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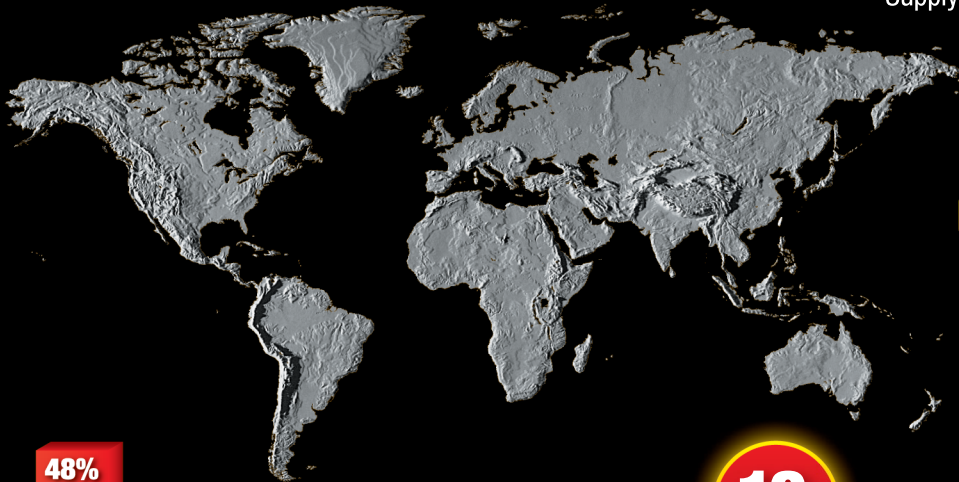
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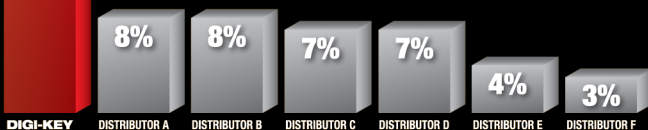
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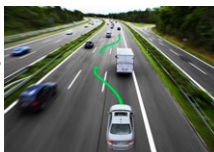
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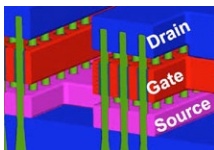


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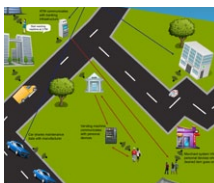
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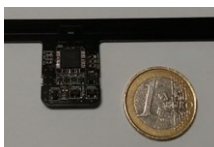
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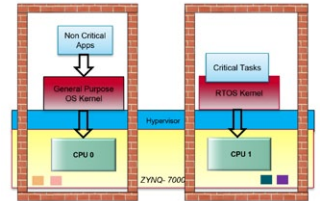
Consumers have come to expect their mobile devices to be intelligent enough to sense the world around them and even learn to anticipate their needs.



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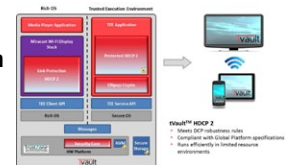


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Broadcom: Time to prepare for the end of Moore's Law

By Rick Merritt

THE PARTY'S NOT over yet, but it's getting time we start thinking about calling a cab. That's Henry Samueli's view of the semiconductor industry in a nutshell. The chief technology officer of Broadcom Corp. was shockingly frank in an on-stage interview at an event celebrating the 40th anniversary of Ethernet.

"Moore's Law is coming to an end—in the next decade it will pretty much come to an end so we have 15 years or so," Samueli told several dozen Silicon Valley technology veterans. "Standard CMOS silicon transistors will stop scaling around 5nm and everything will plateau," he said.

"I am comfortable we will get to terabit networking speeds, but I'm not sure I see a path to petabit speeds," said the co-founder of one of the world's largest communications chip companies. "You will see density of network switch boards levelling off and when you see the network progress level off it will change the dynamics of the entire industry," he said.

"We still have another 15 years or so to enjoy, but we need to prepare at some point for a network that doesn't double in bandwidth every two years," he added. Plenty of pundits have predicted the end of CMOS scaling before, but rarely veteran executives of well-established chip vendors with deep technical understanding. Before co-founding Broadcom in 1991, Samueli was a professor of electrical engineering at UCLA, specializing in communications chips.

The end of CMOS scaling "has been one of my biggest concerns for some time," Samueli told EE Times after participating in a panel discussion. "We've been talking to customers about this for a while," he said.

The end is not near, says ex-Intel exec

Samueli said he has briefed customers that prices for leading edge chips will increase, starting with the 20nm generation due to rising fabrication costs. Market watcher Gartner Inc. recently estimated the average 45,000 wafer/month fab could pay a premium of about \$500 million per process node due to the need to use two or more lithographic exposures to etch finer lines.

Stacking chips into so-called 3-D ICs promises a one-time boost in their capabilities, "but it's expensive," said Samueli.

Broadcom expects to use 3-D stacks to add a layer of silicon photonics interconnects to its high end switch chips, probably starting in 2015 or later, he said.

"We are talking with potential [3-D IC] partners, but we don't have it all sorted out yet," he said.



"Moore's Law is coming to an end—in the next decade it will pretty much come to an end so we have 15 years or so," Samueli told several dozen Silicon Valley technology veterans during a panel with execs from Arista, Brocade and HP.

Intel strategic meetings where Gordon would say beyond ten years I don't see it continuing," said House who is also an EE by training. "As time went on there was always enough money spent and smart scientists" to solve CMOS scaling issues, he said.

"It could be we will have a firm barrier [at 5 nm], but I wouldn't bet on it because the consequences will be so severe" he added. In conversation after the event, Bob Metcalfe, one of the original inventors of Ethernet and the keynoter of the event shared his thoughts with Samueli and others.

"One of the big things I learned today is Moore's Law is related to the elasticity of bandwidth—it not only creates the machines that need more bandwidth, it also creates the machines that provide that bandwidth," he told Samueli. "If you are right and Moore's Law ends, so will this bandwidth elasticity," Metcalfe said.

Another industry veteran on a panel with Samueli took issue with the Broadcom exec's predictions. "The real situation is we have 10-15 years visibility and beyond that we just don't know how we will solve [the problems of CMOS scaling] yet," said Dave House, chairman of switch maker Brocade and a veteran of 23 years at Intel.

At Intel, House interacted regularly with Intel co-founder Gordon Moore who articulated the theory that roughly every two years chip makers would be able to double the number of transistors on a CMOS chip.

"In the 1970s I started preaching Moore's Law will solve all our problems, and Gordon stopped me and said, 'Ten years out, I don't think it can continue,'" House said. "Ten years later, Gordon said again, 'I only see about ten years here.'

"It became a regular thing at

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Silica gets on the passing lane in Europe's LED market

By Christoph Hammerschmidt

IN THE BOOMING market for LED lighting, electronics distributor Silica intends to lead the pack by offering technological excellence at application level. The company currently is in the planning stage of offering custom-made solutions based on customer specifications, said Martin Bieleesch, General Manager Lighting and New Markets Silica EMG, in an interview.

Currently Silica, a subsidiary of Avnet, has LED products from Sharp, Seoul Semiconductor and Philips Lumileds in its portfolio. The company does not define itself as a simple distributor but plans to provide bespoke solutions which include all optical elements, power supplies and similar add-on components. While the company only recently begun offering such solutions, some projects are already active at various customers, Bieleesch said. The power supplies for these solutions are provided by the sister company Avnet Abacus from a handful of different manufacturers,

"Our focus is general lighting", Bieleesch explained - everything customers need for indoor, office and home lighting as well as outdoor lighting. Automotive lighting is not the primary focus. Bieleesch estimates the size of the total available lighting market to about € 70 billion worldwide; automotive lighting sums up to about 13 billion. Backlighting applications represent a significant share of the market, but in this segment the market saturation is already in sight - the penetration rate in this segment is currently about 60 percent as opposed to general lighting where Bieleesch sees only about 10 percent penetration. "The ban of high wattage incandescent light bulb is generating a significant demand growth", Bieleesch observed. Of the € 70 billion market volume, LED account for just about € 10 billion in 2013.

The LED lighting market is somewhat different to Avnet's other markets in the electronics industry. "Many new customers in the general lighting space had no or very little contact with electronic components", Bieleesch explains. The reason: these customers have their roots in the lighting segment, and their daily bread business is implementing lighting solutions based on incandescent or fluorescent lamps. Now that LEDs are increasingly playing a significant role in this business and even start to displace the conventional technologies, these companies suddenly and urgently need LED and electronic component expertise.

Another characteristic feature of this market is its high degree of fragmentation. "In this market you see many small

and mid-size players, including architects, light designers, and electrical fitters", Bieleesch said.

Is indoor or outdoor lighting more interesting? Both, said Bieleesch. "Both sectors are booming. Even for AC LEDs, so far the exotics in the LED lighting market, we start to see demand."

Currently, retrofit solutions prevail because they offer very simple installation options. However, on the long run they might not be the winning technology, Bieleesch predicted. "If you put all the power electronics needed to drive the LEDs into the socket, you create a lot of heat within a very limited space. This restricts the life expectancy of such solutions", he said. However, within the three to four years ahead, the technology should have reached the degree of maturity required to resolve these shortcomings, preparing the ground for an acceptance breakthrough.

"Against this background, we plan to prepare such customer-oriented and attractive solutions that we will be Europe-wide one of the top distributors", Bieleesch said. In order to reach this goal, he bets on organic growth in the first place, but he did not rule out that the company could expand its technology basis by acquisitions.

Divided by geographies, the LED adaptation rate currently is the highest in Japan - helped by the energy bottleneck caused by the nuclear plant failures in 2011. In Europe, environmental considerations are among the major drivers for LED demand. Within the EU, Germany is a very large market, but the engine fires on all cylinders: "All geographies are booming, including Eastern Europe and Turkey", he said.

In street lighting, the situation is somewhat different than in other market segments: in publicly funded projects, the financial condition of the public authorities is an important factor. While currently some Southern European countries are cutting their spending, Turkey is unaffected by the current crisis, Bieleesch described the situation in the South of Europe.

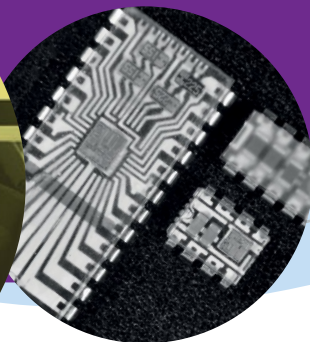
While the LED market runs hot, OLEDs (Organic LEDs) are not (yet) relevant for the demand. "Without any doubt, OLED is an interesting technology. However, it is yet unclear where they can compete against solid-state LEDs", Bieleesch commented on the current OLED performance level. In terms of product segmentation, the mid-range currently seems the sweet spot for Silica. "This market has been underestimated by some manufacturers", he explained. "These LEDs are suited to implement very cost-effective solutions without the need to place high-brightness LEDs everywhere."

Nevertheless, in the long term, high-brightness LEDs will prevail. "The price erosion will make them very popular", Bieleesch said.



Martin Bieleesch: "In Europe, environmental considerations are among the major drivers for LED demand"

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Obsolescence groups tackles long term supply and conflict minerals challenges

By Nick Flaherty

THE INCREASING USE of off the shelf commercial equipment and conflict minerals are two key risks facing designers of long term systems says the outgoing chairman of the UK's Component Obsolescence Group (COG).

The UK COG is the focus in Europe for issues around the supply of long term platforms for markets such as transportation, nuclear, military and aerospace where designs can last 30 to 40 years.

Chairman Nigel Wallis from Ultra Controls is handing over at the COG conference from the 25th June in York, UK. A key issue is getting designers to work more closely with their procurement departments on the sourcing of COTS parts and systems, he says.

"From my perspective the most important thing is the supply chain issue," said Wallis. "Historically COG has been about technology issues but now it's about the supply chain and the engineering and procurement issues are inextricably linked up."

"The will and the intent is always there but there are mechanisms that stop that happening," he said. "There's different agendas – engineering can focus on MTBF and reliability for example, while our agenda as procurement is non-standard parts and long term supply, so hopefully between us we will get stuff that's good for 25 years, he said.

"In my situation we have broken down the barriers and the reasons for it. There's always a technical reason for the part that's designed in, but there might also be supply chain issues that we can address - we don't have to replace the part but we can mitigate the risk."

"The important thing to note is there is still a lot of technical content in the design but there are always gaps in the supply

chain. There's often a replacement device but when there isn't and you have to go through a re-design and re-qualification, that has to be avoided at all costs."

Single source items are an issue if people get bought out or go bust and you have to look for other parts, he says. "And there are some weird and wacky stuff that you can't get re-manufactured," he said. "If you can mitigate it at the front end, best practice is to tackle this at the front end."

There are also problems with manufacturers changing the die, which they can do but this can mean the part is still current but doesn't work in the design.

"One of the problems we have that's recurring is the use of commercial parts," said Wallis. "The MIL parts are made to a certain spec, where a commercial manufacturer doesn't need to tell you if they change the process. The commercial parts are more commonly used and COTS and what that means – it means different things to different people – for some its parts, for others it's a whole systems and there is no one definition."

"The REACH regulations are starting to come in, restrictions on substances in devices, to safeguard health and safety and that could cause some problems," he said.

"We are about materials as well as components so there are issues with conflict materials such as tantalum and coltan – it is beginning to become a problem for people – it's not regulated now, but it will be. I think all we can do is highlight the issues. We can't change the world but it's about raising the awareness".

The group has a German chapter with COG Deutschland looking at automotive issues and it is looking at setting up a Spanish chapter, says Wallis.

Power-One enters into patent license agreement with Microchip

By Paul Buckley

POWER-ONE, a leading global manufacturer of renewable energy and energy-efficient power conversion and management solutions, has entered into a non-exclusive, worldwide, Field of Use agreement with Microchip Technology Inc. for Digital Power Technology (DPT) patents from Power-One.

Digital Power Technology drives increased system efficiency, improved design flexibility, faster time to market, decreased board space requirements and lower system costs. DPT also enables telemetry capability, providing access to critical information including current, temperature and voltage. Telemetry allows the system to accurately monitor its power consumption and thermal performance, enabling designers to easily engineer key features such as system power optimization, fault detection and predictive maintenance features into their end products.

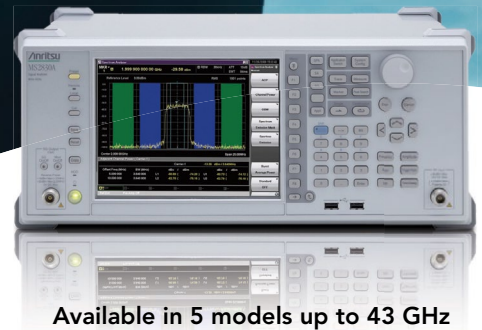
Applications utilizing FPGAs, ASICs, DSPs continue to drive board densities higher, requiring complex power architectures to handle the increasing number of voltage rails and output voltages dropping below 1V. Digital Power Technology is an extremely effective solution for these complex power requirements.

"These DPT patents support Microchip's goal of offering its customers a new level of performance and flexibility in analog-based, point-of-load power conversion solutions," said Bryan J. Liddiard, Marketing Vice President of Microchip's Analog and Interface Products Division. "Configurability through serial communication is crucial to system optimization and maximizing power conversion performance."

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Piezoelectric taxels made up of zinc oxide nanowires convert motion to electronic signals

By Julien Happich

USING BUNDLES OF VERTICAL zinc oxide nanowires, researchers of the Georgia Institute of Technology have fabricated arrays of piezotronic transistors capable of converting mechanical motion directly into electronic controlling signals.

The arrays could help give robots a more adaptive sense of touch, provide better security in handwritten signatures and offer new ways for humans to interact with electronic devices.

The arrays include more than 8,000 functioning piezotronic transistors, each of which can independently produce an electronic controlling signal when placed under mechanical strain. These touch-sensitive transistors - dubbed "taxels" - could provide significant improvements in resolution, sensitivity and active/adaptive operations compared to existing techniques for tactile sensing. Their sensitivity is comparable to that of a human fingertip.

The vertically-aligned taxels operate with two-terminal transistors. Instead of a third gate terminal used by conventional transistors to control the flow of current passing through them, taxels control the current with a technique called "strain-gating." Strain-gating based on the piezotronic effect uses the electrical charges generated at the Schottky contact Interface by the piezoelectric effect when the nanowires are placed under strain by the application of mechanical force.

"Any mechanical motion, such as the movement of arms or the fingers of a robot, could be translated to control signals," explained Zhong Lin Wang, a Regents' professor and Hightower Chair in the School of Materials Science and Engineering at the Georgia Institute of Technology. "This could make artificial skin smarter and more like the human skin. It would allow the skin to feel activity on the surface."

Mimicking the sense of touch electronically has been challenging, and is now done by measuring changes in resistance prompted by mechanical touch. The devices developed by the Georgia Tech researchers rely on a different physical phenomenon - tiny polarization charges formed when piezoelectric materials such as zinc oxide are moved or placed under strain. In the piezotronic transistors, the piezoelectric charges control the flow of current through the wires just as gate voltages do in conventional three-terminal transistors.

The technique only works in materials that have both piezoelectric and semiconducting properties. These properties are seen in nanowires and thin films created from the wurtzite and zinc blend families of materials, which includes zinc oxide, gallium nitride and cadmium sulfide.

