications.

At present, there are several approaches vying for market acceptance but most systems are currently based on some implementation of the IEEE 802.11ad standard currently being developed. In addition to the in-room applications mentioned earlier, this amendment to the existing 802.11 standard includes the support of long-reach links (up to 500 meters) in the 60GHz millimeter wave spectrum.

Implementation Strategies

Implementing 60GHz millimeter wave technology does have its challenges but there are practical strategies which help. Perhaps the best advice is to choose CMOS RF ICs on which to base your system. Previously, most RFIC makers have relied on exotic, high cost processes such as Gallium-Arsenide (GaAs) or silicon-germanium (SiGe) which allow only limited integration and cost-reductions. Now, however, millimeter-wave devices using commodity-grade deep submicron CMOS processes are available. Such CMOS RFICs are helping to bring the cost of millimeter-wave products to cost points suitable for the consumer electronics market.

If a suitable commercially available solution is available, it is frequently the best choice, especially for early-entry products. Existing RFICs can reduce both time-to-market and development costs, allowing you to devote your resources to adding features which will help differentiate your product.

But there are considerations before you commit to a particular off-the-shelf chip/chipset:

The application affects the type of 60GHz technology you should choose. Is it wireless video within the room? Or gigabits of data across a campus? Or is it the need to transfer a lot of data across short distances extremely quickly?

Are you providing an end-to-end (closed) system or does the product have to comply to an industry standard?

l Is your product battery operated or will AC power be available? Trade-offs between link throughput, distance travelled, antenna design, and component selection will depend on the power available and operating time.

l What industrial design constraints will your product have? Any wireless design requires careful placement of the RF circuit within the system. 60GHz adds additional challenges due to the properties of short millimeter waves. In small form factors such as smartphones, heat dissipation and thermal management will add complexity as well.

l Budget. Depending on throughput, distance, form factor, and placement, different wireless components and system level implementation will impact the final cost.

Conclusion

With the 2.4GHz and 5GHz ISM bands approaching capacity saturation, the unlicensed portion of the millimeter-wave band offers a much-needed piece of open spectrum where wireless devices can enjoy new dimensions in capacity and access. Standards are already in place to define both indoor Wi-Fi service and outdoor long-haul links for point-to-point links as well as "last block" mobile access. Millimeter-wave technologies also show promise for use as ultra-short-range "wireless connectors" which eliminate the durability, EMI and industrial design issues associated with traditional mechanical connectors.

Advanced CMOS technologies are making it possible to unlock the potential of all these applications of the unlicensed 60GHz frequency spectrum in an economical manner. SiBEAM is one of the few companies in the world that has mass-produced millimeter-wave ICs in high-volume CMOS fabs on multiple process nodes for over a decade. Part of the company's success can be attributed to its proven closed-loop design for production process where the device's production test vectors are created using inputs from collected data from the CMOS processes used. During production tests, the results produced by these highly-accurate test vectors are then used as feedback by designers to fine-tune the design for optimal yield and performance. The methodology can be migrated between process nodes at different manufacturing foundries. SiBEAM provides support through every phase of design, manufacturing, test and deployment including: RF design, thermal management planning; ackaging and implementation; compliance testing, FCC Part 15B and Part 15C.

This One Misconception About Power Integrity is Going to Cost You Big Bucks

› Steven M. Sandler, Picotest

This misconception is analogous to believing that high speed and microwave engineers don't need to worry about impedance matching as that's a system level issue. In the case of RF, most circuits maintain a 50Ω impedance. The source is 50Ω, the load is 50Ω and the interconnecting printed circuit boards and cables are 50Ω. The impedance matching is well understood and designers of each circuit stage plan for this in their design. The PCB designer also assures that the traces maintain the 50Ω impedance necessary to match the source and load circuits. The same is true of high speed differential transceivers, though the impedance levels tend to be higher, often 100Ω. While power systems are not nearly so well defined, the same considerations are warranted.

What is PI?

Power integrity is the assurance that appropriate power is delivered to the circuits within this system. Appropriate is dependent on what is being powered. For example, low noise microwave amplifiers (LNA's), low jitter clocks and analog sensors can be sensitive to microvolts of power supply noise. This is quite different from high speed transceivers and FPGA's that must maintain certain operating voltage levels, despite very large operating current transients. Power integrity is the assurance that these various power quality requirements are met at each circuit throughout the system. It's easy to see then why it might be incorrectly perceived as a system level issue. But the fact remains it is not a system level issue. The power supply plays a very large role in PI and overcoming an inappropriate power supply may be expensive at best and insurmountable at worst.

What is the PDN

The power system is comprised of power supplies, printed circuit board planes and decoupling capacitors. Collectively, these represent the power distribution (or delivery) network (PDN) as seen in Figure 1. These individual elements interact with each other and achieving PI requires them to be properly balanced.

That being the case the characteristics of the power supply have a significant impact on PI and counter-intuitively a power supply that is "too good" can destroy the balance, resulting in significantly degraded PI.

The power supply contribution to PI

The Picotest VRTS3 training board includes just such an example. The section of the board shown in Figure 2 includes a linear regulator with a selection of output capacitors (U301 and C301-C304), a printed circuit board trace and a 10nF local decoupling capacitor, C402. resulting power is applied to a 125MHz clock (OSC401).

The power supply impedance is measured at the decoupling capacitor in order to see the power quality at the load (125MHz clock) and shown in Figure 3. The impedance is measure with 2 different LDO output capacitors and also with a 2.4Ω resistor switched in series between the voltage regulator

Figure 1. The Power Distribution Network (PDN) is comprised of the VRM, planes and decoupling capacitors

and the decoupling capacitor. Yes, the insertion of the resistor significantly degrades the voltage regulation of the LDO and yet, the impedance seen at the clock is much lower with the series resistor added. This is the result of matching the impedance of the VRM (in this case it is our LDO) with the impedance of the circuit board and decoupling capacitor.

The impedance in the red trace is with a low ESR capacitor that results in an impedance peak at approximately 15MHz due to poor control loop stability. A second peak appears at approximately 7MHz and is the result of the net inductance of the PCB trace resonating with the local decoupling capacitor (C402). Since there are two peaks, it is possible to generate a rogue wave by exciting both resonances simultaneously as seen in Figure 4.

Certainly there are alternative methods of correcting this deficiency. One possibility is to replace the 10nF capacitor with a larger decoupling capacitor. In this case, using the High ESR regulator output capacitor and replacing the 10nF decoupling capacitor with 0.47uF with a 0.5Ω ESR would also eliminate the peak. The capacitor likely needs to be closer to 1uF to overcome the DC bias effect of the ceramic capacitor. This solution adds more parts and the 0.47uF ceramic might be significantly larger. Another possibility is to move the regulator closer to the clock and possibly increase the width of the PCB trace or reduce the dielectric thickness of the PCB. The point is that the power supply, PCB and system have to be designed as a unit. Designing a power supply in isolation of the system will only pass the problems on to someone else where it will ultimately result in a more costly solution.

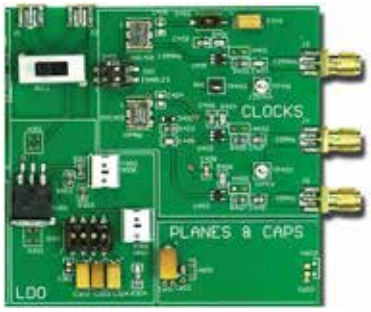


Figure 2. A section of the Picotest VRTS3 training board include an LDO (U301), bulk capacitors (C301-C304), a decoupling capacitor (C402) and a 125MHz clock (OSC401). The connections are made by PCB traces

Selecting a lower cost and higher ESR capacitor results in the blue trace. The first sharp resonance has been eliminated and note that while the ESR increased the impedance at C402 is now lower than with the low ESR capacitor. The peak is still large since the VRM output resistance is much lower than the characteristic impedance of the PCB and decoupling capacitors.

The clock spectrum is shown in Figure 5 with and without the 2.4Ω series resistor switched in. Without the series resistor, the clock shows strong 7MHz sidebands while these sidebands are eliminated by switching in the 2.4Ω series resistor.

Conclusion

Power integrity might be misconceived as a system issue, however, as we have shown the voltage regulator and the system interact with each other.

A well planned PDN saves time and money, as well as a great deal of aggravation and stress. The power supply, printed circuit board and circuits being powered are generally designed independently and on different time schedules. Nonetheless, it is important to determine the general power characteristics required by the load circuits. The primary characteristics include the voltage level and accuracy, ripple and noise voltage, operating load current and dynamic load current transients. These characteristics will help in determining the power supply impedance, printed circuit board plane impedance, decoupling networks.

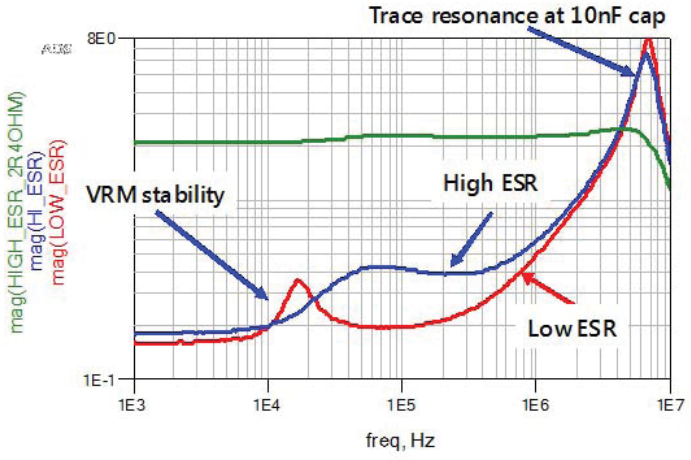


Figure 3. The impedance is measured at the clock decoupling capacitor (C402) with 2 different output capacitors and with a 2.4Ω resistor switched in series between the LDO and the decoupling capacitor

Application Circuit for PGA-122-75+ Operation over CATV Uplink Bandwidth

› Radha Setty and Brandon Kaplan, Mini-Circuits

CATV systems typically require 75Ω components with an operating frequency range of 40 to 1250MHz in the downstream path and 5 to 200MHz in the upstream path. Mini-Circuits' PGA-122-75+ 75Ω MMIC amplifier is designed and characterized for CATV applications with a frequency range of 40 to 1500MHz, making it suitable for use in the downstream path. Within this range, the amplifier provides high dynamic range with typical output IP3 of +43dBm, low noise figure of 2.9 dB and flat gain of 15.5 ± 0.1dB. However, its specified performance is characterized in an application circuit matched for the downstream bandwidth (40 to 1250MHz), which does not support use at lower frequencies. To extend its usability for upstream applications, Mini-Circuits has developed an application circuit to realize comparable amplifier performance over the 5 to 200MHz band.

This article will present an application circuit for PGA-122-75+ over the 5 to 200MHz band, enabling the amplifier to be used in CATV upstream applications. Test results will be provided to validate the amplifier's performance in the upstream application circuit.

Downstream Application Circuit (40-1500 MHz)

The recommended application circuit for PGA-122-75+ from the model data sheet is shown in figure 1 includes DC blocking and matching circuitry at both the input and output. A biasing inductor (L3) and bypass capacitors (C3, C4, C5) prevent high frequency leakage from interfering with the power supply.

The amplifier was characterized in this application circuit for gain, isolation, input and output return loss, OIP3, P1dB and Noise figure following Mini-Circuits standard test procedures. Data plots of the measured performance are shown in figure 2 below for reference.