In their laboratory, Wang and his co-authors - postdoctoral fellow Wenzhuo Wu and graduate research assistant Xiaonan Wen - fabricated arrays of 92 by 92 transistors. The research-

ers used a chemical growth technique at approximately 85 to 90 degrees Celsius, which allowed them to fabricate arrays of strain-gated vertical piezotronic transistors on substrates that are suitable for microelectronics applications. The transistors are made up of bundles of approximately 1,500 individual nanowires, each nanowire between 500 and 600 nanometers in diameter.

In the array devices, the active strain-gated vertical piezotronic transistors are sandwiched between top and bottom electrodes made of indium tin oxide aligned in orthogonal cross-bar configurations. A thin layer of gold is deposited between the top

and bottom surfaces of the zinc oxide nanowires and the top and bottom electrodes, forming Schottky contacts. A thin layer of the polymer Parylene is then coated onto the device as a moisture and corrosion barrier.

The array density is 234 pixels per inch, the resolution is better than 100 microns, and the Sensors are capable of detecting pressure changes as low as 10 kilopascals - resolution comparable to that of the human skin, Wang said. The Georgia Tech researchers fabricated several hundred of the arrays during a research project that lasted nearly three years.

The arrays are transparent, which could allow them to be used on touchpads or other devices for fingerprinting. They are also flexible and foldable, expanding the range of potential uses.

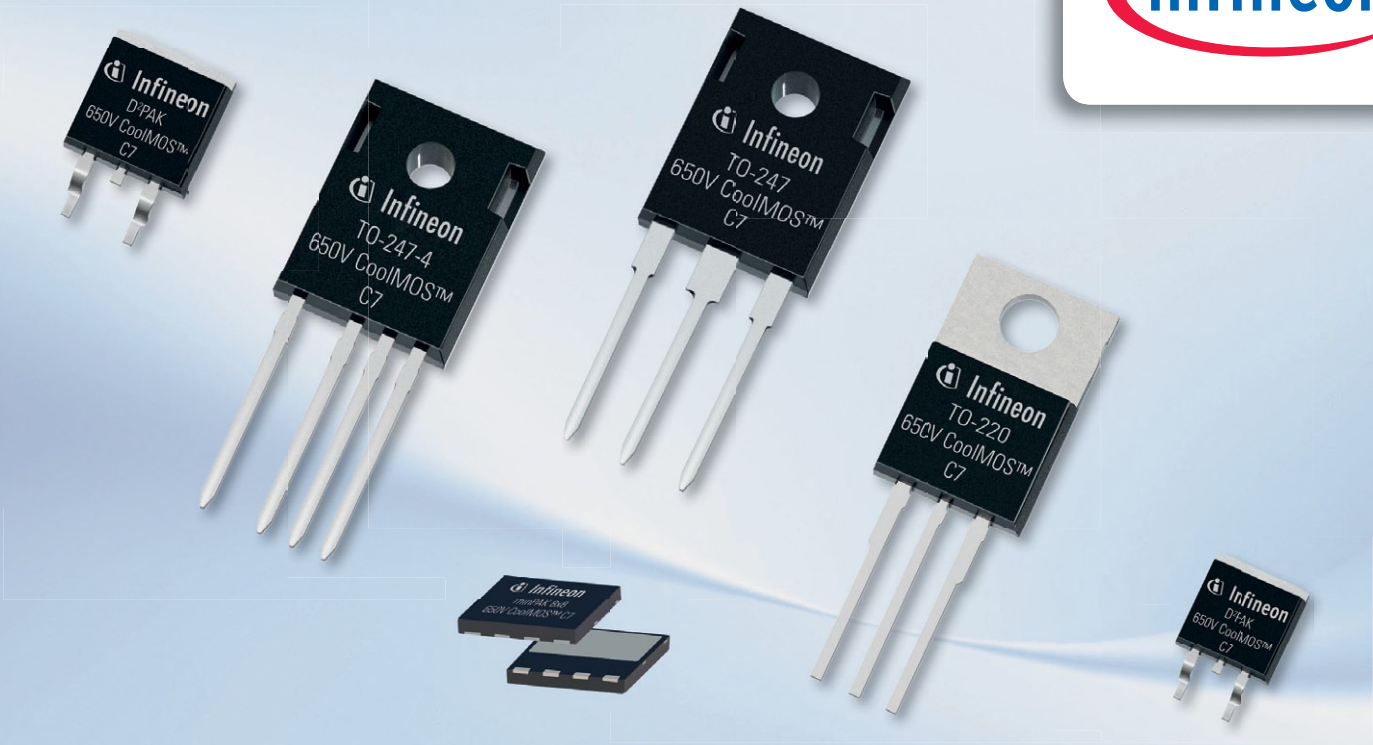
The taxels could find applications in multidimensional signature recording, in which not only the graphics of the signature would be included, but also the pressure exerted at each location during the creation of the signature, and the speed at which the signature is created. Shape-adaptive sensing could be achieved where a change in the shape of the device is measured. This would be useful in applications such as artificial/prosthetic skin, smart biomedical treatments and intelligent robotics in which the arrays would sense what was in contact with them. Because the arrays would be used in real-world applications, the researchers evaluated their durability. The devices still operated after 24 hours immersed in both saline and distilled water.

Future work will include producing the taxel arrays from single nanowires instead of bundles, and integrating the arrays onto CMOS silicon devices. Using single wires could improve the sensitivity of the arrays by at least three orders of magnitude, Wang said.

"This is a fundamentally new technology that allows us to control electronic devices directly using mechanical agitation," Wang added. "This could be used in a broad range of areas, including robotics, MEMS, human-computer interfaces and other areas that involve mechanical deformation."

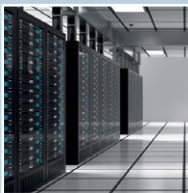
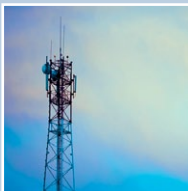


An array of piezotronic transistors making up taxels capable of converting mechanical motion directly into electronic controlling signals: Source Georgia Tech.



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Roadmap to automated driving takes shape: silicon chauffeur takes over

By Christoph Hammerschmidt

THE EUROPEAN COMMUNITY intends to reduce the number of traffic fatalities by 50 percent until 2020; the United Nations put a similar program in place to improve road traffic safety and cut back the number of traffic accidents in a global scale. This gives carmakers and tier ones a good argument to switch to automated driving: A chauffeur made of silicon and algorithms is less prone to fatigue and emotions and thus a safer driver than a human. Another big driver for automation on the road is the reduction of greenhouse gas emissions.

Many of the building blocks required to automate the act of driving are already in place, such as the Electronic Stability Control (ESC) which today is one of the most widespread driver assistant systems in the automotive world, explains Wolf-Henning Scheider, who oversees the Chassis Control Systems business for Robert Bosch GmbH. According to Scheider, ESC has proved to be “plainly the best technical measure to prevent accidents”.

But systems that eventually could take over the control of the car will be, of course, much more sophisticated. To enable a vehicle to drive autonomously (no driver required) or at least automatically (driver is present but only monitors the activities of the electronic driver), it needs, first of all, a machine perception of its surroundings. Therefore, sensors are a precondition for the next generation of vehicles. Then it needs the ability to process the data provided by the sensors, and the ability to translate the results of its algorithms into instructions, which affect the longitudinal and lateral movements of the vehicles. The third element required for automatic driving, the actuators, are already in place - electric power steering, electric brakes (already required for ESC) and throttle-by-wire are already commonplace in to-

day's vehicles. Algorithms and computing resources are subject to research and advanced development, much like the sensors.

Not all sensor technologies are suited for volume cars. LIDAR (Laser) sensors used in Google's famous experimental autonomous vehicles, provide a good spatial resolution, but they are rather susceptible to errors induced by unfavourable weather conditions such as snow or fog. It is also much too expensive for deployment in serial vehicles. The high mechanical and optical content prevents that the price level drops significantly in high-volume, explains Ralf Herrtwich, director for Daimler Benz Research and Advanced Development of Driver Assistance Systems.

To create a 360° surround image for the car's brains, manufacturers typically rely on a combination of proven technologies - radar, stereo and mono cameras, infrared and ultrasound. As an example, Daimler places four radar sensors to the corners of the vehicle plus one long-distance radar (range: some 270 meters) each centrally into the front and aft. Radar and cameras complement each other ideally, Herrtwich explained: while radar is ideal to determine relative speed and distance to an object, cameras along with pattern recognition software offer images with an excellent resolution and can discriminate different objects. In addition, stereo cameras can provide a spatial model of their surroundings.

The electronic systems that steer the vehicle through the traffic need exact and trustable information to compute the correct driving decisions. Therefore, the signals from different sensors are combined and double checked for plausibility and significance - an approach called “Sensor Fusion”.

Already in today's driver assistance systems the signals from radar and video sensors are used to control several safety functions. For example, the video signals are used to “warn” the airbag controller if a collision seems unavoidable but before the mechanical sensors trigger the ignition. “Video-controlled pre-activation of airbags and safety belts saves valuable time in the case of an accident”, explains Gerhard Steiger, director of Chassis Control Systems for Bosch.

At the next level, vehicles will be connected - be it by Car-to-Car or by Car-to-Infrastructure schemes - whereby the infrastructure includes relevant traffic data stored in the cloud. Local current weather information, variable speed limits or traffic congestion data will be used to configure the internal systems of the car accordingly, Steiger said.

Currently, carmakers and suppliers are discussing the roadmap towards automated driving. Steiger believes that the techniques necessary for automatic driving will gradually emerge from today's advanced driver assistance systems. In contrast to more or less all OEMs who do not yet

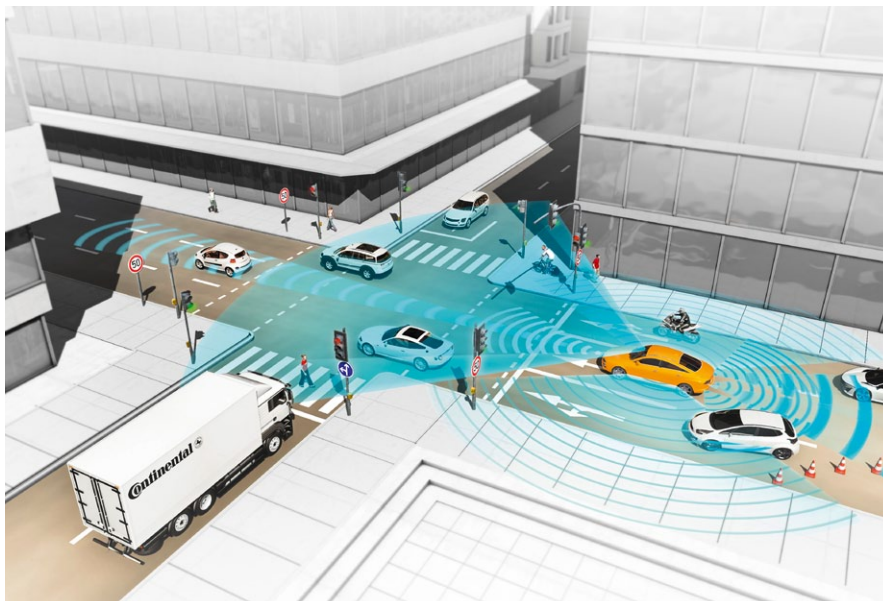


Fig 1: Radar and video sensors generate a 360° surround model of the car's environment.

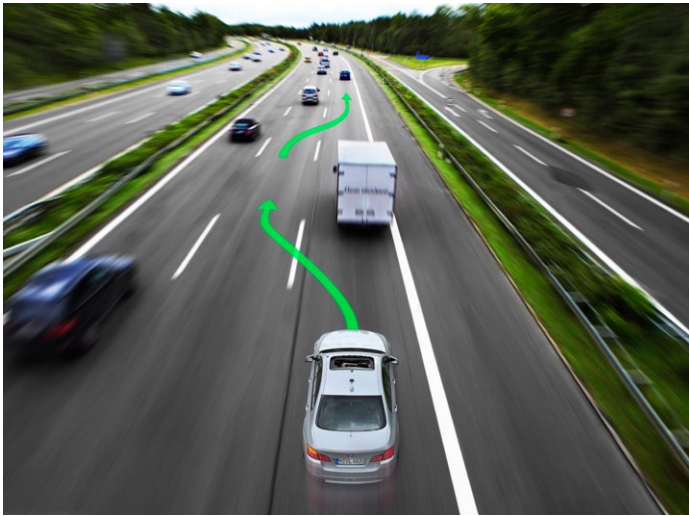


Fig. 2: Driving on motorways is relatively structured. This is where partly automated driving will be available first.

want to hold out the prospects of a defined timeline, supplier Continental already published a relatively detailed roadmap. By 2016, the company plans to provide solutions for partially automated driving: partly automated systems could exonerate the driver in relatively simple, structured driving situations such as stop-and-go traffic on a highway. Similarly, Bosch plans to introduce a system it calls "Traffic stall assistant" which, besides keeping the distance to the vehicle in front, also controls lateral steering but the driver needs to monitor the activities closely. Four years later, Continental hopes to go one step further to what it calls "highly automated driving". At this stage, the machine will assume control, and the driver can apply himself to other activities such as surfing on the Internet or reading a newspaper. In parallel, Bosch has something in the pipeline it calls "Traffic Congestion Pilot". "This pilot will be able to drive a car automatically on highways, from slip way to exit", Steiger said.

Partially automated or highly automated - both categories have in common that the driver must be able to intervene at any time. From about the year 2025, Continental believes that it will be possible to produce and use fully automated cars - vehicles that do not require any kind of driver alertness at all.



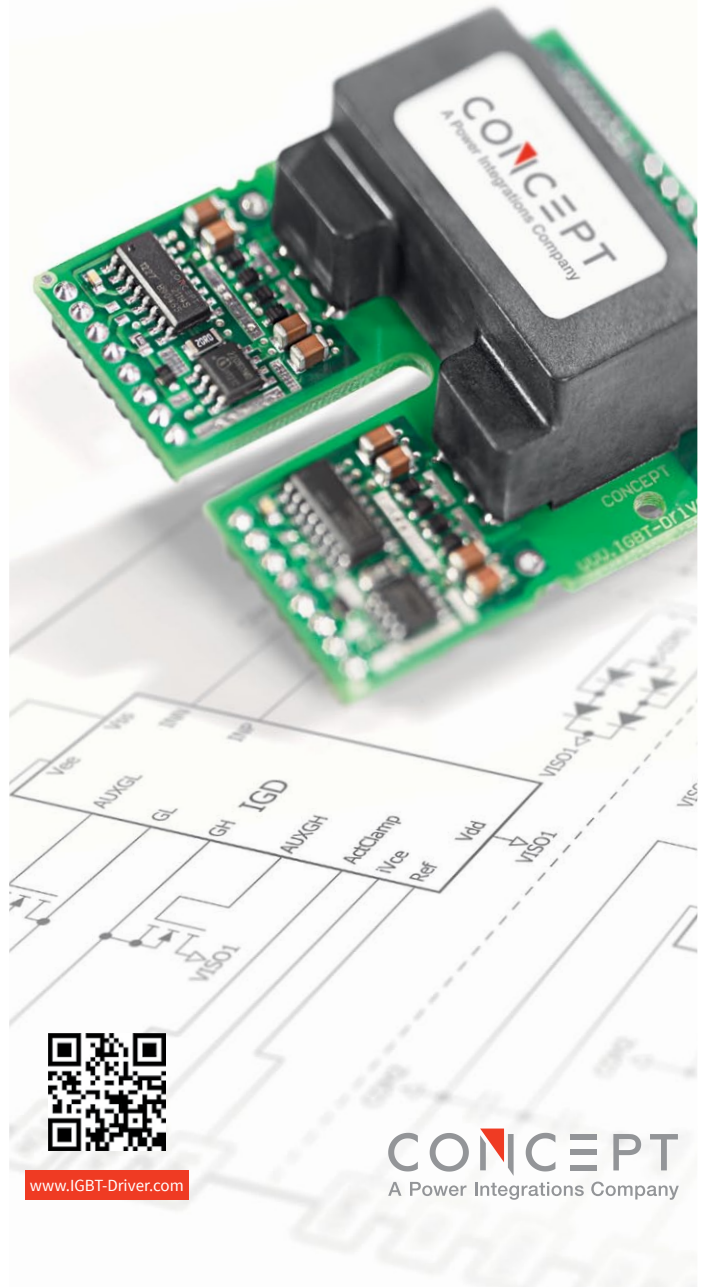
Fig. 3: Production of automotive radar sensors at Bosch (courtesy of Christoph Hammerschmidt).

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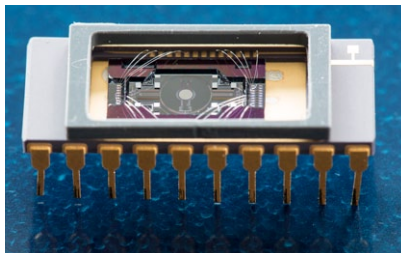
MEMS-based micro mirror laser projector can be integrated into cell phones

By Julien Happich

For years, Fraunhofer IPMS has been working on scanning mirrors for light deflection in one and two dimensions. Alongside resonant scanners with constant sinusoidal movement, a quasi-static variation has also been available for a while, which serves to make Linear movement or static orientation in a specified position possible.