The amplifier exhibits excellent performance across its specified operating bandwidth from 5 to 1500MHz, but performance degrades below 40GHz as expected.

Upstream Application Circuit (5-200MHz)

To extend the performance of the amplifier down to the upstream bandwidth, Mini-Circuits developed the application circuit in figure 3.

The matching circuitry at the input and output are modified to achieve better matching in the lower frequency range. The RF choke at the output also must be have a significantly

Component	Value	Size
DUT	PGA-122-75+	-
C1	1000 pF	0402
C2	120 pF	
C3	100 pF	
C4	10000 pF	
C5	10 µF, 25V	1206
D1	Zener Diode 5.6V ONSEMI MMSZ4690T1G	SOD123
L1	3.3 nH	0402
L2	4.7 nH	
L3	560 nH	0603
R1	1.5 kOhm	
Q1	Transistor ONSEMI FET NTS4101P	SOT323

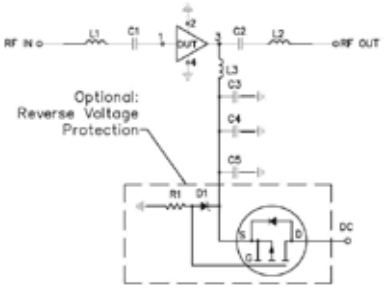


Fig 1: Recommended application circuit for PGA-122-75+

higher value to prevent degradation of gain and output power.

The test board in figure 4 was assembled to test the performance of PGA-122-75+ in the application circuit for the upstream bandwidth. Gain, isolation, input and output return loss, OIP3, P1dB and Noise Figure were swept from 5 to 200MHz. The test

The results of this test indicate that the amplifier exhibits comparable performance to the model spec down to 5MHz in the new application circuit. This enables the amplifier to be used in upstream applications without sacrificing performance.

Conclusion

The application circuit for PGA-122-75+ presented in this article enables designers to use PGA-122-75+ 75Ω MMIC amplifier for upstream CATV applications. This capability allows the same amplifier to be used in both the downstream and upstream paths, reducing system part counts and reducing costly qualification effort on the customer end.

Test boards for both downstream and upstream application circuits are available from stock to support customers evaluating the PGA-122-75+ for their systems.

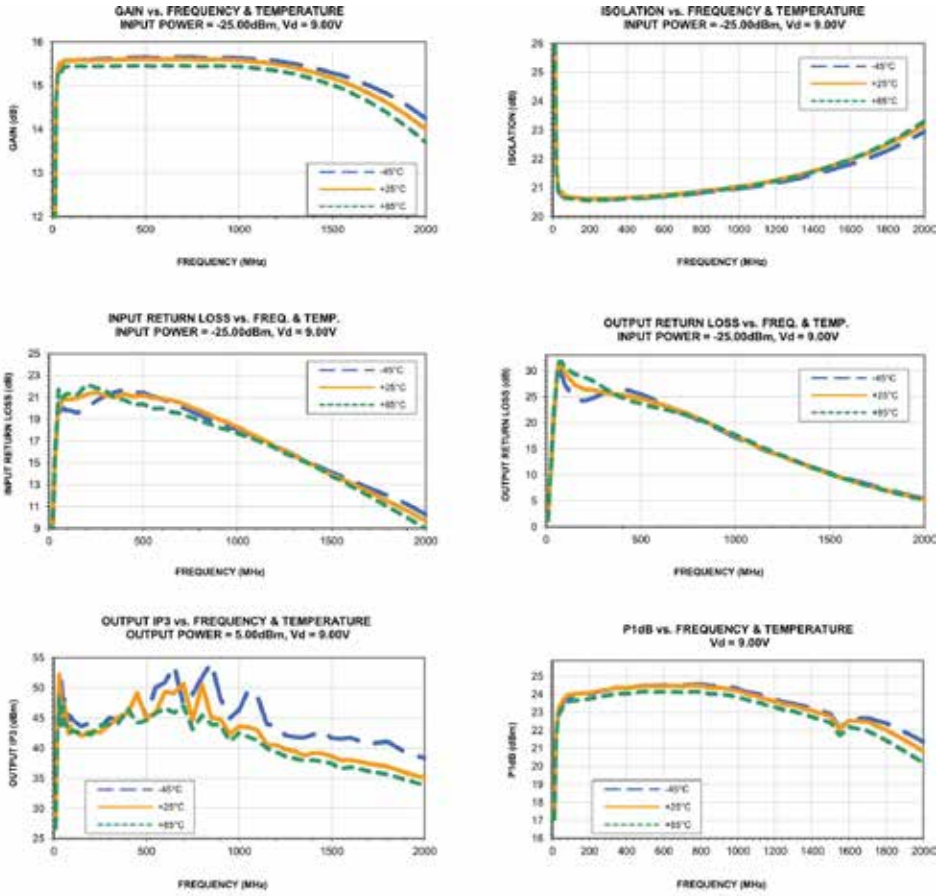


Figure 2: Plots of measured performance of PGA-122-75+ in recommended application circuit (downstream)

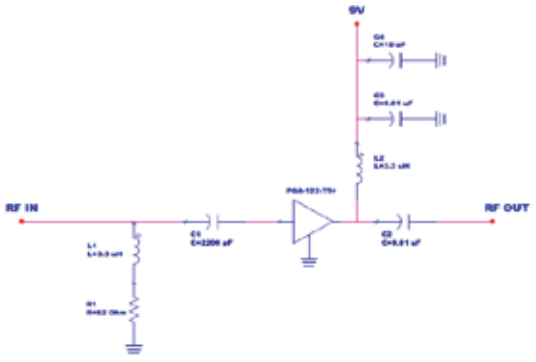
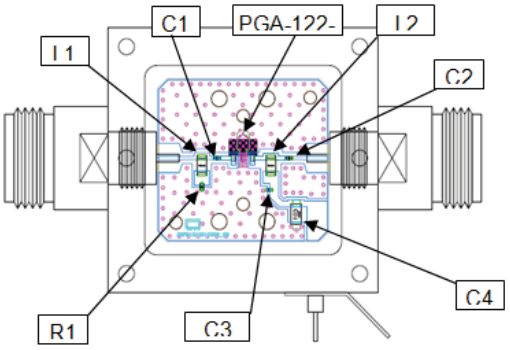


Figure 3: Application circuit for PGA-122-75+ in CATV upstream bandwidth



Component	Part Number	Value	Size
L1	LQH31MN3R3K03L	3.3 uH	1206 (3216)
L2			
C1	GRM155R71H222KA01	2200 pF	0402
C2	GRM155R71H103KA88	0.01uF	0402
C3	GRM155R71H103KA88	0.01uF	0402
C4	GRM32ER71H106MA2L	10uF	1210
R1	RK73H1ET	62 ohm	0402

data is plotted in figure 5.

Figure 4: Test board for PGA-122-75+ in application circuit for upstream bandwidth.

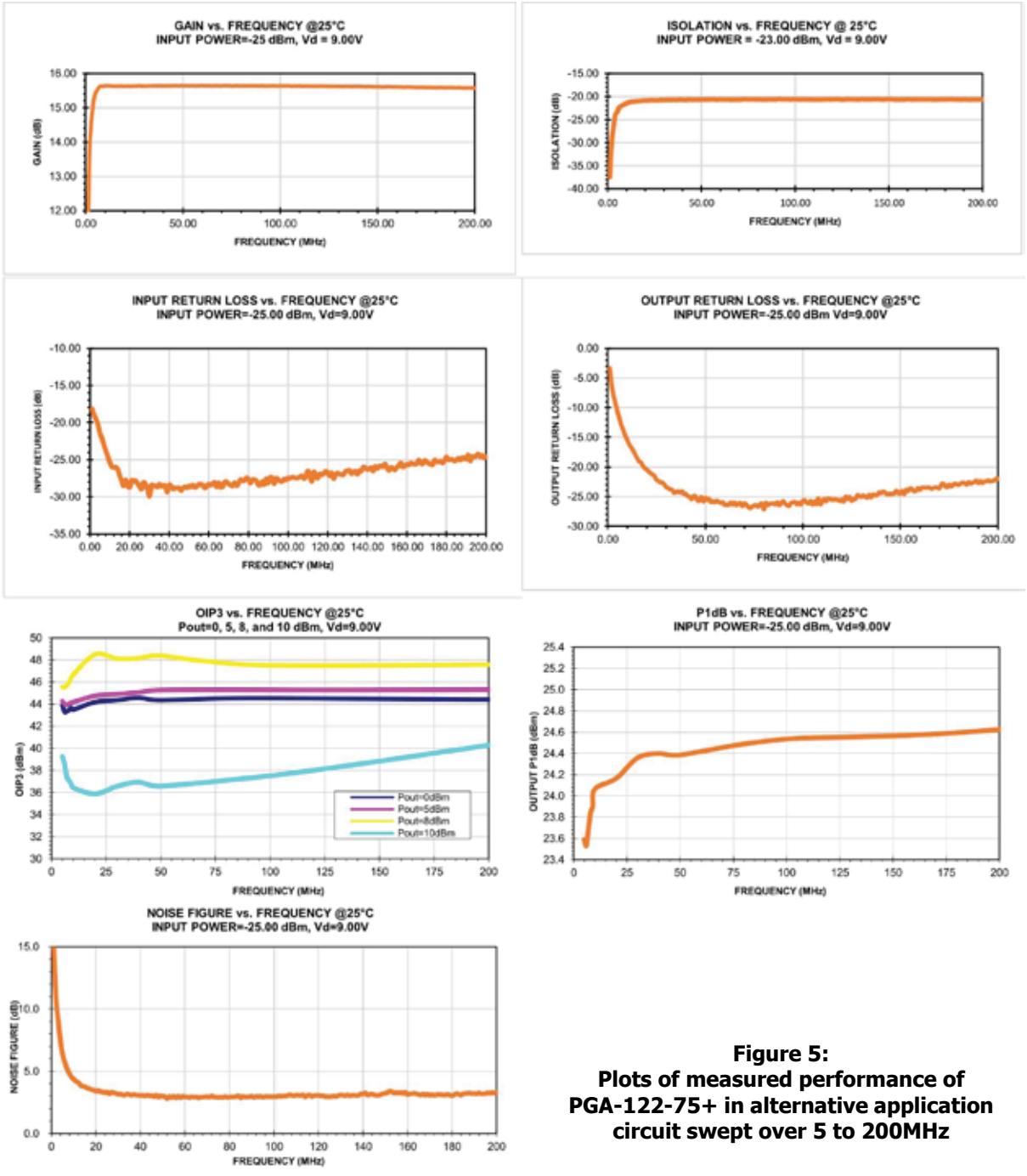


Figure 5:
Plots of measured performance of PGA-122-75+ in alternative application circuit swept over 5 to 200MHz

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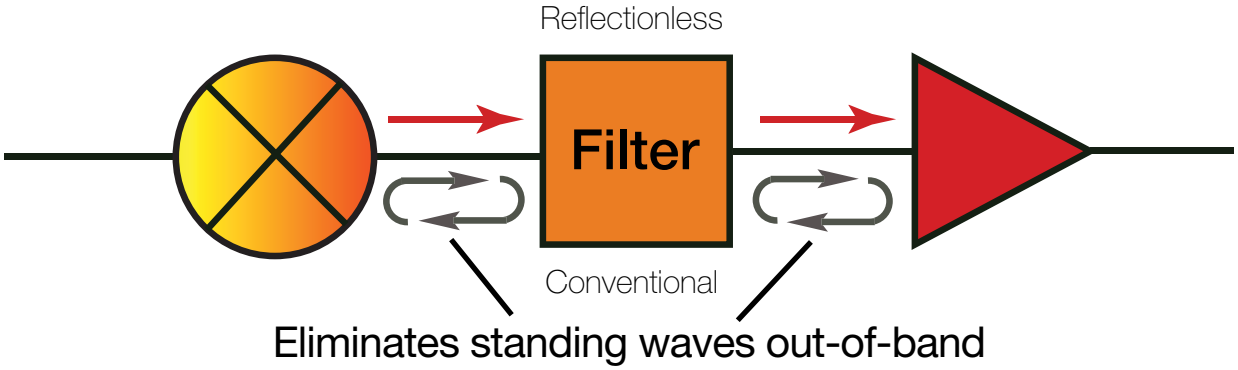

Stops Signal Reflections Dead in Their Tracks!