Both types make compact laser projection systems possible in practice. These could be used as pico-projector components to be integrated into smart phones, supporting projections at the size of a TV screen, even at a short projection distance. Fraunhofer IPMS now concentrates on the "laser beam steering" principle for image generation. Here, a brightness controlled laser beam (e.g. three, in red, green and blue, for full color display) is directed by a single miniaturized scanning mirror over the projection surface fast enough to generate an image which appears cohesive to the human eye.

The scanning mirrors typically have a diameter of about one millimeter and are manufactured from mono-crystalline silicon wafers using established processes in cost-effective, large batches in the MEMs clean room at Fraunhofer IPMS. Fraunhofer IPMS utilizes an electrostatic actuator with comb



shaped electrodes for the necessary movement of the scanning mirrors. It was easy to make one and two dimensional scanners with conventional planar structures (i.e. mirror, outer frame and actuator combs lay on one plane). However, in this case, the resonating frequency is set, and changing the horizontal frequency, for example, is hardly possible. For another thing, the

high scan frequencies bound to the double resonant principle are contrary to the trend toward increasing pixel counts in the projected image – right up to full HD.

These disadvantages are overcome with the new quasi-static scanner concept from Fraunhofer IPMS, called LinScan. It requires one subsequent micro-assembly step, along with a small modification to the mechanical design to permanently tilt the actuator combs toward each other. The Institute was able to show that the combination of a resonant actuator on the quick horizontal axis and LinScan on the slower vertical axis is possible for a two-dimensional scanner like those necessary for pico-projectors. The laser beam can now make targeted jumps from line to line according to an externally configured frequency. This could yield pico-projectors with a SVGA resolution (800 × 600) and higher. As no projection optics are necessary, the result is always a sharp image.

Redux Labs spins out from HiWave to develop new haptics and embedded audio

By Julien Happich

Led by HiWave's former CEO and CTO, James Lewis and Chris Travis, start-up Redux Labs has been spun out to advance its Surface Sensation technology for third generation haptic and embedded audio technology.

The company will deliver a range of haptic/touch and audio transducers, electronic control modules and chipsets, evaluation platforms and bespoke system development for multiple market sectors.

Redux's Surface Sensation use patented techniques that precisely control bending sub-sonic audio waves across a screen to deliver 3D Haptics functionality. The technology's configurability allows OEM product developers to accurately mimic the tactile and acoustic sensations of real-world user inputs such as sliders or a specific button presses on a flat panel such as a display. For example, users could discern the separate keys on a tablet keyboard, or drivers could locate and operate touch panel switches in vehicles without being visually distracted. These haptic effects are localised to the point of touch enabling an effective

multi-touch environment where the tactile sensation is only felt by the finger pressing the key. The same transducers can also cover the audible spectrum to deliver audio cues, messages and alerts from the surface being touched.



By applying these same techniques to audible frequencies, Redux has also developed products that turn a screen or panel into a high quality, forward facing loud speaker, delivering crisp and clear full-range audio directly to the listener.

Surface Sensation is being targeted at flat-screen TVs, laptops, phones and tablet PCs, in which it is expected to replace internal micro speakers. The technology also delivers top quality audio and compelling haptics from other material surfaces including metal, plastics and composites.

James Lewis, Redux CEO said: "Redux will focus on advancing and commercialising haptic and audio solutions, and to develop ground breaking technology that redefines the user experience in an increasingly touch-display oriented world."

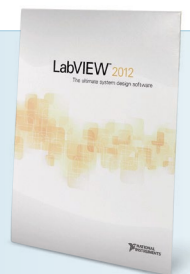
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Sharing the costs of research to circumvent the economics' barrier

By Julien Happich

LAST MONTH, IMEC'S TECHNOLOGY forum which took place in Brussels put a clear emphasis on the synergies that should be leveraged from the many fields of research explored at its international campus and across its hundreds of partnerships.

Several key industry players shared their views on what could come beyond the 10nm node, and although the roadmaps became foggier as they ventured further into the future, a recurring message was that no company alone could afford the kind of investments and risk-taking associated with leading-edge processes.

Director of components research at Intel, Mike Mayberry's was prompt to highlight the challenges associated with costly and wide-ranging research on multiple fronts in an era of consolidation that has fewer technology players. While the Semiconductor Research Corporation (SRC) had 34 members in 1998, only 13 members remain today, which implies fewer end customers of research and overall less options being explored, Mayberry noted. This means consortia need to adapt and join their forces to engage in research before choices are made on the next technology nodes. This way, companies can share the risk of long range research on multiple fronts, and also share the benefits when an optimum transistor technology is found.

For Mayberry, the technology nodes up to 10nm are pretty much defined and under development, but what's beyond the 10nm node remains blurry with some broad optimization choices to be made for transistors. You want to increase charge mobility for a better ON-state while increasing device confinement for a better OFF-state (and thus less leakage). Mobility could be increased with new materials including Ge, new III-V compounds, carbon nanotubes or graphene, while increased device confinement could be realised through innovative electrostatic structures, moving from bulk silicon channels to Ultra-Thin Body (UTB) Silicon-on-Insulator (SOI) to FinFETs (wrapping the gate around three sides) to wires or dot transistors with a Gate All Around (GAA) architecture as shown in figure 1. Though this latest implementation would be the limit to structural electrostatic control, according to Mayberry, noting that with nanowires 6nm in diameter and transistors fabricated at a 7nm pitch, you would lack the required number of dopant atoms to make the devices work in such reduced volumes. Manufacture apart, another issue is how to control these devices. "If you look ahead, beyond visibility on the road, the road becomes foggy but you know it doesn't necessarily end. Instead, there are inflection points" commented Mayberry.

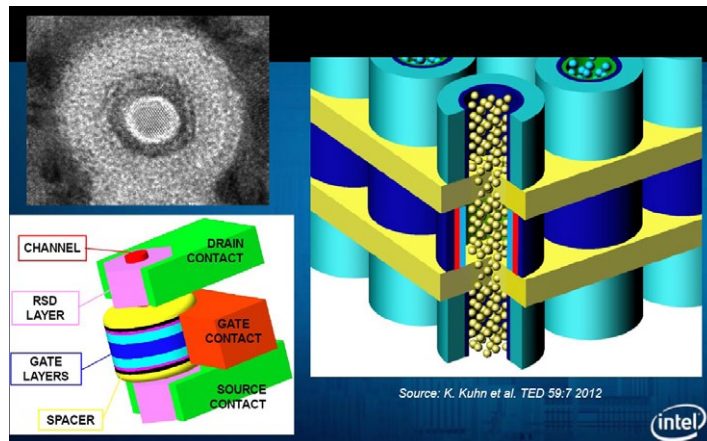


Fig. 1: Gate All Around (GAA) transistor architectures at Intel.

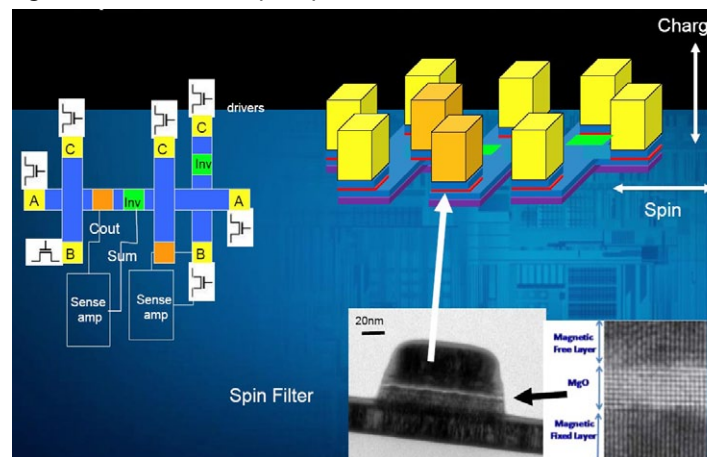


Fig. 2: Spintronic devices built on multi-layered materials.

Hence, with voltage scaling limited by charge mobility and the size of devices being limited by their intrinsic electrical behaviour, spintronics could be the future. Spintronic circuits are not based on charges but on electrons' spins, which define different magnetic domains within multi-layered materials. Charges and spins travel across the devices in different directions, such circuits use mixed domains. So beyond CMOS, various Noncharge devices are being developed theoretically, such as all spin logic (ASL), spin torque oscillators (STO), spin torque majority gates (STMG) or nanomagnetic logic

(NML) to name a few. Intel has actually demonstrated a spin filter based on very fine magnetic layers – see figure 2.

Presenting imec's capabilities for CMOS scaling in the next 10 years, Aaron Thean, director of the logic R&D program hinted at III-V/SiGe/Ge heterogeneous FinFETs – see figure 3 - for increased electrostatic confinement while improving charge mobility. Another issue is to manage process variability, which becomes increasingly limiting as devices shrink. Moving beyond FinFETs, imec is experimenting with vertical nanowire architectures and rod-shaped gate-around devices. Thean reckons that a 16% shrink can be achieved relative to 2-D layouts. The research centre has managed to grow direct self-assembled InAs vertical nanowire on silicon using sub-lithographic surface guides. It is also doing fundamental work with new 2-D flake materials, demonstrating electrical devices with molybdenum disulfide (MoS_2) and tungsten di-selenide (WSe_2).

Gate-all-around (GAA) structures are also a good candidate for 3-D memories according to Keyvan Esfarjani, vice president technology & manufacturing at Intel and co-CEO of IMFT (IM Flash Technologies, a joint venture between Intel and Micron Technologies). Esfarjani anticipates that memory cells could be arranged as 2-D arrays of vertical semiconductor channels across many levels of GAA structures to form multiple volt-

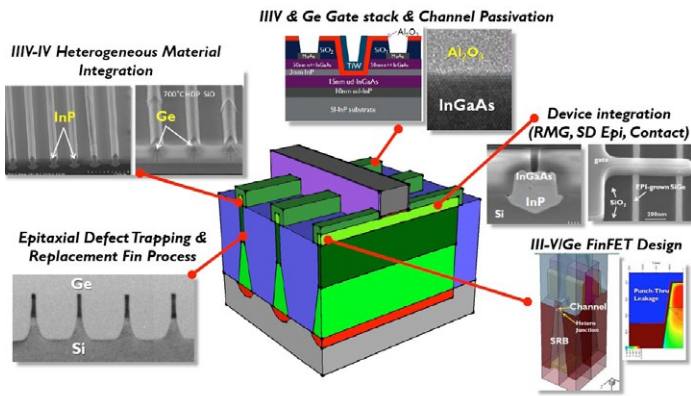


Fig. 3: III-V/SiGe/Ge heterogeneous FinFETs for CMOS scaling.

age level memory cell transistors. The new challenges for such memory architectures are about finding the materials that can withstand the temperatures of multilayer semiconductor processing, while enabling high aspect ratio etching to obtain the vertical channels.

Wait and see who pays the bill for EUV

The only speaker to really raise the issue of an economic barrier that could block future nodes was KLA Tencor's CEO and president Rick Wallace. With billions of transistors on the most advanced semiconductor chips and hundreds of processing steps with 40 to 50 mask layers, things only get harder as design rules shrink. Wallace noted that while the costs of building fabs increased roughly 5 folds moving from the 90nm node to the 22nm node, the cost per transistor didn't follow the same trend. In fact it may rise, and the only way to make it economically viable is to improve yield. You would expect that sales pitch from a semiconductor inspection tools vendor. The argument here is that you can't control what you can't measure, and you certainly can't fix what you can't see. Talking about EUV lithography which has yet to happen, Wallace reminded us that no equipment vendor can afford to develop the corresponding metrology tools purely based on speculation that this technology will be adopted, especially by only a few end-users who may decide in the end, that EUV is not what they want. "It is not a truism that everything is going to scale, economics could block that path" Wallace said, calling for more industry collaboration. "We have some ideas for the tools needed but if there's no funding, we'll wait and adoption will slow down", he added.

Healthcare goes mobile

Another key topic covered during the imec technology forum was how the miniaturisation of health monitoring and diagnostic instruments could drastically cut public spending by encouraging consumers to wear their own health monitoring devices. Health spending drivers include hospital stays, physician or clinical care and nursing home care, often only to keep a tab on heart-beat, temperature, eventually get a blood sample for glucose monitoring or for further lab analysis. The ultimate goal would be to create disposable micro-fabricated test modules that would connect wirelessly to a dedicated mobile phone application or send their analysis results to web services for a better diagnostic – see figure 4. Such modules could host on-chip microscopy for cell identification and counting, on-chip DNA amplification and detection, on-chip protein and metabolite measurements for specific disease biomarkers, microfluidics for sampling blood, saliva or urine, and a low power wireless communication unit. The smartphone and its cloud-based apps would replace the expensive dedicated data processing instru-

ments currently in use in clinical labs, while the disposable unit would only cost from 0.5 to 10 dollars. Imec has already demonstrated several building blocks for such a device. The on-chip microscopy element is achieved through the implementation of an in-line hologram, effectively the interference pattern of a reference beam with the light scattered by the tissues, an image can then be reconstructed from the interference pattern. In cooperation with Panasonic, imec has also developed a microreactor for DNA amplification. To replace costly flow cytometry equipment which can typically count 1000 cells/s, the lab has prototyped a cell sorting microfluidics platform that it believes is scalable to count over a million cells per second.

Similarly, miniaturized bioreactors with integrated imaging and biochemical monitoring could be used to perform highly reproducible cell production for regenerative therapy, to develop organ-on-a-chip models for absorption, distribution, metabolism, and excretion (ADME) testing and toxicology. This could also be used as a tool to predict drug efficacy and unwanted toxicity/side effects, or even for personalized therapy. In his presentation, Peter Peumans, director for bionanoelectronics at imec, also discussed biocompatible miniature electronics to interface directly with the body's control system through neurons. Featuring 456 electrodes able to connect to neuron terminations, the miniature prototype built in his lab integrates on-chip amplification, filters and analog-to-digital conversion for 52 channels. Aimed at neurosciences, this miniature instrument exhibits a very-low-noise (4µVrms) and is able to record and stimulate electrical signals.

Another prototype development project is to use the very-large-scale integration of photonics and electronics for genome sequencing, effectively replacing multiple \$500k machines with a single disposable chip. Peumans expects such a solution would increase genome sequencing throughput by two or three orders of magnitude.

Program manager for body area networks at imec/Holst Centre, Julien Penders believes that turning healthcare into a consumer product with dedicated smartphone apps is a good way to prevent diseases while encouraging a healthier living. Junk food, the lack of physical activity and tobacco use are the biggest risk factors associated to chronic diseases. By putting medical data into consumers' hands together with software applications to help them change their behaviour, Penders believes that wearable health monitoring solutions could save lives at a minimal cost.

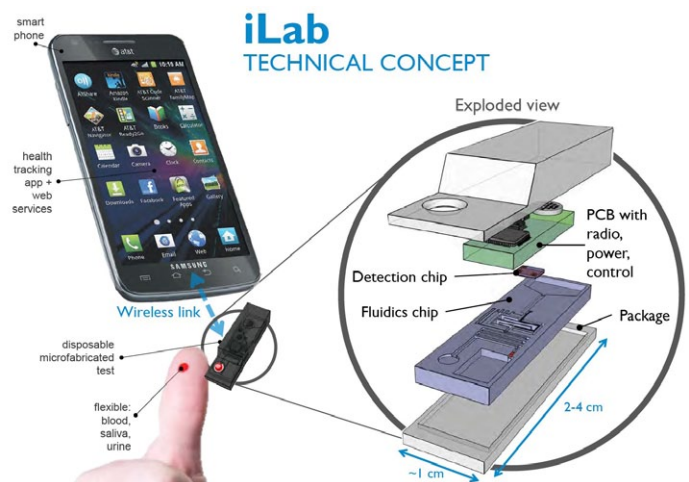


Fig. 4: Disposable micro-fabricated test modules could connect wirelessly to a dedicated mobile phone application.

High-level M2M application design for mobile-based services

By Yi Huang

MACHINE-TO-MACHINE (M2M) applications are complex systems that can only be realized on the basis of a coherent design. The route to coherence is via a requirements analysis, and data interchange via mobile communication networks confronts developers with a number of requirements that feed into design decisions from the use of Machine Form Factor (MFF) SIMs to choosing the right communication protocol.

Connecting machines, devices, and objects is in full swing, be it in an industry context under the Smart Factory heading or in private projects such as home automation. Machine-to-machine applications combine embedded systems and communication technologies. Developers make use of a wide range of communication routes, from direct wiring to wireless networks like W-LAN and Zigbee. Connecting embedded systems by mobile networks, however, opens up a number of particularly interesting scenarios, from the surveillance camera that transmits a picture by MMS to wristwatches with a built-in emergency call function. Thanks to the commitment of mobile network operators in the M2M growth segment enabling devices to communicate with each other via a mobile network is now easier than ever before.

Deutsche Telekom's M2M Developer Community, for example, now offers an entry-level package that bundles an Arduino board with a GSM chip, an M2M SIM card, and access to a Cloud-based developer platform. Yet the use of mobile technology differs from programming network applications in general. What must developers bear in mind? The requirements analysis provides initial answers to this question.