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Mini-Circuits is proud to bring the industry a revolutionary breakthrough in the longstanding problem of signal reflections when embedding filters in RF systems. Whereas conventional filters are fully reflective in the stopband, our new X-series reflectionless filters are matched to 50Ω in the passband, stopband and transition band, eliminating intermods, ripples and other problems caused by reflections in the signal chain. They're perfect for pairing with non-linear devices such as mixers and multipliers, significantly reducing unwanted signals generated due to non-linearity and increasing system dynamic range by eliminating matching attenuators[2]. They'll change the way you think about using filters in your design!

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- ✓ Absorbs stopband signal power rather than reflecting it
- ✓ Good impedance match in passband stopband and transition
- ✓ Intrinsically Cascadable[3]
- ✓ Passbands from DC – to 21 GHz[4]
- ✓ Stopbands up to 35 GHz

 *Tiny 3x3mm QFN*

[1] Small quantity samples available, $9.95 ea. (qty. 20)
[2] See application note AN-75-007 on our website
[3] See application note AN-75-008 on our website
[4] Defined to 3 dB cutoff point

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The TF-X™ - The flying car of tomorrow

Terrafugia's vision for the future of personal transportation, the TF-X™ is a semi-autonomous four-seat hybrid electric flying car with vertical takeoff and landing capabilities. The TF-X™ will be released several years after the Transition®, and will bring a new level of freedom to the personal transit experience.

The TF-X™ is the practical realization of the dream of countless visions of the future; it is designed to be the flying car for all of us. In order to achieve this long-sought-after vision, Terrafugia will focus the TF-X™ program with clear goals that enhance the safety, simplicity, and convenience of personal transportation. We believe these goals are achievable today.

TF-X™ Quick Facts:

Timeline: The TF-X™ is still in the early stages of development, with a production date estimated at 8-12 years in the future.

Pricing: The price will be consistent with high-end luxury cars. More specific pricing information will become available as we progress in the development of the TF-X™ program.

Range: the TF-X™ will have a range of 500 miles with cruise speeds up to 200mph.

TF-X™ Goals:

Safety

Operating the TF-X™ should be statistically safer than driving a modern automobile.

The TF-X™ will be capable of automatically avoiding other air traffic, bad weather, and restricted and tower-controlled airspace.

The TF-X™ will have a backup full-vehicle parachute system which can be activated by the operator in an emergency if the operator believes the TF-X™ to be incapable of auto-landing.

If a TF-X™ operator declares an emergency (which will automatically notify authorities of the situation), the TF-X™ can be landed in non-approved landing zones.

If the operator becomes unresponsive, the TF-X™ would automatically implement an emergency auto-land at the nearest airport.

Simplicity

Learning how to safely operate the TF-X™ will take substantially less time than would be required for a traditional aircraft.

The TF-X™ will give the operator significant freedom in flight – controlled in a manner similar to steering a car.

The TF-X™ will be able to fly in either "manual" or "automatic" modes between approved landing zones or airports.

Convenience

The TF-X™ will carry four people in car-like comfort.
The TF-X™ will have a non-stop flight range of at least 500 miles.
The TF-X™ will fit into a standard construction single car garage.
The TF-X™ will be able to take off vertically from a level clearing of at least 100ft in diameter.
The TF-X™ will be able to drive on roads and highways – providing true door-to-door convenience and an automotive level of weather insensitivity.
In order to facilitate the achievement of this new dimension of personal freedom, the TF-X™ will be priced as low as possible while still allowing Terrafugia to grow to support our customers. The final pricing will not be set until we are much closer to delivery. The biggest price driver is the cost of production. It is likely that TF-X™ will be more expensive than a "normal car" due to the higher costs of the necessary light-weight materials, but with investment in automotive scale production, early studies indicate that it is possible that the final price point could be on-par with high-end luxury cars of today. As demand increases, new materials and manufacturing processes will surely be developed and the price may come down further in the distant future.

Vision of TF-X™ Technical Operations:

The TF-X™ is a fixed wing street-legal aircraft with electric ground drive and electric power assist on takeoff and landing.
The TF-X™ will be capable of "auto-landing" at approved landing sites within approved weather limits.
Prior to departure, the operator will select a primary target landing zone and backup landing zones. If the TF-X™ calculates insufficient energy on board to conduct last minute aborts at the first two sites and safely navigate to and land at the third within a 30 minute reserve, or if the forecast weather in any of the three landing zones would be outside the allowable limits, or if any of the selected landing zones are in temporarily restricted airspace (TFRs), departure will not be allowed until appropriate landing zones are selected.
Aborting the third landing at the end of an extended flight would result in the automatic declaration of an emergency and a horizontal (airplane-like) landing at the nearest airport.
Normal TF-X™ operations will be conducted only in non-tower controlled airspace (Class E and G) and on the ground. Operators who wish to operate in tower controlled airspace (Class B, C, or D) will be able to get additional training.
Licensed TF-X™ operators will be allowed to apply to add new landing zones to an approved landing zone database.
The TF-X™ will advise the operator if they are approaching restricted or tower-controlled airspace, or unnecessarily increasing the risk to human life (as could happen through carelessness, bad intentions, or if the operator becomes incapacitated). If the operator does not take the appropriate corrective action, the TF-X™ vehicle will automatically notify authorities by "declaring an emergency" on behalf of the operator.

(http://www.terrafugia.com/)

Infineon multimode flyback controller improves performance and drives down power consumption in mid- to high-end LED lighting designs

Infineon Technologies AG (FSE: IFX / OTCQX: IFNNY) today launched a multimode flyback controller IC for LED applications. It can shorten 'time-to-light', lower component counts and reduce operational and standby power consumption. Designed to meet the performance and efficiency demands of mid-range to high-end LED designs, the IRS2982S provides a versatile controller solution that can meet the needs of a wide variety of interior, outdoor, office and industrial lighting schemes.

The IRS2982S incorporates a 600 V high-voltage start-up cell that delivers a fast 'time-to-light' of less than 0.5 s. At the same time, it eliminates the need for external components for voltage division. Configurable Critical Conduction Mode (CrCM) and Discontinuous Current Mode (DCM) operation ensure compatibility with a wide range of application requirements. They make the device suitable for dimming LED converter designs across the full current range. The key application of the IRS2982S is the isolated flyback with CV (constant voltage) mode which opens up design flexibility in other topologies, such as non-isolated flyback with CC/CV, buck, boost, and SEPIC (single ended primary inductor converter).

Designed to keep power consumption to a minimum, the IRS2982S features a burst mode capability that ensures ultra-low standby power. The device operates from a wide input voltage range of 85 VAC to 305 VAC and incorporates over-voltage and over-current protection as standard. An optimized single-stage PFC/flyback design ensures a power factor of higher than 0.9 and a low THD of below 20 percent.

Intersil Ships Industry's First USB-C Buck-Boost Battery Charger

Single-chip ISL9237 reduces BOM costs up to 40%, extends battery life for ultrabooks, tablets and power banks

Milpitas, Calif., Feb. 17, 2015 – Intersil Corporation (NASDAQ: ISIL), a leading provider of innovative power management and precision analog solutions, today introduced the industry's first buck-boost battery charger that supports two-way power delivery in ultrabooks, tablets and power banks using the reversible USB Type-C™ connector. The single-chip ISL9237 Narrow VDC (NVDC) battery charger replaces competitive buck and boost two-chip charger solutions, eliminating a charger IC and inductor to reduce customer bill of materials (BOM) costs by up to 40%. The ISL9237 leverages Intersil's patented R3™ modulation technology for acoustic noise-free operation, excellent light load efficiency and ultra-fast transient response to extend battery run-time.

The USB 3.1-compliant ISL9237 joins the emerging USB-C™ ecosystem as the first battery charger capable of providing buck-mode, buck-boost-mode, and boost-mode for 1-to-3 cell Li-ion batteries. It also supports USB On-The-Go (OTG) with a 5Vout reverse buck-mode, and reduces traditional two-stage charging to a single-stage buck-boost for improved efficiency. The USB Type-C interface connection enables delivery of data, video and power up to 100W over a single cable.

In charging mode, the ISL9237 takes input power from a wide range of DC power sources — AC/DC charger adapters, USB power delivery (PD) ports and any travel adapter — to charge battery packs with up to 3-series cell Li-ion batteries. The ISL9237 can also operate connected to only a battery, an adapter, or both. The ISL9237's system turbo-mode helps the battery and charger adapter work together to supply the system load when it exceeds the adapter's capability. In turbo-mode, the ISL9237 quickly turns on the battery BGATE FET to deliver system power. In addition, the ISL9237's wide 5V to 20V input voltage capability helps boost the USB-C ecosystem to support new power bank products. Watch a video on the ISL9237 solution.

"Mobile computing customers have come to rely on Intersil's battery charging and power management innovations to create the world's most efficient devices," said Andrew Cowell, senior vice president of Mobile Power Products at Intersil. "The ISL9237 is the first USB-C battery charger to market. It far exceeds the limits of what was previously possible to help our

customers develop products with thinner form factors and much longer battery life."

The ISL9237 battery charger is the latest member of Intersil's family of mobile computing power management solutions, which include the ISL95852 Vcore PMIC, the ISL95908 peripheral PMIC, and Intersil's discrete PWM controllers (ISL95853/54/55/57). These products power IMVP8-compliant systems using Intel 6th Gen Core processors.

Key Features and Specifications

- Buck-boost NVDC charger for 1-, 2-, or 3-cell Li-ion batteries
- Input voltage range of 3.2V to 23.4V (no dead-zone)
- System output voltage of 2.4V to 13.824V
- Up to 1MHz operation allows use of smaller, lower cost inductors and automatically reduces switching frequency with no audible acoustic noise when charger is in DCM mode
- ASGATE FET control: actively controls inrush current to prevent FET damage
- LDO output for charger VDD
- Compliant with Intel PROCHOT# and PSYS for protection against battery voltage drop, adapter over-current, battery over-current and overheat
- Allows trickle charging of depleted battery
- SMBus/I2C programmable limit settings with adapter current monitor (AMON) and battery discharging current monitor (BMON)
- Battery learn mode activated by SMBus control command, allows calibration of the battery fuel gauge

Pricing and Availability

The ISL9237 buck-boost battery charger is available now in a 4mmx4mm, 32-lead QFN package and priced at $3.50 USD in 1k quantities. For more information on the ISL9237, please visit www.intersil.com/products/isl9237.

OriginGPS' New Module Adds Multi-GNSS to the World's Smallest Footprint

OriginGPS' New Multi Micro Spider Supports GPS, Glonass, BeiDou and Galileo, Featuring MediaTek Technology for Optimal Performance, Signal Accuracy and Power Efficiency Within Ultra-Small Size

OriginGPS, one of the leading manufacturers of miniature Global Navigation Satellite System (GNSS) modules, announced today the launch of their new revolutionary Multi Micro Spider, boasting the world's smallest footprint within a fully integrated and highly sensitive multi-GNSS module.

The Multi Micro Spider is uniquely positioned for applications that require quick movement, minimal power consumption and ultra-small form factors, ranging from wearables to drones.

Like its predecessor, the Multi Micro Hornet (ORG1510-MK), the Multi Micro Spider's (ORG4033) module utilizes MediaTek's MT3333 chip and its onboard flash memory to achieve a rapid update rate and positioning speed of up to 10Hz.

"With the Multi Micro Spider, we're breaking new ground in what's possible with GNSS footprints," said Gal Jacobi, CEO of OriginGPS. "In fact, the new Multi Micro Spider is the smallest multi-GNSS module ever created. It's a plug and play solution that will enable developers to easily improve performance of products while shortening time to market. Because of its size, low power consumption and high performance, the Multi Micro Spider is the perfect GPS and GNSS solution to power the location services for a wearable out on the go to a UAV tracking action sports."

The Multi Micro Spider's key features include:

Peak performance with ultra-small size - At just 5.6 mmx5.6 mm, with a height of 2.65 mm, the Multi Micro Spider packs in a sub-one second Time To First Fix (TTFF) and an industry-leading sensitivity of -165dBm for two simultaneous constellations. All of this achieved using less than 9 mW of power.

OriginGPS' Noise Free Zone (NFZ)™ - The ORG4033 utilizes OriginGPS' patented and proprietary NFZ technology for continued noise immunity and razor-sharp sensitivity even in poor signal conditions.

Onboard flash for market-leading update rate - With an onboard flash memory and an update rate of up to 10Hz, the Multi Micro Spider breaks the market's standard update rate benchmark of 5Hz for positioning, accurate to within 2.5 meters.

Intuitive design that facilitates shorter time to market - The Multi Micro Spider makes use of a developer-friendly design that allows for seamless migration from GPS to GNSS pin-to-pin compatibility. This both reduces overall development costs for new products and shortens their time to market.

Easy integration with OriginGPS' miniature GNSS antenna solutions - The Multi Micro Spider can be easily

integrated with the ORG12-4T-GNSS miniature patch antenna to get the best performance out of a compact form-factor.

Utilizing MediaTek's MT3333 chip, the Multi Micro Spider extends the functionality of GPS and GNSS solutions in wearables, drones and Internet of Things devices, providing a highly integrated multi-GNSS solution that delivers the world's smallest footprint, without sacrificing any of its superior power consumption, signal sensitivity and accuracy.

Marvell Expands Its 32-bit and 64-bit ARMADA SoC Family of Embedded Processors with Robust Ecosystem of Software Solutions and Partners for a Variety of Applications

Marvell (NASDAQ:MRVL), a world leader in storage, cloud infrastructure, Internet of Things (IoT), connectivity and multimedia semiconductor solutions, today announced the 32-bit and 64-bit ARMADA® system-on-chip (SoC) ecosystem of software solutions and partners for a variety of applications.

Marvell's expanded, rich ecosystem brings strong support and commitment to the open source community with software offerings including mainline Linux kernel and mainline U-Boot on publicly available community hardware platforms. Marvell's expansion of its 32-bit and 64-bit ARMADA SoC software ecosystem with OpenDataPlane (ODP), OpenFastPath (OFP), UEFI, openSUSE, SUSE Linux Enterprise, Yocto Project, OpenWrt and carrier grade operating systems demonstrates Marvell's commitment to supporting its customers' requirements to bring new products to market faster.

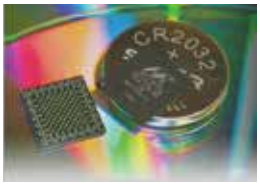
"The 32-bit and 64-bit ARMADA SoC family, paired with our full-featured software offering and integration with publicly available hardware platforms, is designed to enable the quick development of a variety of wired and wireless networking solutions.

Our customers can already leverage the ARMADA SoC ecosystem on Marvell's proven ARMADA 38x family, and will benefit from the expanded ecosystem of our 64-bit ARM®v8 powered ARMADA 3700 Cortex®-A53 device family and ARMADA 7K and ARMADA 8K Cortex-A72 device families based on our MoChi™ and FLC™ architecture," said Michael Zimmerman, Vice President and General Manager of Connectivity, Storage and Infrastructure at Marvell Semiconductor, Inc.

"We are excited to work with our network of global partners to provide a choice of trusted complementary products, and open source and community solutions to enable the development of sophisticated high-volume home and enterprise applications." Based on high-performance and highly-scalable multi-core CPU technology, the ARMADA SoC family delivers a new level of performance, integration and efficiency to high-volume enterprise applications including control plane CPUs, IP appliances, storage edge, routers, security appliances, small and medium-sized enterprise (SME) routers, network attached storage (NAS), home gateways, IoT hubs, wireless routers, Wi-Fi access points (WAP), surveillance video recorders and high-performance networking products.

The 64-bit ARMv8 powered ARMADA 3700 Cortex-A53 device family and ARMADA 7K and ARMADA 8K Cortex-A72 device families based on MoChi and FLC architecture provide a new level of performance and power optimized devices. Marvell's ARMADA SoC family is complemented by several software and hardware partners including Aricent, Avnet Memec - Silica, DENX, Enea, Free Electrons, Globalscale Technologies, Lauterbach, Media5, MontaVista, O.S. Systems, Sartura, Semihalf, SolidRun, StreamUnlimited, SUSE, Timesys, Trend Micro, Volansys and Wind River.

"We are pleased to show Marvell's ARMADA 38x SoC family enabled by Avnet Memec - Silica EMEA Yocto 2.0 layer at embedded world 2016," said Mario Orlandi, President Avnet Memec - Silica EMEA. "Avnet has had a long-lasting successful collaboration working with Marvell and witnessing first-hand the company's commitment to helping customers quickly create and deliver premier products to market. We look forward to continuing our close collaboration with Marvell to provide customers with world-class design engineering services and resources to support the development of innovative, high-performance products and solutions."



Atmel Extends 8-bit MCU Leadership; Launches Industry's Highest Performing 8-bit tinyAVRs with 1kB Flash

Ideal for Consumer, Industrial and Home Automation Markets, New 8-bit AVRs Deliver Industry's Smallest And Lowest Power 8-bit MCU Solution on the Market Today with Just 1kB Flash

Today, at Embedded World 2016, Atmel® Corporation (NASDAQ: ATML), a global leader in microcontroller (MCU) and touch technology solutions, announced the world's highest performing, low power, 8-bit MCUs with 1kB Flash memory. The new ATtiny102/104 MCUs run up to 12MIPS and integrate features previously only available in larger more expensive MCUs, making them ideal for smaller applications including logic replacement and the latest cost-optimized applications in the consumer, industrial and home automation markets.

The majority of today's 8-bit market growth is coming from applications that previously only required discrete components. With many of these new applications requiring simple intelligent functions including timing, motor control or on/off functionality, 8-bit MCUs are becoming an essential feature for the personal healthcare, small kitchen appliance and consumer markets. The ATtiny102/104 8-bit AVRs provide all the necessary features to help spur the growth in these applications with its small, cost-optimized low-pincount package with just 1kB of Flash memory. Integrated features include self-programming for firmware upgrades; non-volatile data storage; accurate internal oscillator to provide more reliable motor control; high-speed serial communication with USART; operating voltages ranging from 1.8V to 5.5V, 10-bit ADC with internal voltage references; and sleep currents at less than 100nA in power down mode with SRAM retention.

"Atmel has already sold more units of its 8-bit AVR core based MCUs than the 7.4 billion people on Earth," said Oyvind Strom, Sr. Director of MCUs, Atmel Corporation. "We continue to expand our AVR portfolio with the new ATtiny102/104 8-bit MCUs. These are the first two devices in our new AVR Tiny portfolio that are packed with features optimized for tiny, compact MCU systems such as LED lighting, fan control and other small applications."

Key Features for Atmel's 8-bit tinyAVR MCUs

- 1kB Flash / 32bytes SRAM
- 8- and 14-pin packages down to 2mmx3mm in size
- Up to 12 MIPS at 12MHz
- Self-programmable Flash
- Accurate (±3%) Internal oscillator

Multiple calibrated internal voltage references (1.1V, 2.2V, 4.3V)

- 10-bytes Unique ID (serial number)

USART

- 10 bit ADC and analog comparator

1.8V to 5.5V voltage range

- -40°C to +105°C and -40°C to +125°C temperature ranges

Development Kits and Ecosystem

To accelerate the design process, Atmel offers a low-cost Xplained Nano evaluation kit available for only $4.44 USD in the Atmel Store. The new kit includes a board with an ATtiny104, embedded programmer, access to all I/O, one push button and one LED. The ATtiny102/104 are fully supported by Atmel's development ecosystem, including Atmel Studio 7, the integrated development environment (IDE) for developing and debugging Atmel | SMART Cortex-M and Atmel AVR MCU-based applications. Atmel Studio 7 gives designers a seamless and easy-to-use environment for coding, building, simulating, programming, and debugging applications for Atmel MCUs. With Atmel's broad portfolio of AVR products and easy-to-use development software, designers can bring their 8-bit MCU to market quickly. Additionally, designers have access to the company's embedded software, including the Atmel Software Framework and application notes, and the Atmel Gallery 'app' store.

Availability

The ATtiny 102/104 engineering

samples are available today with mass production samples scheduled for May 2016.

New extended Harwin Spring Contact Connector range now includes 13 types in extended C and Positive Stop styles, plus low profile 1.1mm model

Ideal for low voltage connections and grounding to prevent RFI/EMI; suits antenna feeds in wearable and mobile applications

Portsmouth, UK, 10 November 2015… Harwin, the leading hi-rel connector and SMT board hardware manufacturer, announces a significant extension to its popular Spring Contact Connector range, with thirteen new models offering design engineers more options to select the best design for each application. The new range includes extended C and Positive Stop models in nine different heights, ranging from 4.5mm down to low profile designs a mere 1.1mm above board level, enabling smaller, lighter, low-profile PCB designs to be achieved. Harwin Spring Contact interconnects suit a wide variety of applications and markets, including antenna contacts in wearable and mobile applications, RFI screening, LED lamp connections, RF ID tags, vision systems, PCB grounding and board-to-board contact.

Harwin Spring Contact connectors maintain a positive force against a mating surface and are available in different widths to offer a choice of spring contact forces. Tolerant to significant mating misalignment, the new design incorporates “positive stop” to prevent damage caused by over compression. A contact anti hook up feature is a further benefit. Specifications include gold-plated contacts and current rating up to 1.0A. Reliable and durable, Harwin Spring Contacts can withstand up to 10,000 mating cycles and operate over a temperature range of -40 to +85 degrees Celsius. Supplied on tape and reel, the Spring Contact Connector range enables low-cost assembly with automatic pick and place machines.

Comments Harwin Product Manager, Graham Cunningham, “The extended Spring Contact range builds on an already enormously popular product line and now brings even wider choice to design engineers. Today, the pressure is on to fit ever more functionality into less space, and our ultra-low profile 1.1mm Spring Contact in particular helps designers meet “smaller and lighter” demands.”