Every M2M project has individual requirements that need to be identified at the outset of the development process. Requirements may change in the course of a project, but in many cases a faulty design can thereby be prevented in advance. In principle, there is no single blueprint for an M2M solution requirements analysis. The range of applications is simply too wide. In practice, however, using the target group and the application area along with the application scope and framework as starting points, working through them systematically, and identifying requirements accordingly has been found to be a successful approach – see figure 1.

Target group and application area

The target group's requirements provide inter alia an indication of the scope of functions required. What exactly is the application to achieve? What added value does it offer to users? As a rule, industry-specific expertise is required to fully identify target group requirements and application area processes. Translating target group-related requirements into the language of engineers is one of the greatest challenges of the requirements analysis. In some cases, however, requirements are immediately evident. Take, for example, a toy robot that is to be controlled by a smartphone. The user interface should be simple enough

Yi Huang is Marketing & Proposition manager in the M2M Competence Center at Deutsche Telekom – www.telekom.de – He can be reached at Yi.Huang@telekom.de

for even a child to use it. Complicated menu structures and a plethora of options are out of place.

The application area is the first indicator of hardware requirements. Household devices can be less robust than devices for industrial use. That is why an Arduino board as a learning and prototyping platform is unsuitable for factory applications. More robust wireless terminals made by manufacturers such as Cinterion, Telit, or Sierra Wireless should be used instead. Furthermore, ambient conditions determine the choice of Subscriber Identity Module (SIM). SIM chip cards identify users in a wireless network. They look inconspicuous but are in reality tiny computers consisting of a CPU, a I/O unit, ROM, RAM, and EEPROM. Standard SIM cards cannot cope with major fluctuations in temperature. That is why, for industrial M2M uses, there are special MFF SIMs. They are smaller than the SIM cards with which we are familiar from mobile terminal devices, can be soldered onto circuit boards and are designed for use in extreme conditions. They can withstand temperatures of between -40 and +105°C.

Many M2M applications are designed to function autonomously in remote locations. A pump control system, for instance, must work for long periods without human intervention. A resulting M2M application requirement is that the application must constantly monitor its state in the network.

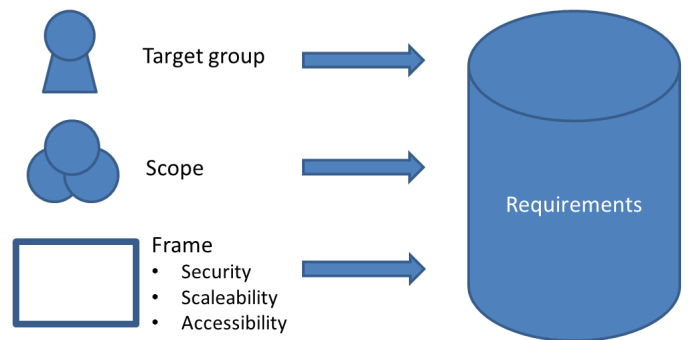


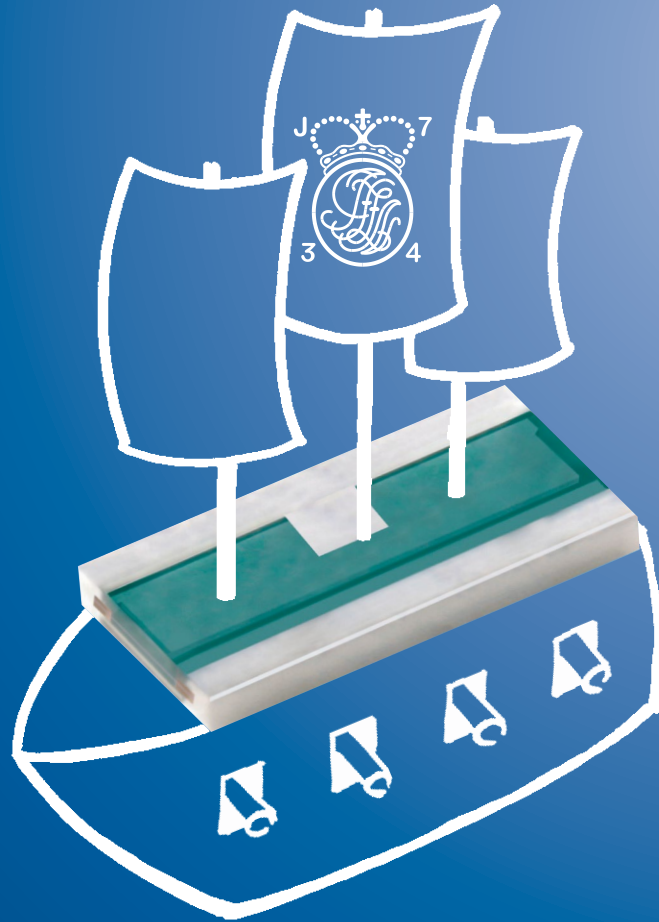
Fig. 1: Identifying the user requirements.

Application scope

Further requirements can be deduced from the application scope. The problem solution approach in figure 2 shows several typical areas of an M2M application, from generating data to providing a service. Some applications must address every area, others only some. As soon as the application relays data via the mobile network in one of these steps, a decision must be made on the communication protocol to be used. The quantity of data transmitted is a cost factor. So M2M developers need to be very conversant with protocols in order to implement the mobile data interchange efficiently.

Take TCP and UDP, for example. Both protocols define how data is transmitted to an IP address, but in different ways. TCP can be compared to a forwarding agency that promises safe

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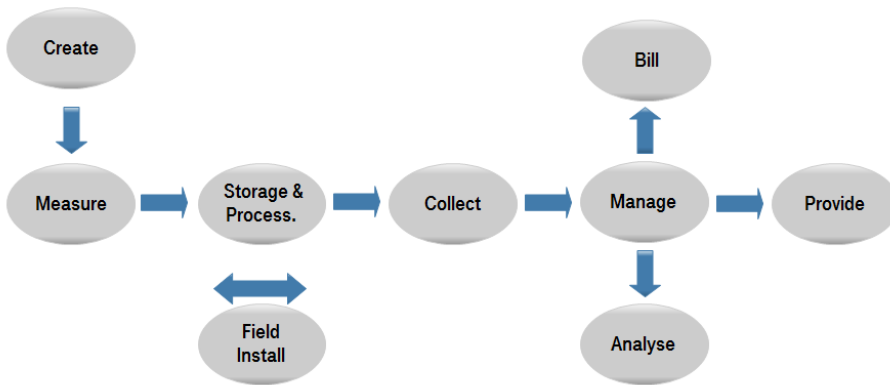


Fig. 2: Application scope.

delivery and documents and secures the process in detail. UDP, in contrast, is like a cycle courier. Packages reach their destination faster but there is not the same delivery audit service. That is reflected in the package size. A TCP header is usually 20 to 60 bytes long, a UDP header a mere eight bytes. Developers can estimate the data volume to be transmitted by counting the number of packages required to transmit the data. Cost-effective solutions can be achieved by means of skillful programming and M2M tariffs that bill all data packages in the smallest block sizes. In several German forests, for example, a tracking solution to combat timber theft is in use that manages with a flatrate of 1 MB per month—and that includes Europe-wide tariffs, including roaming.

Framework

An M2M solution's framework can be described in terms of the aspects security, scalability, and availability. The security requirements result from the purpose and context of the application. For industrial applications and processing business-critical data the security requirements are very high; for M2M solutions for entertainment purposes they are, by contrast, significantly lower. To protect business-critical data mobile network operators provide special VPN offerings for machine-to-machine communication. An IPSec tunnel is built between the private corporate network and a private APN to protect the data transferred. If resources become very large during an M2M application's life cycle, its scalability must be ensured.

How many devices are in use over which periods of time? How does the application handle large amounts of data or a large number of devices? How does that influence performance? Only one or two devices may be used with a prototype, but up to several thousand devices may be involved once an M2M application reaches the market.

Availability is another key aspect in the use of M2M solutions. In some scenarios the most continuous availability of connected devices must be ensured. Medical applications that monitor patients' vital functions and alert the physician in an emergency must always be well connected. In other scenarios continuous availability is not essential. Slight

delays are not critical for a watering solution for window boxes, for example. To cater for different requirements mobile network operators offer different M2M service level agreements. They must be booked in addition to the SIMs and guarantee certain quality parameters such as network availability and coverage. MNOs provide special portals for managing SIM cards and chips. Solution providers can activate SIM cards and set monthly data volume limits via Deutsche Telekom's M2M Service Portal, for example.

Next steps

The sum of all the requirements is the basis for the system design. It gives developers a rough idea of which components they will need to take into account in designing their M2M applications. The next step consists of converting the system design into a detailed design in which placeholders are replaced by detailed specifications. Only then do implementation and test cycles get under way. Reaching a coherent design is an important stage in the development process but not the only one. A point of contact for all M2M development phases within Deutsche Telekom is its M2M Developer Community - www.developergarden.com/m2m/home - where developers will find entry packages, support, comprehensive documentation, and a living community of developers which are interested in making their solution out of the broad spectrum of M2M-applications available. And having developed a solution they can sell it via Deutsche Telekom's outreach worldwide.

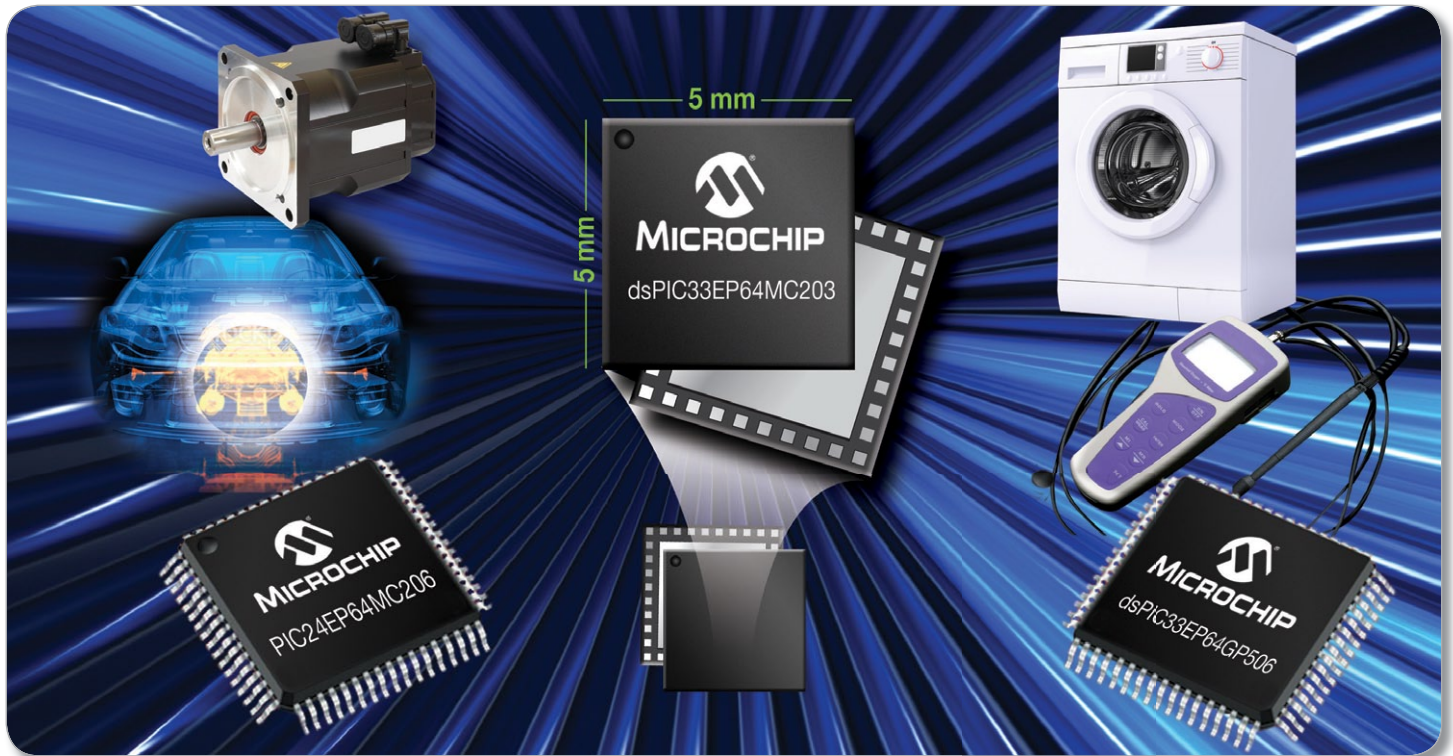
5G WiFi combo chips target entry-level market

Broadcom Corporation has introduced its first 5G WiFi combination chips targeted specifically for entry-level consumer devices, including PCs, notebooks, tablets and smartphones. With more enterprise and retail routers rapidly moving to the IEEE 802.11ac standard, the infrastructure is in place for broad adoption by PCs, tablets and smartphones, opening up significant new opportunities for 5G WiFi to be integrated into mass market platforms. As the first company to deliver 802.11ac technology across all product segments, Broadcom is well positioned to capitalize on these opportunities by providing original equipment manufacturers (OEMs) an affordable solution that offers all of the performance, range and power advantages of 5G WiFi in a single-chip design. As Broadcom's second generation of 5G WiFi combo chips, the BCM43162 and BCM4339 offer the same unmatched performance, range and power consumption benefits as the flagship 5G WiFi combo chip, the BCM4335, but integrate the complete front-end, power amplifier (PA) and low noise amplifier (LNA), to enable a low-cost, mass market solution. The BCM43162 is a peripheral component interconnect express-based (PCIe) client solution for PCs and notebooks with support for Microsoft Windows operating system, and the BCM4339 with secure digital input output (SDIO) interface, is a mobility solution for smartphones and tablets with support for Microsoft Windows and Android operating systems. Additional features include: transmit beamforming and low-density parity-check (LDPC) codes for greater coverage and robust whole-house media and data applications; 433 Mbps WLAN PHY rate for superior speed; Broadcom proprietary TurboQAM for 33 percent increase in 2.4 GHz speed; and Broadcom proprietary Channel Smoothing WLAN PHY to increase receiver sensitivity by an average of 2 db across 802.11n and 802.11ac rates.

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Data management for a modern M2M framework

By Sasan Montaseri

OUR WORLD IS SURROUNDED by electronic and wireless devices. Managing all the different types of machines we have to deal with every day has encouraged technologists to have them connected so they are able to communicate with each other and perform tasks independently. This technology, which is known as Machine-to-Machine (M2M), is the science of enabling devices to manage and communicate data so they require the least human presence or manual programming.

M2M data communication and data management is increasingly gaining attention and soon, according to various reports, more and more devices need to connect, communicate and distribute their data to each other and over the Internet. There are various reports, including one from Cisco explaining that there will be over 10 billion connected devices by 2016. Each machine will produce, share, receive and analyze data, and data management persists in becoming an important component for M2M ecosystem.

Some of key components for an M2M ecosystem include:

Sensors: to detect any input data in the form of light, heat, motion, signal, and so on, and can transform it into human-readable output.

RFID: a technology incorporating the radio frequency portion of the electromagnetic spectrum to identify data relating to any living or non-living thing.

Wi-Fi: some type of wireless technology in which electromagnetic waves carry signals in telecommunications.

Autonomic computing system: a self-managing computing model that would control the functioning of computer applications and systems without input from the user, which can function while being invisible to the user.

Before M2M communication is made possible, machines need to be equipped with a suitable database framework so they can collect, analyze and share data in a scalable fashion. Machine intelligence – IQ – has a direct relation to its ability to understand and analyze data. One scenario for such a deployment is when every machine (node) accumulates and shares certain data with other machines (nodes) so any node can do data “analysis” and “processing” from their collected data. In a network gateway scenario, other devices are connected to each other and to the cloud, which may include a relational back-end

database. Data interoperability and standards are also important. Data management capabilities – such as asynchronous or synchronous replication to distribute data, SSL to secure data, and the conventions and data structure necessary to govern how machines should exchange data – play an important role for M2M ecosystems.

For example, a home automation application can monitor the cycle of a washing-machine, schedule a coffee machine to finish brewing at a specific time, and check that lights are off when away from home. Residents need to access and control information on these devices through multiple interfaces,

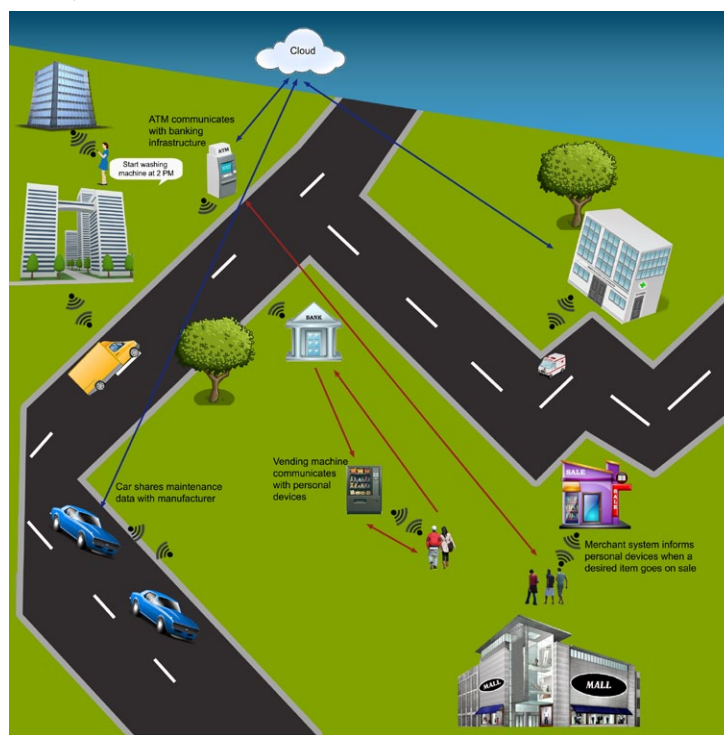
whether mounted in the home or on a personal smart phone or tablet. A database for such devices must provide a framework for communication within the M2M infrastructure.