ERNI Electronics Introduces Optimized High-Speed Connectors

Introducing the new ERmet ZDpro connector family, ERNI Electronic paves the way to 100G ATCA systems. The ERmet ZDpro connectors are an enhancement of the ERmet ZD family. This high-speed differential Hard Metric connector system enables data rates of >25 Gbit/s and is the first connector system that meets the requirements for 100G ATCA technology. The high data rates and the improved transmission behavior are mainly based on the reduced size of the signal termination, designed for vias with a diameter of only 0.30mm. The drilling hole diameter for the shielding contacts is specified with 0.46mm. The fact that the reduction of the vias leads to an improved crosstalk behavior was the motivation to the further miniaturization of the press-fit zone. The communication technology shows an ongoing trend to increasing data rates and higher bandwidths. Theas means there is a strong need for 100 Gigabit Ethernet (GbE) data transmission. Typical applications are the next generation of internet backbones, data centers or cloud computing. The new ERmet ZDpro connectors fulfill the requirements and challenges of the important interface between backplane and daughter cards in these high speed systems.

The ERmet ZDpro is based on the mechanical design of the proven ERmet ZD and ERmet ZDplus with the same dimensions. ERmet ZDpro connectors are backwards mating compatible to ERmet ZD and ZDplus connectors. This means, that existing backplane designs do not need layout changes on the backplane side, if customers want to upgrade their daughter cards in the first step before upgrading the whole system. Of course the layout on the daughter cards has to be modified, if ERmet ZDpro

receptacles are used.
To benefit from the maximum performance of the new ERmet ZDpro the usage of backdrilling is recommended. Decreasing via stub length and the related "stub effect" by backdrilling significantly reduces the reflections and the overall BER (Bit Error Rate) of the connection.
Availability
The first products of the ERmet ZDpro family are the 4-pair right angle female connector and the related straight male connector with press-fit termination. Both will be available starting September 2015. The connectors provide 40 signal pairs. The male connectors are available with different contact lengths (3.8mm or 5.3mm). While the standard variants with 3.8mm contacts offer an optimized impedance behavior the male connectors with 5.3mm contact lengths provide a 1.5mm higher wipe length of 2.9mm.

ON Semiconductor Showcases its Advances in IoT Technology at Embedded World 2016

ON Semiconductor (Nasdaq: ON), driving energy efficiency innovations, will be exhibiting highlights from its expansive range of solutions relating to the Internet of Things (IoT) at the Embedded World conference (held in Nuremberg Messe between 23rd and 25th February). Visitors may experience interactive and informative demos at the company's booth (5.178).
ON Semiconductor will demonstrate the new NB3H63143G small form factor, low power, low cost one-time programmable (OTP) clock generator, a member of the OmniClock family of devices that support any output frequency from 8 kHz to 200 MHz in addition to offering a rich feature set and utmost operational flexibility. OmniClock generators have three single-ended clock outputs (LVCMOS/LVTTL), two of which can be combined into a differential output (LVPECL/LVDS/HCSL/CML), allowing designers to replace multiple crystals and/or oscillators, reducing overall system cost. The devices are available in a 3x3mm QFN 16 package which integrates three individual output enable (OE) pins as well as three individual output voltage (VDDO) pins and a smaller 2x2mm DFN 8 package for applications with little available board space.
"The OmniClock family offers the most features and flexibility of any programmable clock devices available in the market today," said Prescott Sakai, director of ON Semiconductor's timing products business unit. "They enable customers to meet their system's low power requirements while at the same time substantially simplifying board design and the overall system bill-of-materials."
During Embedded World, one demonstration will present the NB3H63143G OmniClock generator providing a 19.2 MHz clock to the AR1820HS 18 megapixel image sensor, a 48 MHz clock to the AP1302 imaging co-processor, and a 19.2 MHz clock to a USB controller. Another demonstration will show how the OmniClock generator can change the output frequency and the spread spectrum modulation on the output frequency in real-time.
Introduced in order to facilitate greater use of video in IoT systems, the MatrixCam™ video development kit (VDK) will also be on display. The compact, low power, 1080p camera solution is capable of streaming video over Wi-Fi or Ethernet connections. It supports smart operation, with wake-up initiated via either Bluetooth Low Energy (BLE) or motion detection through its built-in PIR sensor.
To support the connectivity that will be vital to next generation applications like IoT, ON Semiconductor will also be displaying its latest wireless devices. TheNCS36510 is highly integrated system-on-chip (SoC) for the implementation of secure wireless networks with the minimum of external components. It incorporates a 2.4 GHz IEEE 802.15.4-2006 compliant transceiver, a 32-bit ARM® Cortex®-M3 microprocessor, a true random number generator, plus RAM and Flash memory resources. The AX5043 narrowband, ultra-low power RF transceiver supports frequency-shift keying (FSK) and amplitude-shift keying (ASK) modulation. It delivers 16 decibels-milliwatt (dBm) of output power and -136 dBm sensitivity at 100 bits per second (bps) FSK.
Other demonstrations will include smart passive sensors, Sigfox™ functionality, BLDC motor control and touch level sensing.
"There are many possibilities for IoT

Cypress Helps IoT Developers Bring Differentiated Products to Market Faster with Growing Portfolio of PSoC, MCU and Bluetooth Low Energy Solutions

Cypress Demonstrating New Version of Easy-to-Use PSoC® Creator™ Software that Streamlines Designs and Now Supports Flexible Microcontroller Families from Spansion Merger

For designers of connected devices from smart home appliances to wearable fitness trackers to factory automation equipment, the interconnectivity of the Internet of Things (IoT) is largely outweighed by the specific application requirements they must address. Embedded solutions provider Cypress Semiconductor Corp. (Nasdaq: CY) is addressing the diversity of the IoT, and common design concerns such as time to market and power consumption, with its expanded portfolio of ARM®-Cortex®-M-based PSoC® programmable system-on-chip devices, microcontrollers (MCUs) and Bluetooth Low Energy solutions. Since its merger with Spansion in March 2015, Cypress has introduced more than 180 new devices in its PSoC 4 family and more than 150 new devices in the FM4 and FM0+ Flexible Microcontroller families originally developed by Spansion. Here at the Embedded World 2016 exhibition, Cypress has continued this expansion with the launch of its PSoC 4 S-Series devices for Industrial Internet systems, wearable electronics, home appliances and other consumer applications. Additionally at Embedded World, Cypress is demonstrating a new version of its easy-to-use PSoC Creator™ Integrated Design Environment (IDE) that now supports its FM families, starting with the FM0+ devices. PSoC Creator simplifies system design and accelerates time-to-market by enabling concurrent hardware and firmware design. More information on Cypress's PSoC 4 and FM families can be found at http://www.cypress.com/PSoC4 andhttp://www.cypress.com/mcu.

Cypress is demonstrating its portfolio of PSoC, MCU, Bluetooth Low Energy, memory and energy-harvesting Power Management IC (PMIC) solutions for the IoT, along with its automotive and USB-C solutions, at Embedded World in booth number 148, located in Hall 4A, at the Nuremberg Messe in Germany.

Recently announced products and technologies from Cypress that address a diverse range of IoT applications include:

PSoC 4 L-Series, the world's most flexible one-chip ARM Cortex-M0 solution for smart home appliances and industrial internet applications

Three series of FM4 products that provide fast, secure and reliable communication interfaces for factory automation and smart home appliance applications

Two series of FM0+ products deliver ultra-low power consumption for portable IoT applications

EZ-BLE™ PSoC, the industry's most integrated Bluetooth Low Energy module, and multiple other new, fully-certified modules that reduce time-to-market

PSoC 4 BLE and PRoC™ BLE Programmable Radio-on-Chip solutions fully qualified for the Bluetooth 4.2 standard and its features that improve data rate, privacy and security for IoT applications

A demonstration of a light-powered IoT beacon solution based on Cypress's energy harvesting PMIC and EZ-BLE PRoC module that eliminates the need to replace batteries, significantly reducing maintenance costs

A Bluetooth Smart Mesh demonstration showing an implementation for smart home lighting applications.

More information on Cypress's Bluetooth Low Energy and energy harvesting solutions is available athttp://www.cypress.com/ble and http://www.cypress.com/energy-harvesting.

Infineon Security and RF Components support Samsung Galaxy S7 and Galaxy A smartphone series

Where smartphone manufacturers differentiate their offers in a highly competitive market through either security or performance, Samsung chooses both. The world market leader builds its new Samsung Galaxy S7 and Galaxy A devices with security and RF (radio frequency) components from Infineon Technologies AG (FSE: IFX / OTCQX: IFNNY).

Smartphone owners benefit from low noise amplifiers (LNA) to antenna tuners and RF switches enhancing the data rate and reducing power

consumption. At the same time, embedded Secure Element (eSE) chips protect security-critical functionalities of the mobile device. They enable secured transfer of sensitive payment credentials for contactless payment, convenient biometric authentication of the user and new applications such as mobile ticketing.

The Samsung Galaxy S7 is Samsung's latest premium smartphone introduced at Mobile World Congress 2016. The Galaxy A devices were already launched in December 2015 and are being rolled out worldwide.

Trailblazer for mobile payment

Embedded Secure Elements are becoming a mainstream security solution for NFC (Near Field Communication) applications. According to IHS estimates the number of smartphones shipped with embedded NFC secure Elements is projected to increase from 427 million today to 1,620 million in 2020 (NFC Report 2015). Consumers' ease-of-use and trust in secured mobile services is expected to significantly increase the acceptance of mobile payment.

Follow the Snyder family

Smartphones and wearables are part of our everyday lives. On the occasion of the Mobile World Congress, Infineon has followed a day in the life of the fictitious Snyder family – also visiting Barcelona. During the day, the family's smart helpers are repeatedly put to use. It is in this way the reader also discovers the contribution Infineon makes with its products in the areas of security, high frequency, sensors, power management and mobile infrastructure. With this, we make life easier, safer and greener.

Find out more at www.infineon.com/mobile-solutions and at www.infineon.com/mwc

Rohde & Schwarz presents multistandard test solution for RF and audio tests on Bluetooth® modules

The modules used in Internet of Things (IoT) applications often combine Bluetooth® with other wireless interface technologies. The R&S CMW500 wideband radio communication tester is the only test platform on the market to offer a one-instrument solution for testing all cellular and non-cellular standards and Bluetooth. Rohde & Schwarzhas now expanded it leading test platform to include Bluetooth audio tests for manufacturers of Bluetooth headsets and audio car kits.

Today, Bluetooth modules are used in mobile, automotive, smart home and other IoT applications. Accordingly, manufacturers and integration specialists have higher testing requirements. Rohde & Schwarz helps them to optimize test performance, minimize test times and thus save considerable costs. The R&S CMW500 wideband radio communication tester is the only testing solution that combines all 38 RF signaling tests defined by the Bluetooth SIG together with other cellular technologies such as LTE, LTE-Advanced and WCDMA as well as non-cellular technologies such as WLAN and GNSS. The Bluetooth Special Interest Group (SIG) has qualified the solution for RF measurements.

RF signaling tests and fast spectrum measurements

Developers can use the R&S CMW500 to perform extensive tests on their Bluetooth products and optimize their design before taking it to a Bluetooth Qualification Test Facility. The test platform offers unparalleld flexibility since the parametric test concept allows developers to set all the parameters themselves. Thanks to the easy-to-use R&S CMWrun sequencer software tool, they can also use the compact solution to perform automated prequalification tests for Bluetooth Basic Rate, Enhanced Data Rate and Bluetooth Low Energy in line with Bluetooth core specifications for versions 1.2, 2.0, 2.1, 3.0+HS, 4.0, 4.1, 4.2.

The extremely fast R&S CMW500 greatly benefits developers, e.g. when performing the complex spectrum measurements that are part of the Bluetooth qualification tests. The R&S CMW500 delivers the first test results in less than one second, which simplifies optimization tasks. The solution is also ideal for general integration and coexistence tests, for example, to check whether WLAN and Bluetooth transmitters in certain frequency bands interfere with each other.

New R&S CMW-KS602 option for Bluetooth audio tests

Those who do not have their hands free when using a computer or driving rely on Bluetooth headsets and Bluetooth hands-free car kits to make telephone calls. Manufacturers of headsets or hands-free car kits can now ensure the quality of their products by using the R&S CMW500 to test the audio properties of their products as well as to perform RF signaling tests. The Rohde & Schwarz test platform can

be used in the development phase to optimize products and in production to verify audio characteristics.

When establishing the Bluetooth connection, the flexible R&S CMW500 can operate as master or slave. It supports the hands-free audio gateway mode, authentication when pairing Bluetooth devices with headsets, etc. and the volume control function on the microphones and headsets. it supports various voice codecs, including CVSD and mSBC.

R&S CMW platform: the right solution for all M2M/IoT requirements

For users who only perform Bluetooth® and WLAN non-cellular integrations tasks, the R&S CMW270 wireless connectivity tester offers a cost-effective solution. The R&S CMW270 was also qualified by the Bluetooth SIG for RF measurements. The R&S CMW290 functional tester supports all common cellular and non-cellular mobile communications standards. Wireless module integrators require extensive functional tests for hardware and applications. The R&S CMW290 offers all essential measurements and an excellent price/performance ratio.

Rohde & Schwarz will demonstrate its R&S CMW platform for Bluetooth tests at booth C40, hall 6 at Mobile World Congress in Barcelona. The new R&S CMW-KS602 option for Bluetooth audio tests will be available fromRohde & Schwarz in March 2016.

Cypress Introduces the Industry's Fastest 64Mb Quad Serial Peripheral Interface NOR Flash Memory with Extended Temperature Range Support

New FS-S Family Device Provides High Read Bandwidth to Enable Faster Access Times in High-Performance Embedded Systems

Cypress Semiconductor Corp. (Nasdaq: CY), a global leader in embedded systems solutions, today introduced a 1.8V, 64Mb NOR Flash memory with a Quad Serial Peripheral Interface (Quad SPI). The newest device in the Cypress FS-S NOR Flash family combines the Quad SPI interface with the industry's highest read bandwidth and fastest program time while enabling a small PCB layout. The device is ideal for high-performance applications, such as video game consoles, Advanced Driver Assistance Systems (ADAS), automotive instrument clusters and infotainment systems, networking equipment and set-top boxes.

High-performance system designs require the highest read bandwidth for program execution, a small, low-pin-count package, and the fastest program and sector erase times. The 64Mb FS-S Quad SPI NOR Flash memory leverages an 80-MHz Double Data Rate (DDR) mode to deliver read bandwidth of 80 MBps and enables the fastest program execution for high-performance systems. Available in industry-standard compact 8-lead SOIC and 24-ball BGA packages, the device saves board space and simplifies layout. The device provides a 0.475-ms program time per 512 bytes, increasing manufacturing throughput and enabling new data to be written quickly. For battery-powered applications, the memory extends battery life by providing low standby current and a deep-power-down mode. The FS-S NOR Flash family offers AEC-Q100 automotive qualification and supports an extended temperature range of -40˚C to +125˚C.

"Our new 1.8V, 64Mb FS-S NOR Flash device has a low pin count that is ideal for space-constrained wireless applications, and it is optimized for other high-performance applications, expanding the reach of the family," said Hiro Ino, Senior Director of the NOR Flash Product Family at Cypress. "This product marks a continuation of Cypress's strategy to expand our high-performance memory portfolio and our NOR Flash market leadership."

Availability

Cypress's 64Mb FS-S Quad SPI NOR Flash memory is now sampling in 8-lead SOIC and 24-ball BGA packages. Production will start in the second quarter of 2016.

Energy Harvesting Power Management Unit Delivers Industry-Leading Efficiency in Energy Scarce IoT Applications

Analog Devices, Inc. today announced a power management unit (PMU) designed to enable faster and more efficient energy harvesting in IoT applications where energy is scarce. Due to its unique circuit design, the ADP509x is among the most efficient energy harvesting PMUs on the market, converting harvested power down to the 16 µW to 100mW range with only sub-

µW operation losses. The ADP509x also delivers the fastest cold-startup time available today. Devices relying on energy harvesting in low energy conditions often have to slowly accumulate enough energy to turn on, resulting in long delays before the device can start sensing, processing, and transmitting. This can result in missed data collection, slow operation, and poor user experience. The ADP509x PMU solves these problems with an innovative multiple-power-path design, which enables faster startups and smoother operation.

Energy harvesting is a key critical component in achieving fully autonomous IoT solutions. Not only does it drive significant cost savings in applications where battery replacement is costly, but it creates possibility for a host of new applications where battery replacement is impossible or impractical. A key barrier for energy harvesting is that in many applications energy from the environment is only available at very low levels (for example, low-light indoor solar harvesting), and periodically not at all. This requires power management solutions that can not only enable satisfactory system operation with very little energy, but also efficiently manage energy storage devices to satisfy energy demand at times when no energy is being harvested.

"We believe the ADP509x is a big step toward enabling new autonomous applications for IoT,"said Michael Murray, general manager of Industrial IoT, Analog Devices. "We've been collaborating with other companies like Alta Devices, which makes extremely innovative and efficient solar cells, to explore what new possibilities exist by pairing the most efficient energy harvesting components together. Not only will this have huge benefits for traditional IoT applications, but it will also lower some significant hurdles in emerging applications such as e-textiles and other wearables."

IAR Systems supports Ambiq Micro's Apollo MCUs targeted for wearables and IoT

IAR Systems® announces that the latest version of the complete embedded development toolchain IAR Embedded Workbench® for ARM® supports the Apollo family of ARM Cortex®-M4F microcontrollers from the semiconductor company Ambiq Micro.

Since the start in 1983, IAR Systems has been building and expanding a strong network of partners. The company is the hub of a powerful partner ecosystem, including all leading semiconductor vendors worldwide. Thanks to this, the complete C/C++ compiler and debugger toolchain IAR Embedded Workbench supports more microcontrollers in more architectures than any other tool on the market. All available ARM cores from all major vendors, in total more than 4,000 devices, are supported by IAR Embedded Workbench, and IAR Systems continually adds support for new devices.

The Apollo family of microcontrollers from Ambiq Micro offers leading power numbers in both active modes and sleep modes. These power savings combined with a high-performance processing engine make the Apollo MCUs a good choice for battery-powered devices including wearable electronics, activity and fitness monitors, and wireless sensors.

"We are really pleased that our Apollo MCUs are supported by IAR Systems' complete development tools," says Mike Salas, Vice President of Marketing and Strategy, Ambiq Micro. "The combination of the ultra-low power performance of the Apollo MCUs and the high-quality development toolchain IAR Embedded Workbench for ARM will help developers worldwide to bring new innovative products to life."

IAR Embedded Workbench is a powerful development toolchain that incorporates a compiler, an assembler, a linker and a debugger into one completely integrated development environment. The toolchain provides extensive debugging and profiling possibilities such as complex code and data breakpoints, runtime stack analysis, call stack visualization, code coverage analysis and integrated monitoring of power consumption. For complete code control, IAR Systems also offers integrated add-on tools for static analysis and runtime analysis. More details about IAR Embedded Workbench for ARM and trial versions are available at www.iar.com/iar-embedded-workbench/arm/.

Precision Power Conversion Platform Enables Disruptive Inverter Technology to Lower Solar Energy Cost

Analog Devices, Inc. today introduced a revolutionary addition to its power conversion platform with an innovative series of mixed-signal control processors. The ADSP-CM41x series is designed to dramatically simplify system design, lower cost, and improve efficiency and safety in solar, energy storage, and electric vehicle infrastructure. Solar panels and battery systems have become significantly less expensive in recent years, creating the need for inverter technologies to drive the next wave of efficiencies in solar energy. While disruptive new inverter designs have begun making improvements in size, weight, and cost reductions, they require further advances in digital processing to unlock their full potential. The new ADSP-CM41x control processors represent a breakthrough in power conversion design, with an unmatched level of hardware integration specifically tailored to solar and other emerging energy applications. By alleviating the need for complex external circuitry, the ADSP-CM41x control processors deliver design time and cost reductions, safety improvements, and the precision gains needed to maximize the impact of today's inverter designs.

Learn about ADI's Power Conversion Platform:http://www.analog.com/ADSP-CM41x.html

Learn about ADI's portfolio of mixed-signal control processors:http://www.analog.com/en/products/processors-dsp/cm4xx-mixed-signal-control-processors.html

Connect with engineers and ADI product experts on EngineerZone®, an online technical support community:https://ez.analog.com/community/analog-microcontrollers

"The cost of sustainable energy is the primary challenge facing the industry," says Mark Martin, vice president, Industrial Automation, Energy and Sensors, Analog Devices. "With the ADSP-CM41x, Analog Devices has overcome fundamental hurdles in power converter design to help our customers solve this challenge. The controller's unique architecture and performance levels are key enablers for innovative inverter solutions."

Central to the ADSP-CM41x design is its breakthrough "dual independent core" safety concept, which enables the integration of safety redundancy and functions into a single chip. This first-ever architecture saves considerable development time and system cost by eliminating the need for an external supervisory element, which is the current standard. Equally important is the on-board integration of optimized hardware accelerators, designed to offload work from the processor core and boost the processing power available for core functions. Additionally, the device's on-board arc fault detection simplifies design, and enhances safety by using intelligent decision making to improve reliability and accuracy.

Building upon an already state-of-the-art power conversion platform

The ADSP-CM41x establishes a new benchmark in ARM core processing and analog precision, adding to the industry performance leadership established by the recently released ADSP-CM40x power conversion series. The ADSP-CM41x series seamlessly integrates with other critical signal chain components, including the AD740x sigma delta-based A/D converter, which replaces larger, more expensive sensor modules to reduce system cost and improve isolated current measurement. Also included in the platform is the ADuM413x series of isolated gate drivers featuring iCoupler® isolation technology that enables faster switching to further increase system efficiency.

ON Semiconductor & RFMicron Unveil Multifaceted IoT Sensor Platform Supporting Battery-Free Operation

Compact, highly integrated solution utilizes multiple connectivity modules to provide accurate "sense data" onto any cloud platform

IoT Platform Development Kit

ON Semiconductor (Nasdaq: ON),driving energy efficiency innovations, teamed with RFMicron, and developed a game-changing 'plug-and-play' development tool to speed the deployment of wireless passive sensor solutions onto any Internet of Things (IoT) cloud platform. The IoT Platform Development Kit, SENSORRFGEVK, brings together

a series of performance-optimized computing and connectivity modules to facilitate quick and effective deployment of battery-free wireless sensing technology and IoT hardware in locations where power and space constraints are of particular concern. This streamlined and flexible solution takes the approach of moving much of the system's intelligence away from where the sensors are situated, and placing it on the cloud.