Managing big data

A sharp increase is expected in machine communication and data exchange as more machines are connected to the Internet and other networks to share information with other machines. M2M communication is on the rise: millions of machines are being connected to collect and accumulate a large amount of data. Known as the Internet of Things (IoT), this network connects embedded data in a variety of systems such as medical devices, automotive software, mobile devices, and tablets. However, these

machines often encounter serious data management challenges in which a large amount of data is collected and accumulated at different locations. As these devices become part of a networked and connected ecosystem, the complexity of data management and system connectivity makes it difficult to find and query required data without configuring data distribution to replicate between machines or synchronize with a back-end RDBMS product.

Embedded ecosystems are generally composed of many machines that divide up a big data problem. Some data is private to each machine, while other data is shared with select peers; so the database should use replication and synchronization to efficiently distribute local data with other machines and back-end databases according to the manufacturer’s business logic and policies. Any number of peers can participate in replication, allowing an ecosystem to scale up as more machines are added. Data produced on a machine or retrieved from other machines should be locally queried for rapid decision-making,



Sasan Montaseri is the founder of ITTIA – www.ittia.com – He can be reached at sasan@ittia.com

Ever wished for a better bench scope?

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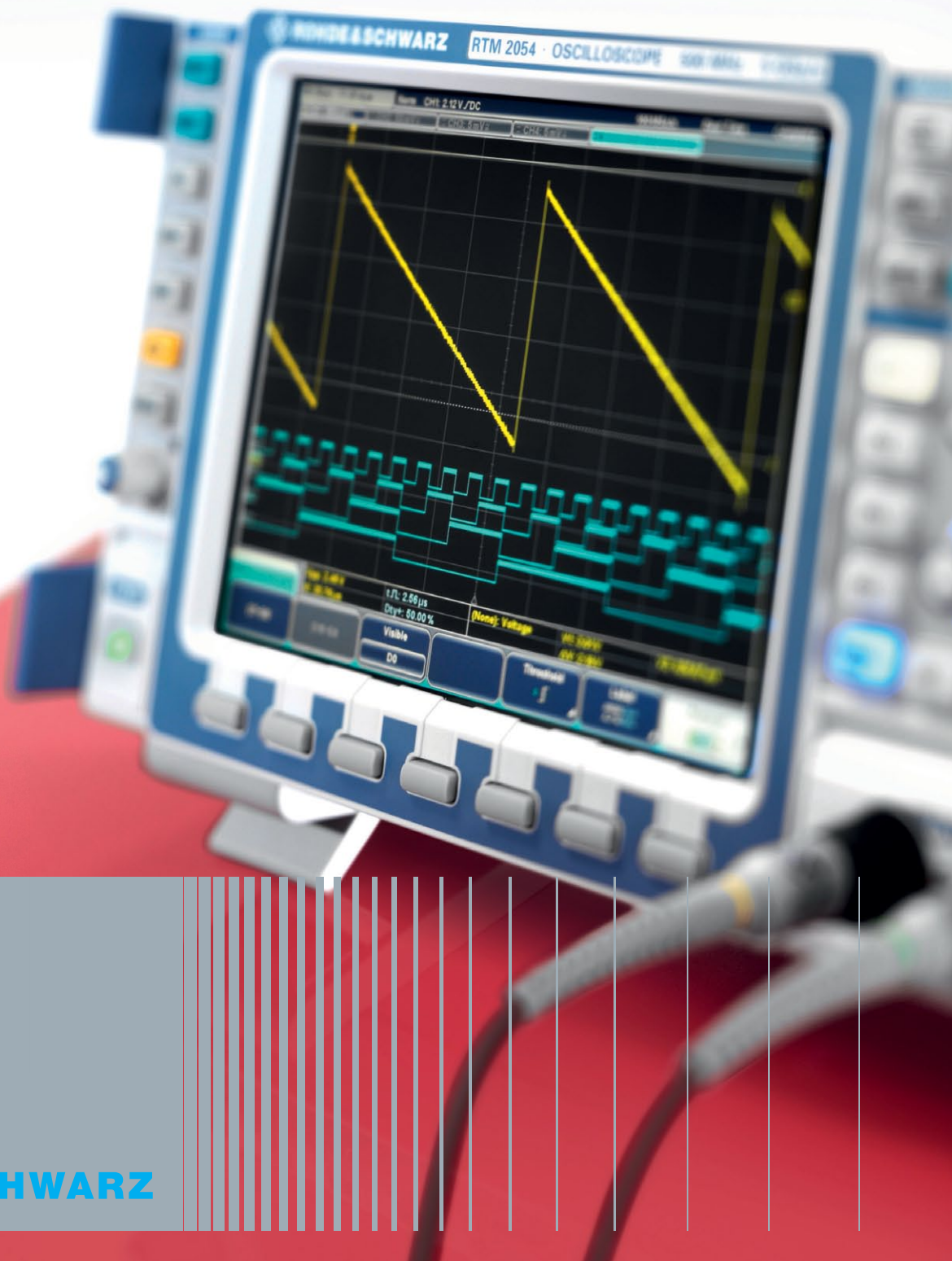
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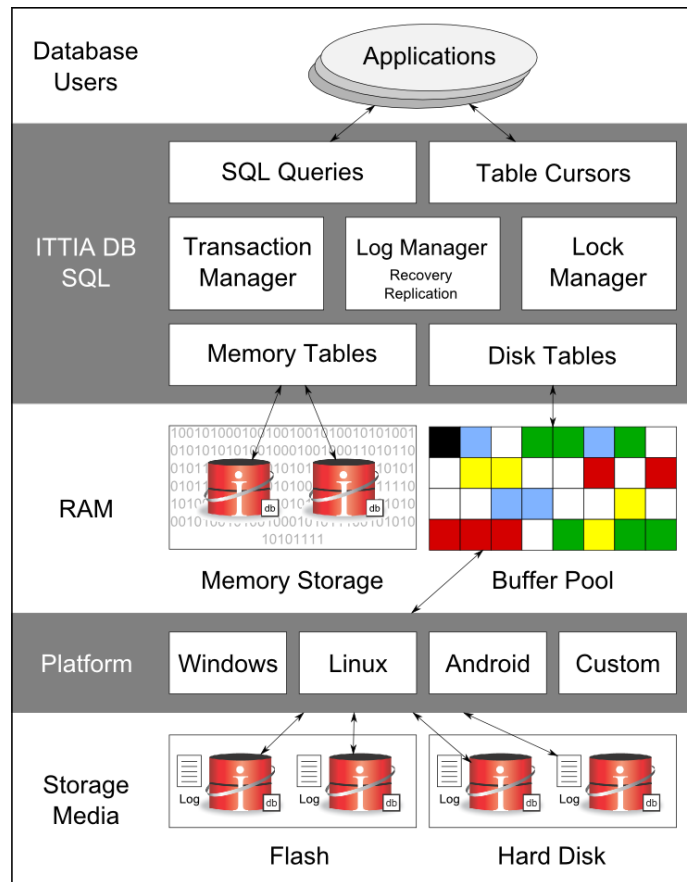


ensuring that each machine functions autonomously. Local queries should not be interrupted by a background data exchange, which is important for maintaining responsive interaction.

Machines in an ecosystem often run on a variety of platforms and processor architectures, so the database should be capable to keep them connected with a cross-platform approach to data management – even with a custom file system and no operating system. M2M manufacturers need to ensure that these machines are communicating with each other while executing queries and meeting other data management expectations.

This requires a solution that connects databases across systems, handling data exchange and high availability for the machine, while providing continuously maintained redundant copies so that data is always available and machines can always wake up and communicate. Such requirement necessitates a cross-platform technology in which any combination of hardware and operating system software can be used to create redundancy. Another important requirement is the ease of configuration for a variety of M2M scenarios, whether data flows bidirectionally or only in one direction. Dynamic configuration settings should be stored directly in each database file, and be applied without any restart or reload step, and should allow changes to the local database to be automatically tracked and exchanged with peers whenever a connection is available.

ITTIA DB SQL's M2M solution is a software library for storing data that should be later transmitted to other machines. This ensures manufacturers a proper M2M communication, while queries and other data management expectations are also met. Using M2M data analysis, each machine can run various SQL



queries to make decisions on data after it is transported and saved. Also, change notifications allow a machine to set up an event queue to monitor for changes in specific tables, especially via machine-to-machine protocols.

Key features of ITTIA DB SQL's M2M solution are its interoperability and maintainability, its single-user and multi-user options to simplify data management without the complexity of a back-end database server, multi-threaded concurrency. The database solution also allows shared access to automatically perform the necessary locking when a database is shared between devices. Built-in replication duplicates changes across multiple databases, even if connectivity is not always available, then row-level locking allows the database to interact with other systems and share data without interrupting normal usage. ITTIA DB SQL equips machines with big data capabilities for smart embedded systems with limited

local resources.

With this unique technology, a large data set can be distributed across a wide array of devices, with the potential to store millions of rows per device. Machines can then run queries on individual machines, or pool data together in a back-end system for data warehousing and data mining.

Manufacturers benefit from highly reliable embedded database software with a strong track record in mission-critical systems, which allows smart systems to manage, connect, and analyze data obtained from machines or humans (M2M or H2M) – adding value to machines with “intelligence” in the M2M framework that are able to scale and have an adequate memory capacity to store and communicate data, no matter how small these machines are.

Lime Microsystems partners with Europractice to bring flexible RF to universities across EU

Lime Micro has just announced a deal with Europractice that will see its open source Myriad RF platform and its field programmable transceiver put in front of all EU universities. The company is hoping this will vastly increase both RF skills in graduates and the number of people innovating wireless systems. Under the terms of the deal, Europractice will promote Lime's LMS6002D field programmable RF transceiver and associated boards for use in research and teaching of wireless technology to its member establishments throughout Europe. This will begin immediately.

The list of boards includes both Lime's Universal Wireless Communications Toolkit and Azio's Myriad RF-1, an open source board created for Lime's non-profit MyriadRF initiative, which seeks to increase access to RF hardware -through low cost, easy to use boards - and advance wireless system innovation. The products enable the creation of highly flexible wireless systems. The field programmable RF (FPRF) transceivers are software configurable for all major wireless communication frequency bands (300 MHz to 3.8GHz) and standards (including LTE, HSPA+, CDMA and 2G). FPRF ICs are highly user-programmable. In this way, they bear comparison with FPGAs, which can be used for implementing complex digital logic functions. In contrast, the FPRF comes from the wireless domain, and brings exciting new possibilities. By combining the FPRF with an FPGA, users have an even greater range of possibilities. The Myriad-RF board can be easily connected to Altera and Xilinx boards. And Lime's Universal Wireless Toolkit gives connectivity to Altera evaluation boards.

Lime Micro - www.myriardf.org

Got Tough Software Radio Design Challenges?



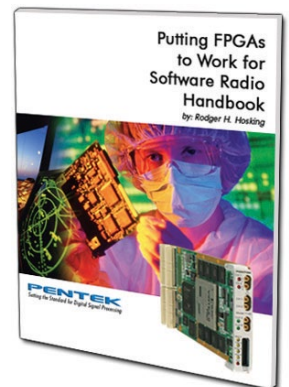
Unleash The New Virtex-7 Onyx Boards!

Pentek's Virtex-7 Onyx™ boards deliver unprecedented levels of performance in wideband communications, SIGINT, radar and beamforming. These high-speed, multichannel modules include:

- A/D sampling rates from 10 MHz to 3.6 GHz
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- GateFlow® FPGA Design Kit & Installed IP
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3G HSPA module based on Intel's XMM 6255 HSPA platform

Swiss-based u-blox announced it is collaborating with Intel to bring a small, cost-effective 3G-only HSPA module to the market. Based on Intel's XMM 6255 HSPA modem platform, the chipset will be packaged in a compact, low-cost module that maintains layout compatibility with u-blox' SARA 2G and LISA 3G module series. The 2G-3G-4G nested design allows product designers to offer tailored solutions to their target markets



based on a single PCB design. This facilitates product diversity and easy migration while keeping price at a minimum through reduced design, test, logistics and certification costs. Specifically designed for M2M applications, the XMM 6255 platform features the Intel X-GOLD 625 digital- and analog- baseband with integrated Power Management Unit and the Intel SMARTI UE2p transceiver for 3G.

u-blox
www.u-blox.com

Gemalto teams with Encore Networks for mission critical M2M communications

European smartcard specialist Gemalto has teamed up with US machine-to-machine (M2M) router supplier Encore Networks to provide reliable wireless links for mission critical applications as operators pull out of wired communications. Gemalto's Cinterion M2M technology will provide wireless connectivity for Encores' ruggedized routers deployed in mission critical applications for diverse market segments from Government, Electrical, Oil & Gas, Waste & Water, Transportation to the Enterprise. The routers use the Cinterion multimode M2M technology to wirelessly gather mission critical data from legacy customer premise equipment and rapidly transmit it to centers around the US. The communication module is engineered to withstand high temperatures, humidity, vibration and shock with proven reliability in the harshest conditions and most severe weather conditions. The solution enables secure 3G connectivity on both CDMA and GSM mobile networks allowing integrators to develop one product design for any mobile network while significantly reducing development costs and speeding up time to market for innovative products.

With a footprint that matches Gemalto's other 3G and future-oriented M2M modules, the Encore Networks router can be easily customized or upgraded without major design changes as technology needs and networks evolve. "Gemalto's unique multimode solution helped us design and quickly launch a first-to-market innovative industrial hardened router to cost-effectively upgrade any hard wire copper solution to wireless," said Peter Madsen, CEO, Encore Networks. "With network operators in the US suspending support for wired line infrastructure over the next four years, Gemalto and Encore are well positioned to solve critical connectivity challenges for millions of applications, ranging from industrial automation for M2M and SCADA (Supervisory Control and Data Acquisition) systems to traffic lights and more."

Gemalto
www.gemalto.com

ARM teams with LogMeln to drive M2M in the cloud

Processor core designer ARM has teamed with US remote access specialist LogMeln to simplify and accelerate commercial development on the Internet of Things (IoT). As part of the agreement, the companies are cooperating on LogMeln's Xively Jumpstart Kit, a rapid prototyping-to-production bundle that significantly reduces the cost, complexity and learning curve required to bring IoT-based connected products and solutions to market. Perhaps better known for remote log in to PCs, LogMeln has launched a new commercial IoT Public Cloud called Xively Cloud Services. The IoT enables a world where devices, data and places are interconnected with applications and users over the internet, transforming how people discover, interact and experience their world. It is made possible through a rapidly growing class of small, inexpensive yet powerful processors, ubiquitous connectivity, mobile computing and interaction platforms. LogMeln's Xively Jumpstart Kit combines ARM's mbed platform for rapidly building connected devices using ARM-based Microcontrollers with Xively's cloud platform for anyone wanting to build Internet-connected devices and associated cloud-based applications from small entrepreneurs to established Original Equipment Manufacturers (OEMs). With ARM mbed for product development, combined with Xively Cloud Services, developers and businesses can focus on their own innovations rather than on infrastructure.

LogMeln
www.Xively.com

Single chip combines Wi-Fi and ZigBee IP for networked devices

Alpha Micro is now stocking GainSpan's GS2000 single chip solution, the industry's first to bring together two IEEE low power standard wireless technologies: Wi-Fi (802.11b/g/n) and 802.15.4. The GS2000 is a highly integrated System on a Chip (SoC) containing multi-standard RF as well as both 802.11b/g/n and 802.15.4 PHY/MAC functionality, dual ARM Cortex -M3 processors, networking stack and services, and large memory size to support various application profiles - all on a single silicon die. The new Wi-Fi and ZigBee IP chip will accelerate the development and market adoption of home networked devices. The GS2000 features a dual mode IPv4/IPv6 TCP/UDP networking stack along with additional networking services, enabling a complete networking solution for embedded MCU based applications. It supports Wi-Fi WLAN software and networking features, ZigBee IP - which is based upon 6LoWPAN - and IP based addressing and methods over both 802.11 and 802.15.4 wireless standards. By incorporating the only two wireless IP-based Home Area Network (HAN) standards while supporting IPv4 and/or IPv6 devices, the GS2000 extends internet connectivity wherever there is a Wi-Fi access point or hotspot, and leverages the key benefits of each technology—the high data rates and widespread availability of Wi-Fi along with the small channelization and meshing capability of ZigBee IP.