Each IoT Platform Development Kit incorporates ON Semiconductor's battery-free wireless sensor tags, which use RFMicron's Magnus® S2 Sensor IC, and can perform temperature, moisture, pressure, or proximity sensing functions. The platform also features a UHF RFID reader module with 32 decibels-milliwatt (dBm) power rating and an 860 megahertz (MHz) to 960 MHz frequency range. Localized data processing is performed by the ARM® Cortex-A8 based AM335x system-on-chip (SoC). The platform has the capacity to transfer captured data either wirelessly (via WLAN, Zigbee, Z-Wave, UHF Gen 2, etc.) or using wireline infrastructure (via KNX, CAN, SPI, Ethernet. etc.). This development kit complements ON Semiconductor's existing wireless sensor evaluation kit, SPS1M-EVK, which provides a set of tools test our sensor capabilities.

"This IoT Platform Development Kit opens up greater opportunities for IoT-based data-acquisition/ monitoring enabling the implementation of wireless sensors quickly and effectively into many applications. Using it, the data from multiple sensors can rapidly be accessed, analyzed and used on multiple backend networks," states Gary Straker, Vice President and General Manager of Protection and Signal Division at ON Semiconductor. "As a result of this platform, wireless sensing technology can now be deployed into application scenarios where a mains supply is simply not available or where replacing batteries would be too difficult and costly to undertake. This ground-breaking product will markedly broaden the scope of IoT deployment and this development kit offers a tool that makes evaluating the technology simple for multiple application use cases. Through this wireless sensing technology we will be able to connect what was previously un-connectable."

The platform also possesses an intuitive touch-enabled user interface, plus LEDs, headers and switches designed to enhance its configurability and expand its operational potential. The sophisticated accompanying software allows the platform to fit seamless into any supported network, serving as a dedicated node. Built-in application firmware will assist engineers in implementing more effective IoT-based data-acquisition/monitoring systems irrespective of their experience level.

The combination of all the functions above in a single self-contained board creates an integration tool IoT platforms can use to easily evaluate wireless sensing technology in their ecosystems.

Availability

The wireless sensor IoT Platform Development Kit, SensorRFGEVK, and the wireless evaluation kit, SPS1M-EVK, are immediately available directly from ON Semiconductor's website or through all franchised distributors.

Amphenol Industrial's Amphe-RXS

The Amphenol Industrial Products Group now offers a connection system that incorporates both power and signal contacts in one connector. Amphe-RXS uses Amphenol's RADSOK® terminals as power contacts and either standard or high vibration (AHVB) signal terminals to produce an all-inclusive connector.

Because of its unique design, this new robust, mixed connector is perfect for devices and systems where space is at a premium, such as 3-phase electric motors, hybrid or electric vehicles, motorcycles, scooters, as well as material handling systems to name a few.

The Amphe-RXS incorporates Amphenol's RADSOK® technology for higher amperage, lower t-rise, less resistance and lower mating forces. These power terminals can range in size from 2.4 mm to 5.7 mm (up to 120 A continuous), while its signal terminals can range from size 22 to size 16.

The all-in-one connection system can accommodate a variety of easy locking solutions ranging from plastic lock tabs to small screws. Lever locks or large jack screws,

which are bulky, complex and often unreliable, are not needed due to the lower mating forces of the RADSOK®.

DSP Group Unveils Next-Generation Ultra-Low-Power Always-On Voice Processor

Optimized for Google Hotword and Sensory TrulyHandsfree, DBMD4 Enables Best-in-Class Performance for Mobile, Wearables and IoT

LOS ALTOS, Calif., Feb. 22, 2016 (GLOBE NEWSWIRE) — DSP Group®, Inc. (NASDAQ:DSPG), a leading global provider of wireless chipset solutions for converged communications, unveiled DBMD4 – its next-generation, ultra-low-power, always-on voice and audio processor. The DBMD4 platform features a notably small footprint, offers the lowest power consumption and best-in-class enhancements for always-on voice operation, elevating performance and functionality of battery-operated devices.

Ultra Low Power Always-On Voice Activation for Any Device

Adoption of voice-enabled applications such as smart assistants, voice commands and voice search is proliferating in mobile, smartwatches and IoT devices. DBMD4 allows battery-operated devices to actively listen and sense voice activity and commands while in ultra-low power mode – alleviating battery strain, improving device usability and extending battery life.

DBMD4's power-optimized implementation for always-on voice is based on Sensory TrulyHandsfree and Google Hotword. In addition, DBMD4 supports six seconds of voice buffer that enables seamless operation. DBMD4 is a completely autonomous, audio-centric processing solution enabling power-hungry application processors in mobile and wearable devices to actually sleep during voice sensing.

"The consumer and enterprise use of mobile smart assistants is on the rise. This creates a real need for a low-power solution that enables users to enjoy these functionalities via a simple voice-enabled interface," said Harry Wang, Research Director at Parks Associates. "Integrating with both mobile and wearable devices, DSP Group's solution will further increase the usage of such applications – creating value for application developers, service providers, and end users," he concluded.

"We are excited to be working closely with DSP Group to enable the first DSP with Sensory's low power always listening hardware block," said Todd Mozer, CEO of Sensory. "DBMB4 features built-in handshaking with Sensory's TrulyHandsfree, which gives it a winning combination of power consumption and accuracy in trigger word listening environments," he continued.

High-Performance Voice Enhancement Suite

DBMD4 incorporates a suite of voice enhancement algorithms including noise suppression that significantly improve user experience and accuracy of speech-driven applications, particularly in high noise environments.

When integrated in smartphones, wearables and IoT devices, DBMD4 leverages these algorithms to achieve more effective isolation of voice from surrounding environmental sounds. This enables effective voice operation in almost any environment. DBMD4 also supports advanced audio and voice features including Acoustic Echo Cancellation (AEC), Automatic Gain Control (AGC), Beam Forming and more.

Smaller Form-Factor, Technically Superior

DBMD4 offers a markedly small 1.8 x 2.1mm form factor, making it ideal for a variety of mobile, wearable and IoT devices.

Embedding a programmable low-power DSP, DBMD4 supports digital and analog microphones and incorporates various Application Processor Interfaces such SPI, I2C, UART and SLIMbus. The platform is also equipped with a comprehensive software framework and a complete suite of Android drivers for Lollipop 5.x that enables rapid development and fast time-to-market.

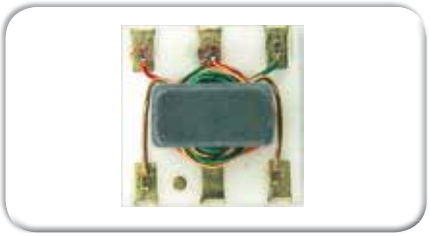
"We foresee a bigger role for voice and audio in consumer devices for smart processing and sensing – including mobile, wearables and IoT," said Ofer Elyakim, CEO of DSP Group. "With advanced features like low-power always on and best in class voice enhancement solutions, we believe that DBMD4 is uniquely positioned to play an instrumental role in this evolution," he added.

DSP Group will present its solutions for smartphones, wearable devices, and IoT at the Mobile World Congress in Barcelona, February

22-25 in DSP Group's meeting room, Hall 2 Room 2A32MR

Mini-Circuits' 75Ω Balanced to Unbalanced Transformer Supports Applications from 1 to 400MHz

Mini-Circuits' TRS1.33-1T-75+ 75Ω RF balanced-to-unbalanced transformer covers the 1 to 400MHz frequency range, supporting a variety of applications including impedance matching, push-pull amplifiers and more. This model also meets upstream bandwidth requirements of the DOCSIS® 3.1 standard. It model provides an impedance ratio (secondary/primary) of 1.33:1, 0.6dB insertion loss, 1.1dB amplitude unbalance, and 3˚phase unbalance. It can handle up to 0.75W RF power and 300mA DC current. A secondary center tap allows DC feed and DC bias without the need for extra bias tees in the signal chain. Featuring core and wire construction with all-welded connections, the transformer measures 0.20×0.20×0.20", saving space in crowded PCB layouts.



Antenova announces two flexible antennas: Bentoni and Asper for positioning applications with GNSS and 2.4-2.5GHz

Antenova Ltd, manufacturer of antennas and RF antenna modules for M2M and the Internet of Things, is adding two new positioning antennas, Bentoni and Asper, to its range of flexible FPC antennas.

Bentoni is a positioning antenna for all of the global public satellite constellations: GPS, GLONASS, Beidou and GALILEO. It is designed to be used in trackers, portable devices, network components, drones and wearable electronics.

Asper is a dual antenna with two separate antenna systems in a single form factor. It combines a 1559 – 1609 MHz antenna with a 2.4 – 2.5 GHz antenna in the same part for positioning applications with wireless connectivity as well. This antenna is suitable for sports cameras, trackers, dash cams, portable devices, network devices and wearable electronics.

Both antennas offer high performance and maintain good isolation in situ within a device.

Bentoni and Asper are the latest flexible FPC antennas in Antenova's flexiiANT product range. They are supplied with an I-PEX MHF connector and a 1.13 mm RF cable in a choice of three lengths. They can be folded to save space in operation within a device.

Antenova's antenna design team aims to create antennas that a product designer can integrate with the other circuits in a design in a convenient way, rather than designing a product to fit around the antenna. The aim of these antenna designs is plug and play simplicity – they are self-adhesive mounted so that they can easily be fixed inside an electronic device.

Bentoni antenna and Asper antennas are available to order now.

Samsung Introduces World's Largest Capacity (15.36TB) SSD for Enterprise Storage Systems

First revealed at the 2015 Flash Memory Summit in August, the 15.36TB SSD is based on a 12Gb/s Serial Attached SCSI (SAS) interface, for use in enterprise storage systems. Because the PM1633a comes in a 2.5-inch form factor, enterprise storage managers can fit twice as many of the drives in a standard 19-inch, 2U rack, compared to an equivalent 3.5-inch storage drive.

"To satisfy an increasing market need for ultra-high-capacity SAS SSDs from leading enterprise storage system manufacturers, we are directing our best efforts toward meeting our customers' SSD requests," said Jung-bae Lee, Senior Vice President, Memory Product Planning and Application Engineering Team, Samsung Electronics. "We will continue to lead the industry with next-generation SSDs, using our advanced 3D V-NAND memory technology, in order to accelerate the growth of the premium memory market while delivering greater performance and efficiency to our customers."

The unprecedented 15.36TB of data storage on a single SSD is enabled by combining 512 of Samsung's 256Gb V-NAND memory chips. The 256Gb dies are stacked in 16 layers to form a single 512GB package, with a total of 32 NAND flash packages in the 15.36TB drive. Utilizing Samsung's 3rd generation, 256-gigabit (Gb) V-NAND technology which stacks cell-arrays in 48 layers, the PM1633a line-up provides significant performance and reliability upgrades from its predecessor, the PM1633, which used Samsung's 2nd generation, 32-layer, 128Gb V-NAND memory.

Samsung's new PM1633a SSD provides the opportunity for significant improvements in the efficiency of IT system investments through its high storage capacity and exceptional performance. These performance gains stem from Samsung's latest vertical NAND (V-NAND) flash technology, as well as the company's proprietary controller and firmware technology.

The PM1633a SSD sports random read and write speeds of up to 200,000 and 32,000 IOPS respectively, and delivers sequential read and write speeds of up to 1,200MB/s. The random read IOPS performance is approximately 1,000 times that of SAS-type hard disks, while the sequential read and write speeds are over twice those of a typical SATA SSD. Inside the new SSD lie Samsung's advanced controller units that support the 12Gb/s SAS interface, along with a total of 16GB of DRAM. Samsung also uses specially designed firmware that can access large amounts of high-density NAND flash concurrently.