Alpha Micro
www.alphamicro.net



Solutions from AC to Point of Load

Our Latest Products

AC Front End

Overview

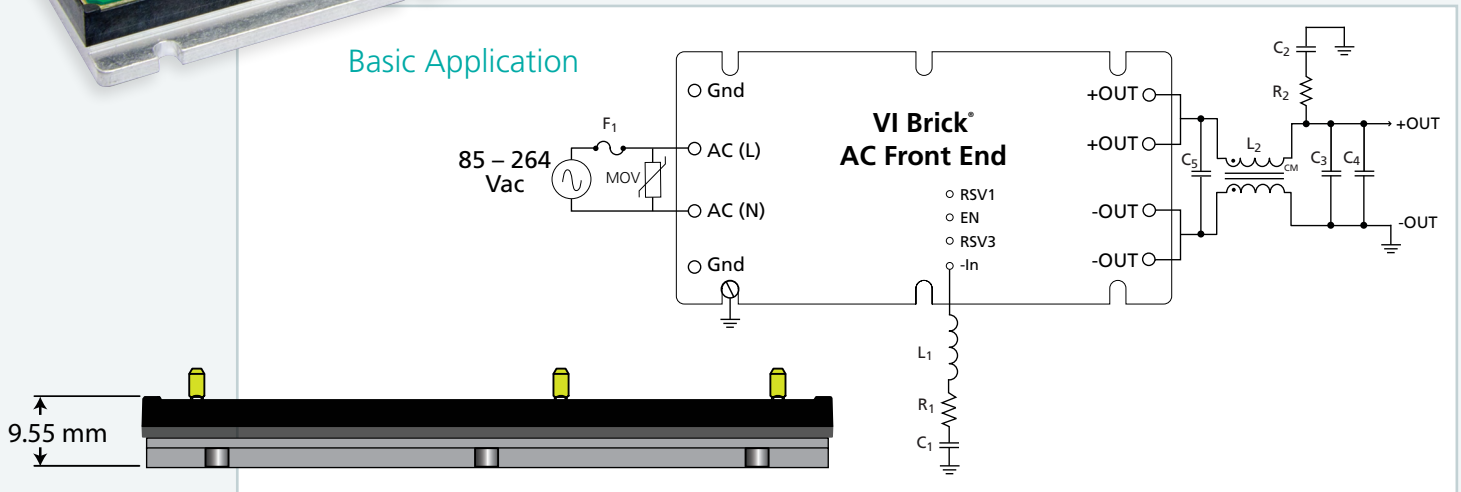
- Universal Input: 85 – 264 Vac
- Output: 48 Vdc - isolated, regulated (SELV)
- Power: 330 W - over entire input voltage range
- Isolated AC-DC converter with active Power Factor Correction (PFC)
- Integrated rectification, filtering and transient protection
- Peak efficiency: >92%
- EN55022, Class B EMI conducted emissions with a few components
- EN61000-3-2 harmonic limits
- -55 to 100°C baseplate operation



Features

- Low profile, 9.55 mm height above board
- Small footprint, size of a business card
- Flanged aluminum package for secure mounting and thermal management
- Consistent high efficiency across the worldwide mains (flat efficiency curve)
- Reduced power loss and cooling requirements
- Module includes PFC, regulation, isolated 48 V output (SELV), filtering, rectification, transient protection, agency approvals, simplified thermal management
- Simple design, requires few external components
- Module power density, 121 W/in³
- Complete solution including hold-up capacitors, 54 W/in³

Basic Application



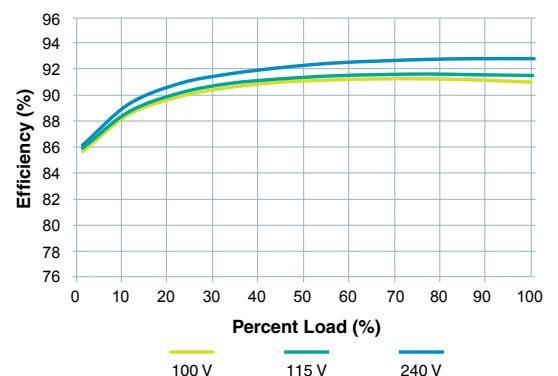
Resources

- [▶ An Introduction to the Vicor AC Front End Module](#)
- [▶ High Performance AC-DC Power System Webinar](#)
- [▶ AC Front End Product Information](#)

Part Number	Input Voltage	Output Voltage	Output Power	Operating Temperature
FE175D480C033FP-00	85 – 264 Vac	48 Vdc	330 W	-20 to 100°C
FE175D480T033FP-00	85 – 264 Vac	48 Vdc	330 W	-40 to 100°C
FE175D480M033FP-00	85 – 264 Vac	48 Vdc	330 W	-55 to 100°C

Replace the “-00” suffix in the part number with “-CB” to order an evaluation board.

Consistent High Efficiency Over Line, Load, Temperature



Picor Cool-Power ZVS Buck Regulators

Wide Operating Range

- Wide V_{IN} (8 – 36 V) and wide V_{OUT} (1 – 16 V)
- 12 V-optimized performance with PI34xx Series
- 40°C to 125°C operating range

Simple to Use; Fast Development Time

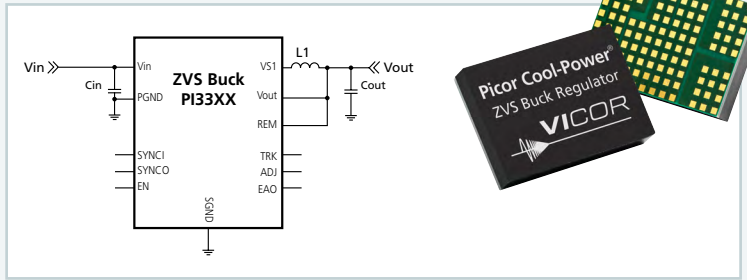
- Internal compensation - few external components
- No additional design or additional settings required

High Efficiency

- Up to 98% peak efficiency (19 V_{IN} to 15 V_{OUT})
- PI34xx Series optimized for 12 V_{IN} with even higher efficiency
- Light and full load high-efficiency performance

Flexible and Rich Feature Set

- Paralleling and single wire current sharing
- Frequency synchronization
- User adjustable soft-start & tracking
- Power-up into pre-biased load
- Optional I²C functionality & programmability



Cool-Power Model Number	Output Range		I_{OUT} Max
	Set	Trim Range	
PI3311-00-LGIZ	1.0 V	1.0 V to 1.4 V	10 A
PI3318-00-LGIZ	1.8 V	1.4 V to 2.0 V	10 A
PI3312-00-LGIZ	2.5 V	2.0 V to 3.1 V	10 A
PI3301-00-LGIZ	3.3 V	2.3 V to 4.1 V	10 A
PI3302-00-LGIZ	5.0 V	3.3 V to 6.5 V	10 A
PI3303-00-LGIZ	12 V	6.5 V to 13.0 V	8 A
PI3305-00-LGIZ	15 V	10.0 V to 16.0 V	8 A
Higher Current Versions			
PI3311-01-LGIZ	1.0 V	1.0 V to 1.4 V	15 A
PI3318-01-LGIZ	1.8 V	1.4 V to 2.0 V	15 A
PI3312-01-LGIZ	2.5 V	2.0 V to 3.1 V	15 A
PI3301-01-LGIZ	3.3 V	2.3 V to 4.1 V	15 A
I²C Functionality and Programmability			
PI3311-20-LGIZ	1.0 V	1.0 V to 1.4 V	10 A
PI3318-20-LGIZ	1.8 V	1.4 V to 2.0 V	10 A
PI3312-20-LGIZ	2.5 V	2.0 V to 3.1 V	10 A
PI3301-20-LGIZ	3.3 V	2.3 V to 4.1 V	10 A
PI3302-20-LGIZ	5.0 V	3.3 V to 6.5 V	10 A
PI3303-20-LGIZ	12 V	6.5 V to 13.0 V	8 A
PI3305-20-LGIZ	15 V	10.0 V to 16.0 V	8 A
PI3311-21-LGIZ	1.0 V	1.0 V to 1.4 V	15 A
PI3318-21-LGIZ	1.8 V	1.4 V to 2.0 V	15 A
PI3312-21-LGIZ	2.5 V	2.0 V to 3.1 V	15 A
PI3301-21-LGIZ	3.3 V	2.3 V to 4.1 V	15 A
12 V Optimized Option			
PI3420-00-LGIZ	1.0 V	1.0 V to 1.4 V	15 A
PI3421-00-LGIZ	1.8 V	1.4 V to 2.0 V	15 A
PI3422-00-LGIZ	2.5 V	2.0 V to 3.1 V	15 A
PI3423-00-LGIZ	3.3 V	2.3 V to 4.1 V	15 A
PI3424-00-LGIZ	5.0 V	3.3 V to 6.5 V	15 A

8 – 36 Vin

8 – 18 Vin

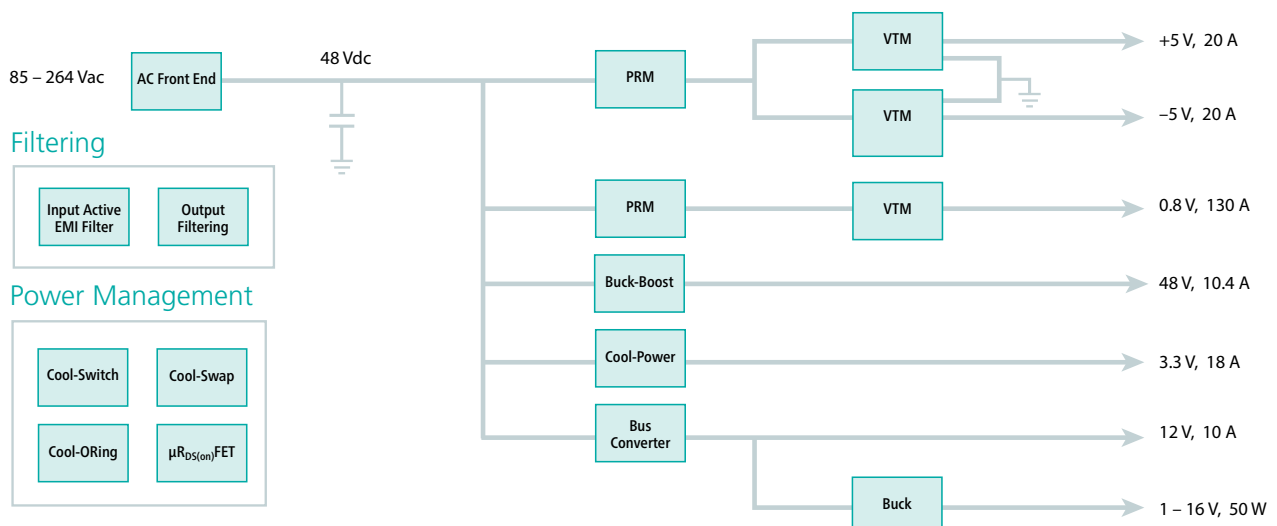
I²C is a trademark of NXP Semiconductors

NEW: Isolated ZVS DC-DC Converters



Resources

- Interview with ECE Europe about ZVS Regulators
- ZVS Point-of-Load Regulation Webinar
- High Performance On-Board Power Design Webinar
- Cool-Power ZVS Buck Regulators Product Information



Solutions from AC to Point of Load

VI Chip PRM Module

Simple to Use

- Point-of-load, Buck-Boost regulation
- Factorized Power Architecture
- Minimal external components

High Density

- Up to 1,700 W/in³, with 500 W in 1.1in² package

Wide Vin Optimized for 48 Vout

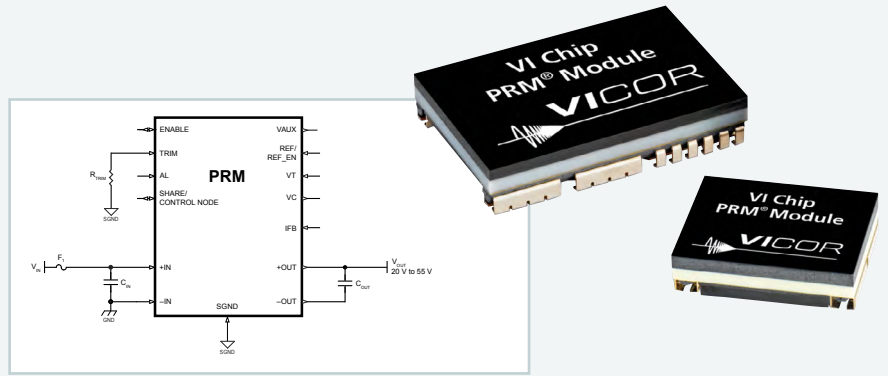
- 24 Vin, 18 – 36 Vin range
- 36 Vin, 18 – 60 Vin range
- 45 Vin, 38 – 55 Vin range
- 48 Vin, 36 – 75 Vin range

High Efficiency

- Full 500 W: 97.8%
- Half 250 W: 96.7%

Flexible

- Regulation: Remote sense, local loop, adaptive loop
- Parallel capabilities



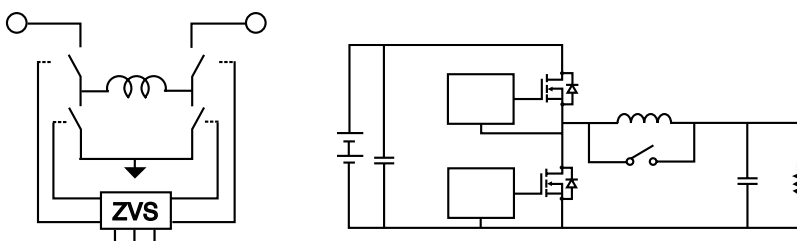
PRM Modules Model Number	Input Voltage Nom. (V)	Input Voltage Range (V)	Output Voltage Voltage Range (V)	Output Power Max.	Output Current Max.	Package Size
P024F048T12AL	24 V	18 – 36 V	26 – 55 V	120 W	2.5 A	Full
P036F048T12AL	36 V	18 – 60 V	26 – 55 V	120 W	2.5 A	Full
P045F048T17AL	45 V	38 – 55 V	26 – 55 V	170 W	3.5 A	Full
P045F048T32AL	45 V	38 – 55 V	26 – 55 V	320 W	6.67 A	Full
P048F048T12AL	48 V	36 – 75 V	26 – 55 V	120 W	2.5 A	Full
P048F048T24AL	48 V	36 – 75 V	26 – 55 V	240 W	5.0 A	Full
PRM48BH480T200A00	48 V	38 – 55 V	5 – 55 V	200 W	4.17 A	Half
PRM48BF480T400A00	48 V	38 – 55 V	5 – 55 V	400 W	8.33 A	Full
✗ PRM48AH480T200A00	48 V	36 – 75 V	20 – 55 V	200 W	4.17 A	Half
✗ PRM48AF480T400A00	48 V	36 – 75 V	20 – 55 V	400 W	8.33 A	Full
✗ PRM48BH480T250A00	48 V	38 – 55 V	20 – 55 V	250 W	5.21 A	Half
✗ PRM48BF480T500A00	48 V	38 – 55 V	20 – 55 V	500 W	10.42 A	Full



These PRM modules can be further configured to meet your exact needs.

Resources

- An Overview of Vicor's VI Chip PRM Module
- PRM Product Information
- Configure a PRM for your application's requirements

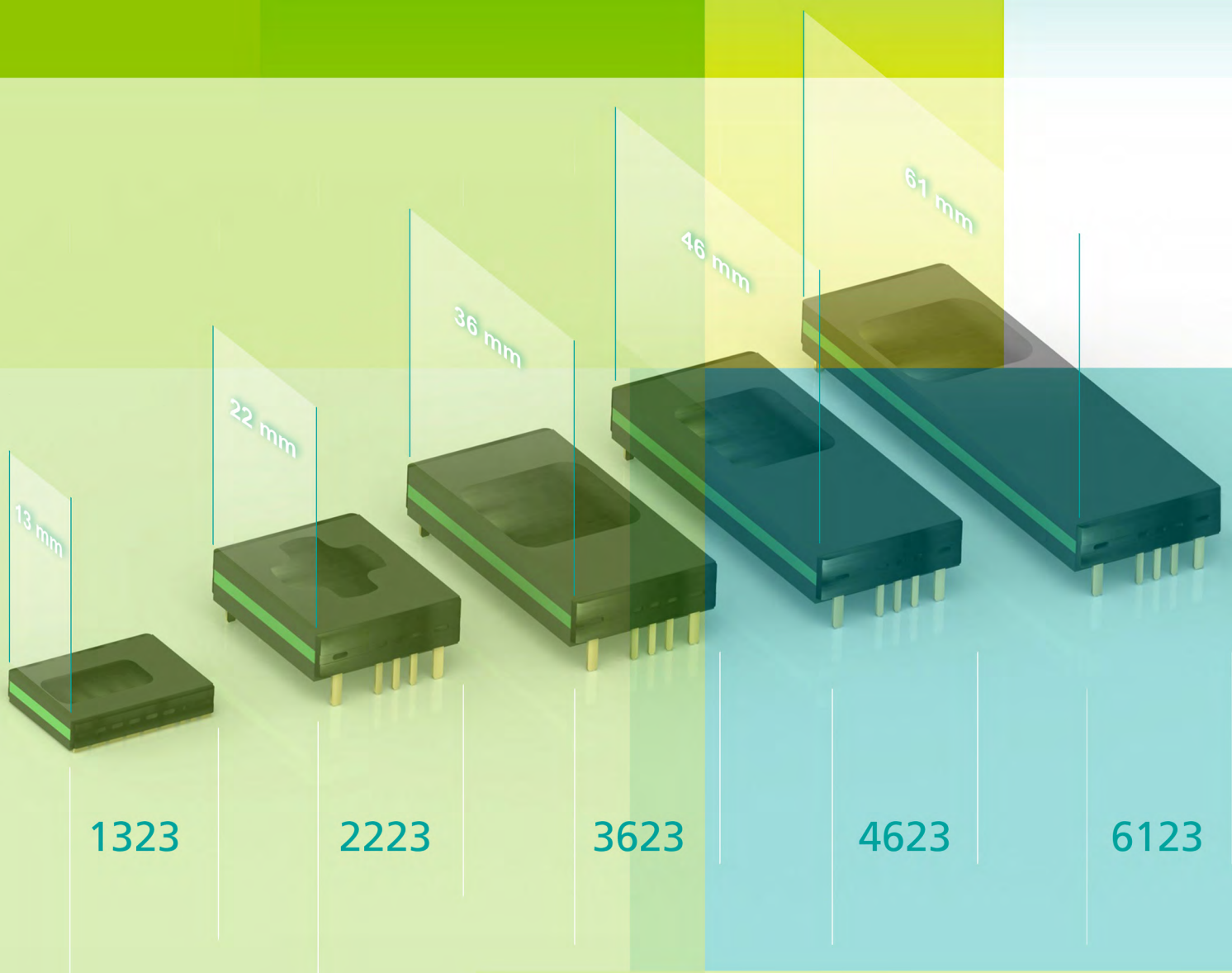


- Reduces Q1 turn-on losses
- Reduces gate drive losses
- Reduces body diode conduction

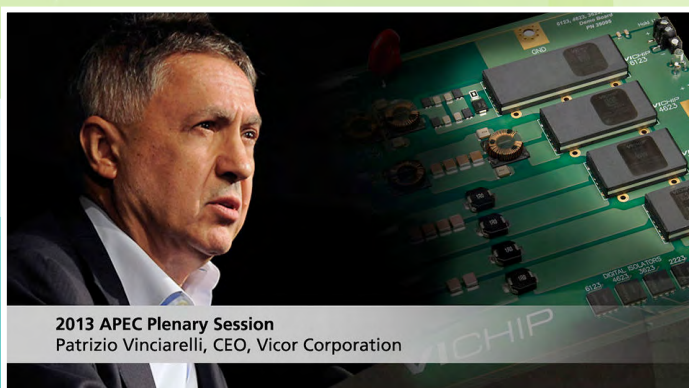
Benefits of Zero-Voltage-Switching Topology

Introducing... The Growing ChiP Lineup

"Converters housed in Package" Technology



Resources



2013 APEC Plenary Session
Patrizio Vinciarelli, CEO, Vicor Corporation



▶ Vicor's CEO discusses ChiP technology at APEC

▶ An introduction to ChiP technology

Configure Your Product

PowerBench™ online design center

- Design your own DC-DC converters to meet your application's requirements
- Or use hundreds of predefined designs
- Online registration allows designs to be saved

VI Chip® PRM® Module

- Point-of-Load Buck-Boost regulation with remote sense
- Full Chip (up to 500 W in 1.1 in²)
- Half Chip (up to 250 W in 0.57 in²)

Other DC-DC Converters

- Maxi, Mini, Micro Series: Full (160–600 W), Half (100–300 W), Quarter (50–150 W)
- VI-200 / VI-J00 Series: Full brick (50–200 W), Half brick (25–100 W)
- ComPAC, VIPAC Arrays and chassis-mount MegaMods




AC-DC Converters

- VIPAC - Autoranging input with filtering, multiple output, cold plate chassis,
- FlatPAC - Multiple output and autorange input with heat sink or conduction-cooled models

Complete power systems

- Westcor custom AC-DC
- High power density, small size, high efficiency
- Fan-cooled, slide-in assemblies

Resources

-  PowerBench tools
-  Register for PowerBench account
-  Modeling, Simulation, and Selection Techniques in Power Design

Efficiency Graphs Calculated Automatically

Typical Performance Characteristics

The following figures present typical performance at $T_c = 25^\circ\text{C}$, unless otherwise noted. See associated figures for general trend data.

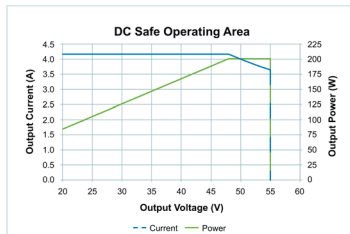


Figure 1 — DC Safe Operating Area (SOA)

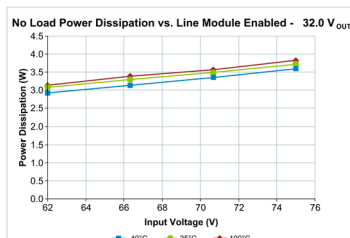


Figure 2 — No Load Power Dissipation vs. V_{IN} , module enabled

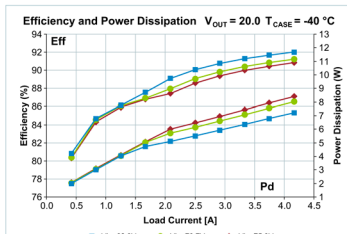


Figure 4 — Total efficiency and power dissipation vs. V_{IN} and I_{OUT} Low Trim, $T_{CASE} = -40^\circ\text{C}$

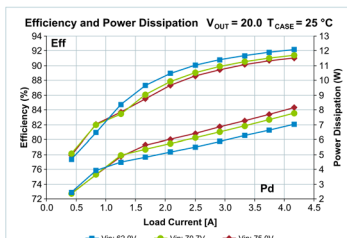


Figure 5 — Total efficiency and power dissipation vs. V_{IN} and I_{OUT} Low Trim, $T_{CASE} = 25^\circ\text{C}$

Data Sheet for Custom Products Generated Automatically



PRM® Regulator

PRM2A04-000599



High Efficiency Converter

Features

- 69.2 V input (60.6 V to 75.0 V), non-isolated 2VS buck-boost regulator
- 20.0 V to 55.0 V adjustable output range
- 134 W output power in 0.57 in² footprint
- 94.1% typical efficiency, at full load
- 894 W/in² (55 W/cm²) Power Density
- 5.29 MHz MTBF (MIL-HDBK-217 Plus Parts Count)
- Pin selectable operating mode
 - Adaptive Loop
 - Remote Sense / Slave
- Half VI Chip® Package
 - 22.0mm x 16.5mm x 6.73mm
 - Surface Mount Pin Style
 - T Grade

Typical Applications

- High Density Power Supply DC-DC rail outputs
- High Density ATE system DC-DC power
- Telecom MPU and ASIC core power
- Communications Systems
- Non-isolated and isolated power converters



Product Ratings

$V_{IN} = 60.6 \text{ V to } 75.0 \text{ V}$	$P_{OUT} = 134 \text{ W}$
$V_{OUT} = 31 \text{ V}$ (20.0 V to 55.0 V Trim)	$I_{OUT} = 4.20 \text{ A}$
Operating Temperature T Grade -40°C to 125°C	Package & Pin Style Half VI Chip, Surface Mount

Product Description

The VI Chip® PRM® Regulator is high efficiency converter, operating from a 60.6 to 75.0 Vdc input to generate a regulated 20.0 to 55.0 Vdc output. The 2VS buck-boost topology enables high switching frequency (~1.0 MHz) operation with high conversion efficiency. High switching frequency reduces the size of reactive components enabling power density up to 894 W/in².

The Half VI Chip® package is compatible with standard pick-and-place and surface mount assembly processes with a planar thermal interface area and superior thermal conductivity. In a Factorized Power Architecture™ system, the PRM and downstream VPM® current multiplier minimize distribution and conversion losses in a high power solution, providing an isolated, regulated output voltage.

The PRM2A04-000599 has two selectable modes of regulation depending on the application requirements. In Adaptive Loop Operation, the PRM2A04-000599 utilizes a unique feed-forward scheme that enables precise regulation of an isolated PDL voltage without the need for remote sensing and voltage feedback. In Remote Sense Operation, the internal regulation circuitry is disabled, and an external control loop and current sensor maintain regulation. This affords flexibility in the design of both voltage and current compensation loops to optimize performance in the end application.

VI Chip PRM Module Configurator

User Defined Module

Specify a User Defined PRM Module

All PRM Modules

Designer's Reference (This text is for reference in M

Input Voltage		
Voltage Range Platform		
1. <input type="radio"/> Wide (36-75 V) <input type="radio"/> Narrow (38-55V)		
Selection Range		
Vin Low Line	<input type="text"/> V	
Vin Nominal	<input type="text"/> V	
Vin High Line	<input type="text"/> V	
Undervoltage Lockout	<input type="text"/> %	
Undervoltage Lockout Hysteresis	<input type="text"/> %	
Overshoot Lockout	<input type="text"/> %	
Overshoot Lockout Hysteresis	<input type="text"/> %	

Output Voltage		
Selection Range		
Vout Set Point	<input type="text"/> 48.0 V	26.0 - 52.0 V
Maximum Trim	<input type="text"/> 55 V	52.8 - 55 V
Overshoot Limit	<input type="text"/> N/A %	
Overshoot Limit Hysteresis	<input type="text"/> N/A %	
Turn On Delay	<input type="text"/> 1 ms	1 - 4 ms
Output Rise Time	<input type="text"/> 1 ms	1 - 4 ms

Output Power, Package, and Product Grade		
2. Package Size <input type="radio"/> Half (0.65 x 0.57 in) <input type="radio"/> Full (1.28 x 0.87 in)		
Selection Range		
Load Current	<input type="text"/> A	
Current Limit Setpoint		
3. Pin Style Select your Package Size above to show Pin Style options.		
4. Product Grade <input type="radio"/> T-Grade <input type="radio"/> M-Grade		

Requests / Results	
<input type="button" value="SIMULATE"/>	<input type="button" value="GET PART NUMBER, PRICE AND DELIVERY"/>

Online Design Tools

Online Simulator

- Simulate electrical and thermal behavior
- Supports VI BRICK IBCs, BCMs and PRMs
- User defines line and load conditions, input and output impedance and filters
- Simulations include start-up, steady state, shutdown, Vin step and load step, as well as thermal.
- Electrical and thermal performance showed in charts and tables

Design Calculators

- Determine trim resistors for fixed and variable output voltage trimming
- Calculate required bus capacitance for VI-ARM, FARM, and ENMod modules
- Thermal calculator for heat sink selection

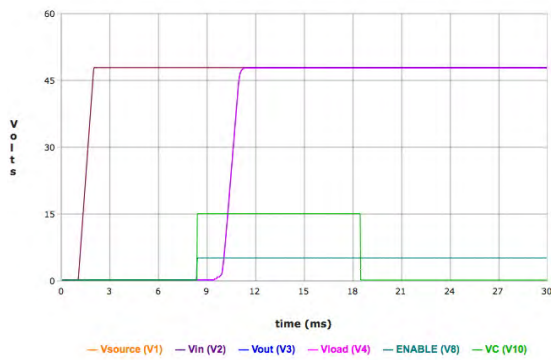
Filter Design

- Select attenuation and frequency
- Choose from five different topologies
- Supports regulated and unregulated converters

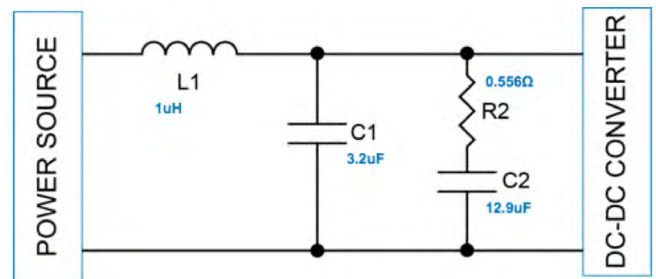
Resources

- ▶ Using Vicor's online simulator
- 🔧 Online simulator: VI Brick IBCs
- 🔧 Online simulator: BCMs
- 🔧 Online simulator: PRMs
- 🔧 Filter design tool
- 🔧 Design calculators

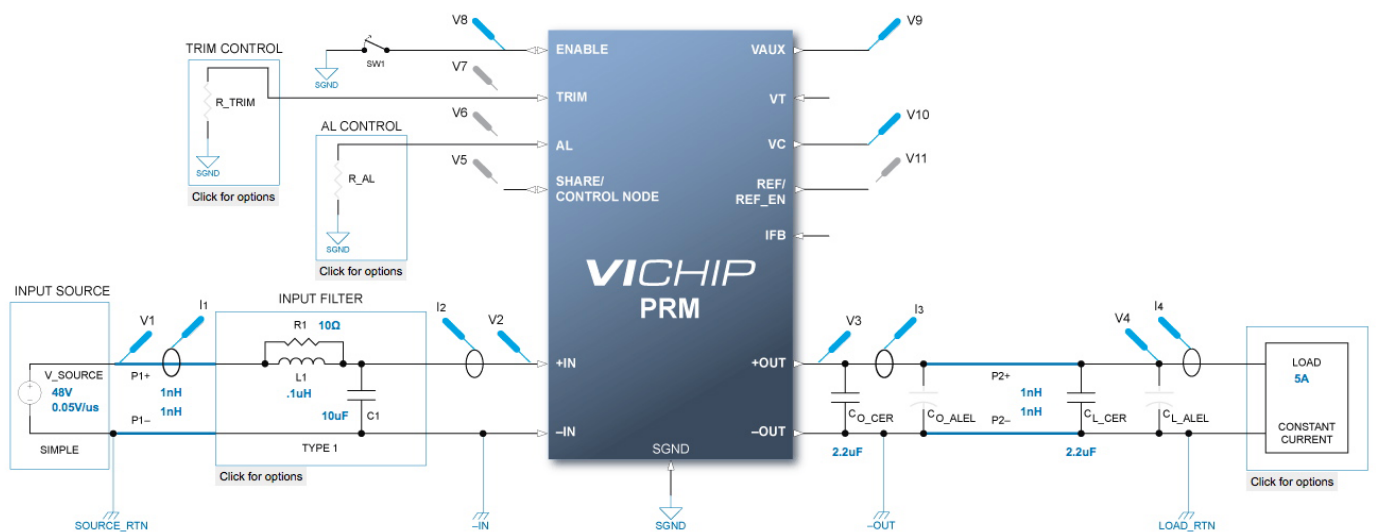
Graph Showing Simulation Results



Calculation of Components for Parallel Damped Filter



Simulator Lets You Define All Parameters



PRM48BF480T500A00	
Package Size	Full Chip
Input Voltage (V)	48
Output Voltage (V)	48.0
Output Power (W)	500
Operating Temperature (°C)	-40 to 125

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- > Netcom
- > Telecom Infrastructure

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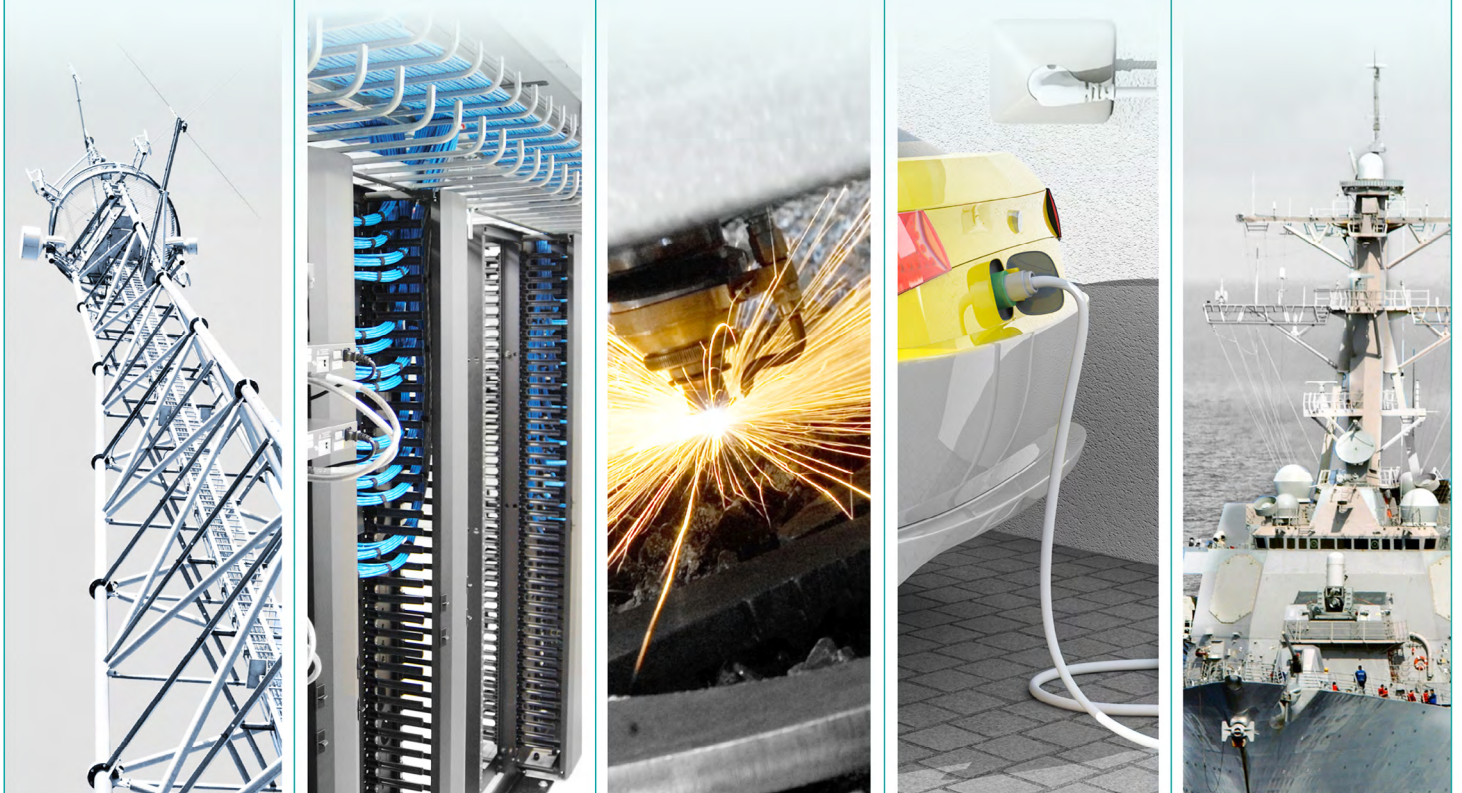
- > ATE
- > Lighting
- > Process Control
- > Transportation

Automotive

- > Electric Vehicles
- > Hybrid Vehicles

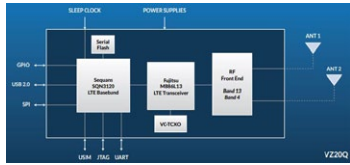
Defense/Aerospace

- > Aircraft Test Equipment
- > Ground Vehicles
- > Radar
- > Telemetry
- > Unmanned Vehicles



Family of modules provides all-in-one LTE connectivity for M2M

French 4G chipmaker Sequans Communications has introduced a new line of LTE modules with a complete RF front end and key interfaces in a single, compact package for M2M designs.