The 15.36TB PM1633a drive supports 1 DWPD (drive writes per day), which means 15.36TB of data can be written every day on this single drive without failure, a level of reliability that will improve cost of ownership for enterprise storage systems. This drive can write from two to ten times as much data as typical SATA SSDs based on planar MLC and TLC NAND flash technologies.

Further, the drive boasts a highly dependable metadata protection mechanism in addition to featuring a data protection and restoration software tool in case of a momentary blackout, which make enterprise systems more stable and manageable.

Starting with the 15.36TB density, Samsung will provide a wide range of capacity options in its PM1633a SSD line-up – 7.68TB, 3.84TB, 1.92TB, 960-gigabyte (GB) and 480GB later this year. With more choices in storage capacity, Samsung is reinforcing the competitiveness in its SAS SSD line-up. The Samsung PM1633a SSD line-up is expected to rapidly become the overwhelming favorite over hard disks for enterprise storage systems.

ACHIEVE LOWER POWER AND INCREASED BATTERY LIFE FOR IOT AND WEARABLE APPLICATIONS

Maxim Integrated's power management chip runs from a primary cell while extending battery and shelf life.

With the MAX14720 power management integrated circuit

(PMIC) from Maxim Integrated Products, Inc. (NASDAQ: MXIM), designers can optimize power and battery life for wearable medical/ fitness and Internet of Things (IoT) applications.

Increasing battery life and achieving low power are common challenges faced by engineers when developing wearable and IoT products. The MAX14720 PMIC is ideal for non-rechargeable battery (coin cell, dual alkaline) applications where size and energy efficiency are critical. In addition, an electronic battery seal extends shelf life by effectively disconnecting the battery prior to initial power-up. Integrating the functionality of five discrete devices-power switch, linear regulator, buck regulator, buck-boost regulator, and monitor-the MAX14720 reduces the bill of materials (BOM) and allows for much smaller form factor designs.

"In 2020, 190 million wearable electronic devices for fitness and health will be sold, generating $14.4 billion in revenue[1]," according to Gartner. Angela McIntyre, Research Director and Michele Reitz, Principal Research Analyst at Gartner said, "System design for wearables will remain fairly straightforward, employing basic microcontroller unit (MCU)-based processing, BT and Wi-Fi communications, and accelerometer and gyro sensor chips, with display drivers, optoelectronics, USB charging interfaces, small NOR memory and power regulator chips playing major roles in many wearable designs.[2]"

Key Advantages

Lower power: While most battery PMICs operate from 3V, the MAX14720 runs from a primary cell and operates down to 1.8V.

Extended battery life: Low quiescent current IP is critical for wearable applications because it can extend the runtime of the system significantly.

Longer product shelf life: An electronic battery seal offers extended storage life and allows for a fully sealed housing.

Flexible operation and system diagnostics: Value added features such as push button input monitoring, power-up sequencing, and voltage rail monitoring further reduce BOM cost and space.

Commentary

"Maxim has a strong position in the rechargeable wearables market," said Frank Dowling, Executive Business Manager at Maxim Integrated. "As a result, we have leveraged our expertise and IP for the non-rechargeable wearables market."

Availability and Pricing

Available in a 25-bump, 0.4mm pitch, 2.26mm x 2.14mm wafer-level package (WLP).

Specified over the -40-degree Celsius to +85-degree Celsius temperature range.

Pricing available upon request.

[1] Gartner, Forecast: Internet of Things - Endpoints and Associated Services, Worldwide, 2015, 29 October 2015. This figure includes chest straps, sports watches, wristbands, smart garments and other fitness monitors.

[2] Gartner, Forecast Overview: Wearable Electronics Production and Semiconductors, Worldwide, 2015, Michele Reitz, Angela McIntyre, 26 October 2015.

AAO High Speed Solutions Introduces the Rugged Four Channel 10G-Base-T to XAUI Connector Converter Product

Amphenol Aerospace, a global leader in interconnect technologies, now offers a new four-channel 10G-Base-T to XAUI connector product in addition to its current set of 10GbE products. The product facilitates the bi-directional protocol conversion of four channels of IEEE 802.3 XAUI through the appropriate PHY and transformer logic to IEEE 802.3 10G-Base-T.

The product has been developed, integrated, and delivered for the rugged environments typically found in Military, Aerospace, and Industrial markets. The qualification testing was conducted with test methods and limits for products fielded in aerospace applications. Most, if not all, of the relevant IEEE 802.3 standards are supported.

The four-channel converter utilizes Split Pair Quadrax contacts for 10G-Base-T system connections. Split Pair Quadrax is a derivative of standard industry Quadrax, but has improved signal integrity to support up to 6.5Gbps signaling. The contact is used to enhance the signal integrity of the 10G-Base-T

interface. The product can support 10G-Base-T cable distances of 100 meters on CAT6A cable, or 30 meters on the same cable in low power mode.

A power supply, two dual-channel 10G-Base-T to XAUI PHYs, Ethernet transformers, clocking, and an MDIO interface is contained within the connector unit itself. There is no MDIO communication necessary to utilize the converter connector, but access over this channel to the PHY units enables users to change configuration or optimize the given links, in addition to retrieving data for built-in-test requirements. Power and ground inputs attach to the unit via a small connector and cable assembly.

The sub-system interface is a dual-bank Samtec HQDP ribbon and connector that includes four channels of XAUI and the MDIO interface. Other configurations are available including different shell rotations, alternate plating, power cable lengths, signal cable lengths, and others. In addition to supporting 10G-Base-T on the physical system side, the product also supports interoperability with IEEE standard devices operating at 10Base-T, 100- Base-Tx, and 1000Base-T.

On the sub-system side, an SGMII MAC interface is also supported in addition to XAUI. Jared Sibrava, Amphenol Aerospace High Speed Solutions Business Unit Director, says, “This product is a great and welcome addition to our products that support 10GbE. In addition to supporting various 10GbE and 40GbE products in high and low density over fiber optic protocols, we can now support system integrators who wish to utilize the 10GbE protocol, but do so over copper cables.

IEEE 10GBase-T is growing in use and becoming more accepted by aerospace manufacturers. By providing this rugged product to the market, communication between system components and internal MACs and switches becomes much more trivial.” The product is stocked for prototype quantities by Mouser Electronics and is accompanied with test cables and test boards. This enables rapid integration into sub-systems.

Panasonic Develops Single Cable and Connector Solution for Transmission of Full-spec 8K Video Signals*1

Panasonic Corporation today announced that it has developed single cable and connector solution that enable the transmission of uncompressed full-spec 8K video signals*1.

Currently, to transmit video signal via connector-equipped cables from an 8K signal source or other devices to an 8K display, 4K-equivalent images are transmitted using four HDMI cables, and then they are combined to show in 8K resolution by using image processing. Panasonic’s newly-developed connector-equipped cable, which uses plastic optical fiber technology, can achieve the transmission of full-spec 8K video via a single cable, with improved bandwidth and length.

High-speed transmission over optical fiber connector can be achieved when the optical axes are completely aligned. However, when the equipment and the cable’s connection portions are detachable, it is difficult to precisely align optical axes at the connection, leading to poor connectivity and other defects. That has hampered the deployment of optical fiber cables in video transmission cables with detachable connectors.

Working with KAI Photonics Co., Ltd., a venture from Japan’s Keio University, Panasonic developed connector-equipped cables that adopt “plastic optical fiber and its connection technology using ballpoint-pen type interconnect*2.” Further, by applying Panasonic’s technology for the multi-level modulation of broadband signals, a transmission bandwidth exceeding 100 Gbps was achieved with a single cable.

Professor Yasuhiro Koike of the Faculty of Science and Technology, Keio University, commented: “I am delighted that Panasonic successfully developed a prototype cable for transmitting 8K images based on ‘plastic optical fiber and its connection technology using ballpoint-pen type interconnect,’ which was developed by Keio University. We would like to further cooperate with Panasonic to respond to the variety of needs for

audiovisual transmission."

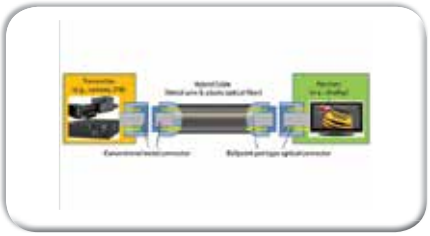
Anticipating the spread of the corporate use of 8K devices in the B2B market, Panasonic aims to make this innovative connector cable technology an international standard.

Technologies related to this proto model will be exhibited at the Panasonic booth at CES 2016 to be held in January in Las Vegas, U.S.A.

Notes:

*1 The term denotes an image of approx. 33 million pixels (7,680 × 4,320) and 120 frames/sec. A full HD image is composed of approx. 2 million pixels (1,920 × 1,080) and 60 frames/sec. and a 4K image approx. 8 million pixels (3,840 × 2,160) and 60 frames/sec.

*2 The ballpoint-pen type interconnect technology for plastic optical fiber connection has been developed jointly by Mitsubishi Pencil Co, Ltd. and Keio University's Professor Yasuhiro Koike.



LATTICE SEMICONDUCTOR LAUNCHES ICE40 ULTRA™ PLATFORM FOR WEARABLE DEVICE DEVELOPMENT

Feature Rich, Low-Power Platform in Compact Wrist Watch Form Factor Supports Multiple Wearable Applications

iCE40 Ultra FPGA featured in platform is 60 percent smaller than alternative microcontrollers

Broad range of hardware features make platform a fit for almost any consumer wearable device

Platform comes with user guide and demos to help expedite device design

Lattice Semiconductor Corporation (NASDAQ: LSCC), the leading provider of customizable smart connectivity solutions, today announced a development platform for use in designing low-power wearable devices for consumers. Based on the iCE40 Ultra™ FPGA, the platform features a large number of sensors and peripherals, making it a compelling platform for the design of a wide array of wearable devices.

The iCE40 Ultra FPGA uses a package that is 60 percent smaller than alternative microcontrollers. The iCE40 Ultra FPGA also supports a low power standby mode for always-on functionality, making it an ideal choice for consumer wearables that need to operate for days between charges.

Hardware features and sensors supported by the iCE40 Ultra Wearable Development Platform include a 1.54-inch display, MEMS microphone, high-brightness LED, IR LED, BLE module and 32MB of flash memory. The platform also supports sensors capable of measuring heart rate/SpO2, skin temperature, and pressure as well as an accelerometer and gyroscope. The platform comes in a wrist watch form factor (1.5-inches wide x 1.57-inches long x 0.87-inches high) with a wrist strap and a built in battery.

"One of the more popular applications to emerge from the growing Internet of Things market are wearable devices. However, with so many potential applications for wearables and their strict power requirements, it's a challenge to find a semiconductor platform that features the right combination of low power operation and peripheral support," said Ying Chen, product marketing manager at Lattice Semiconductor. "Our iCE40 Ultra Wearable Development Platform's power usage and feature set make it an ideal choice for nearly any wearable application our customers can dream of."

Included with the platform are a detailed user guide and several demos to showcase parallel RGB to MIPI DSI bridging, health monitor, pedometer, IR transmitter or flashlight functions.

The iCE40 Ultra Wearable Development Platform is available now direct from Lattice at a retail price of $270. Please visit www.latticesemi.com/ultrawearable to learn more about the platform and for ordering information.

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