The EZLinkLTE modules are based on Sequans' LTE baseband and give device designers a plug-and-play, all-in-one LTE connectivity solution that significantly reduces devel-

opment cost and time to market. The first EZLinkLTE module, sampling now, is the VZ20Q, which is one of the first modules in the industry to support both LTE bands 4 and 13. The baseband chip at the heart of the new module is Sequans' SQN3120 Mont Blanc chip that was certified by Verizon Wireless in 2012. The chip is compliant with 3GPP release 9 and it delivers category 4 throughput of up to 150 Mbps in the downlink. Starting with the SQN3120 chip, the VZ20Q integrates all other elements necessary for a complete LTE modem system. These include an LTE-optimized RF transceiver provided by Sequans' RF partner, Fujitsu Semiconductor, a complete dual-band RF front-end for bands 4 and 13, LP-DDR SDRAM, embedded boot Flash, and VC-TCXO, all in a single, surface-mountable package with a very compact footprint, 17 x 24 x 2 mm. "Our EZLinkLTE modules provide great value to device designers in terms of cost savings and reduction of development risk and time," said Georges Karam, CEO of Sequans. EZLinkLTE modules are designed to provide a comprehensive LTE connectivity solution for the design of connected consumer electronics devices, tablet and laptop computers, machine-to-machine devices, and other applications featuring embedded LTE connectivity.

Sequans Communications
www.sequans.com

Dual-band Ethernet port adapter with external stub antenna

connectBlue's Ethernet port Adapter RWE251s features Wireless LAN (WLAN) dual-band functionality and an omnidirectional external stub antenna, making the unit suitable for use in both the 2.4GHz and the 5GHz ISM bands with no restrictions as to its position. Based on WLAN IEEE 802.11 a, b, g, n (also commonly referred to as Wi-Fi), the rugged RWE251s can be used in industrial and medical applications where the Ethernet cable needs to be replaced with a robust wireless connection. The ready-to-use RWE251s optimizes the installation process as well as lowers the installation costs in demanding applications. Dual-band support makes it easier to identify interference free channels and connect to networks that utilize both the WLAN 2.4 and the 5GHz radio bands and thereby coexistence between wireless technologies is facilitated. The 11cm external stub antenna with RPSMA connector is omnidirectional. It is also possible to place the RWE251s inside and the stub antenna outside a metal cabinet giving maximum systems in design possibilities. The product is IP65-classed and can operate in the extended temperature range of -30 to +65°C. Configuration of the device is simple and intuitive thanks to the SMART configuration mode. The RWE251s supports WEP64, WEP128, WPA-PSK, WPA2-PSK, TKIP, CCMP (AES), LEAP, PEAP and is radio type approved for US (FCC), Europe (ETSI R&TTE) and Canada (IC RSS). Further, the RWE251s is configurable to optimize for Profinet.



connectBlue
www.connectblue.com

Wireless data logger connects to the cloud through Bluetooth LE

MSR Electronics has unveiled the universal MSR145 mini data logger, a wireless unit able to connect via Bluetooth Low Energy and a smartphone, a PC or the BLE receiver box, to the manufacturer's web-based "MSR SmartCloud" service for mobile data monitoring. As well as enabling the wireless monitoring of measured data and fast readings of measured values, the unit displays its readings on a



96x64 pixels wide viewing angle OLED (organic light-emitting diode) graphic display measuring 22.14x15.42mm. The free MSR smartphone app can be used to recall the current and last recorded values at any time. A smartphone, a PC or the BLE receiver box by MSR Electronics GmbH transmits the measured data to MSR SmartCloud, if required. MSR SmartCloud facilitates the storage of measured data on a server via the Internet, allowing the user to view, print or download the measured values of their data loggers to a PC for a detailed analysis, wherever they are. The display is switched on and off manually; the desired display data can be configured in the MSR PC software program "Set up".

MSR Electronics GmbH
www.msr.ch

ZigBee single-chip solution connects smart lighting to infrastructure

To simplify the development of ZigBee wireless connectivity-enabled smart energy infrastructure, home and building automation and intelligent lighting gateways, Texas Instruments Incorporated announced the availability of the CC2538 system-on-chip (SoC). The industry's most integrated ZigBee solution, the CC2538 is cost-efficient with an ARM Cortex-M3 MCU, memory and hardware accelerators on one piece of silicon. The CC2538 supports ZigBee PRO, ZigBee Smart Energy and ZigBee Home Automation and lighting standards to deliver interoperability with existing and future ZigBee products. The SoC also supports IP standards-based development using IEEE 802.15.4 and 6LoWPAN IPv6 networks for maximum flexibility. The CC2538 development kit (CC2538DK) provides a development platform for the CC2538 allowing users to see all functionality without additional layout. It comes with CC2538 evaluation modules (CC2538EMK) and mother boards with an integrated ARM Cortex-M3 debug probe for software development and peripherals including an LCD, buttons, LEDs, light sensor and accelerometer for creating demo software. The boards are also compatible with TI's SmartRF Studio for running RF performance tests. For more information on the CC2538, available development kits and Z-Stack software see:



Texas Instruments
www.ti.com

Battery-less wireless temperature sensors based on low power UHF RFID tags

By Mikel Choperena

NOWADAYS, THERE IS an undeniable and unstoppable trend to use RF identification (RFID) in a number of applications, such as supply chain management, public transportation, access control and many more. The use of this technology entails a number of advantages over barcode technologies such as tracking people, items and equipment in real time, non-line of sight requirement, long reading range, standing harsh environments, etc.

Recently, the combination of RFID with sensory systems has extended the applications of RFID to environmental monitoring or healthcare applications. Those existing sensors usually operate in the 13.56 MHz and 134.2 kHz frequency bands. However, these sensors have the inconvenience of a limited reading range (a few centimetres) and high cost. To overcome this limitation, battery free RFID sensor development has been focused on RFID tags using the UHF bands (868 MHz, 900 MHz and higher) which offer temperature monitoring and higher reading distances than previous ones. On the other hand, the popularity of the standard EPC C1G2 (ISO 18000-6C) makes it possible the use of a universal communication standard compatible with many readers from many vendors.

Therefore, there is a strong motivation to develop optimized RFID tags able to support different sensor types, such as temperature sensors, pressure sensors, humidity sensors, strain gages, etc. and able to use standardized communication protocols such as EPC C1G2.

Farsens is developing full passive UHF sensor tags that can communicate to over a meter without the need of batteries on the sensor tags. The Fenix2 is a wireless passive temperature sensor that works under these premises. Figure 1 shows the typical architecture of a battery free RFID sensor tag. The antenna receives the signal emitted by the reader. In order to achieve the maximum power transfer from the antenna to the voltage multiplier, a matching network is required. Typically this matching network is implemented together with the antenna. The voltage multiplier rectifies the incoming signal charging the supply capacitor CSUPPLY. This capacitor is used to supply power to the rest of the tag. The analogue front-end provides the signals that the rest of the tag requires to work properly, such as regulated voltages, clock and reset signals. It is also in charge of demodulating the incoming ASK signal and modulating the tag answer. The digital core communicates with the EEPROM and, when present, the external temperature sensor. It also realizes the required actions to answer the reader queries using the EPC C1G2 standard. The EPC C1G2 is specifically designed for identification applications and does not include support for sensors. Nevertheless there are some possible workarounds to integrate sensors in the C1G2 standards.

The most straightforward method is to choose user commands for this purpose. A new user command can be defined to access the sensor. The new command may contain configuration parameters for the sensor, so that the behaviour of the

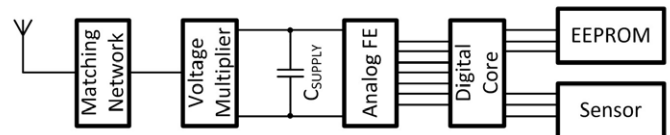


Fig. 1: Architecture of an RFID tag with external sensor.

sensor can be controlled externally. The answer from the tag to this user command may contain the value of the sensor. The standard allows the use of user commands which makes such an RFID sensor C1G2 compliant. Nevertheless, compliance with the standard may not be good enough. In order to integrate these battery-less RFID sensors in any commercial C1G2 network, compatibility between all the elements in the network must be ensured. Including user commands limits the compatibility, as every item in the network needs to support the new command. If one or more items in the communication chain do not support this user command, the end user will not be able to retrieve the information from the sensor. Therefore, in order to solve this incompatibility problem, mandatory commands of the standard shall be used.

Memory mapping

A good solution to obtain a fully EPC C1G2 compatible tag, is to implement the memory mapping method. This method consists in redirecting the user memory bank (defined in the standard) to the temperature sensor value. This way, the reader only needs to request the value contained in a specific memory location. If the requested address contains the direction assigned to the sensor, the answer of the tag will contain the value of the measurement. The main advantage of this solution is that any C1G2 network does support it, and as the EPC code is not altered, none of the advanced features of the EPC networks are damaged.

On the sensor side, sensing products and technologies are rewriting future designs in an extensive range of industrial, medical, consumer, communications and automotive applications. The operational specifications of the sensors are quite different

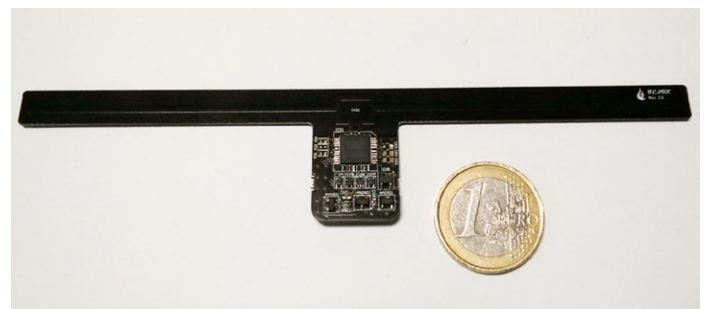


Fig. 2: Fenix2 battery free temperature sensor tag (front view).

Mikel Choperena is Business Development Manager at Farsens – www.farsens.com – He can be reached at mikel.choperena@farsens.com

depending on the manufacturer, the magnitude to be measured and the final application of the sensor. So, different modes of acquiring and forwarding the data are developed.

Several data-rate options

Periodic sampling can be used for processes that need to be monitored constantly, where power cannot be reduced. If the number of bits transmitted per second is low, the power consumption is also low. Hence the sampling rate is directly correlated to the average power consumption. Implementing a variable data rate, the average power consumption of many sensors can be reduced. From a power consumption point-of-view, one has to look at the average current including the maximum current peak during measurement (or conversion time), instead of simply the quiescent current. The peak current directly shakes the voltage supply and external capacitors must be added to reduce the voltage drop.

The main advantage of the battery-less temperature sensor lies on the possibility of using the sensor without batteries at all. This feature allows for a wide range of opportunities using temperature sensors in applications where the accessibility is restricted, or where the use of batteries is not recommended. Since batteries are not needed, the sensor tags need not to worry about autonomy.

Typical applications for these battery-less temperature sensors are temperature sensitive assets and processes. Each tag has a unique ID and a temperature sensor that is uniquely associated to that ID. It makes the Fenix2 a perfect solution for

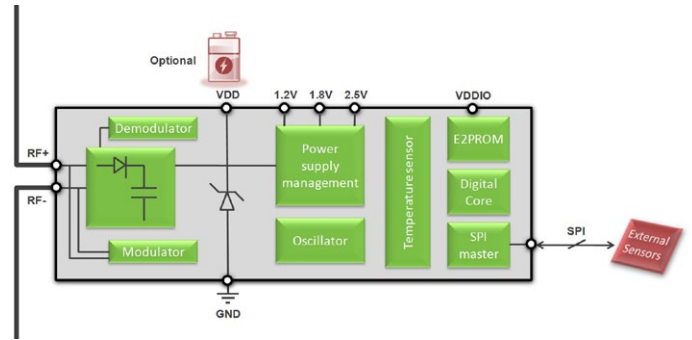
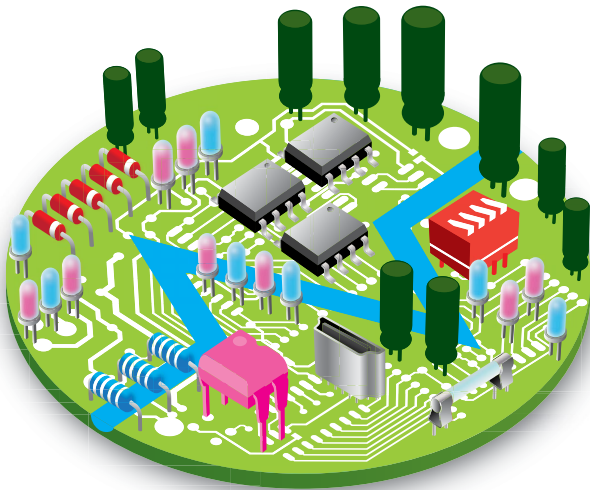


Fig. 3: Farsens' RF IC block diagram.

applications such as cold chain monitoring or fire prevention for high value assets (i.e.: switchgears).

Farsens' Fenix2 battery free RFID sensor tag as shown in figure 2 is capable of transmitting a unique identifier and the associated temperature data to a commercial EPC C1G2 reader without the need of a battery on the sensor tag. The device, whose RF block diagram is illustrated in figure 3, features a LPS331AP temperature sensor from ST Microelectronics with a temperature range from -30°C to $+85^{\circ}\text{C}$. The tag comes in a variety of antenna designs and sizes to adapt the performance to the required application. The reading distance for the battery free temperature sensor tag is around 1.5 meters and it can be embedded in a wide variety of materials such as plastics or concrete.



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Smartphone-based patient monitoring is set to impact medical equipment OEMs

By Colin Weaving

PATIENT MONITORING AND diagnosis equipment is being transformed, undergoing a profound change that will severely disrupt the markets served by many of today's successful medical equipment OEMs. Nanotechnology, in the form of highly integrated MEMS sensor systems-on-chip (SoC), looks set to make entire categories of hospital or laboratory equipment obsolete. The change is being accelerated by consumer adoption of low-cost, universal data terminals with telecoms capability – otherwise known as smartphones – making health monitoring at home a safe and practicable option. By collaborating with the semiconductor industry, can the manufacturers of medical equipment navigate their way successfully through this disruptive period?

Patients today are used to being required to visit a surgery or hospital for blood tests, scans, electro-cardiograms and other types of health monitoring. Blood tests, for instance, are a routine element in the process of diagnosing and treating cancer, heart disease and many other life-threatening or chronic conditions. For a blood test to take place, blood must be taken from the patient by a nurse or doctor, carefully packaged, sent to a laboratory and tested using largely manual processes by a medical technician. The results must then be recorded by the technician and sent to the patient's medical practitioner.

There are many drawbacks to such a process. Among the most important are the high cost of skilled medical staff, and the use of dedicated medical premises. There is also a long delay between taking the blood test and receiving the results. In urgent cases in which the patient's condition is worsening rapidly, this delay can put the patient's life at risk. In all cases, doctors would prefer to prescribe treatments based on the patient's current (real-time) health indicators, rather than indicators dating from the original blood sample.

What's more laboratory technicians are bound to make a certain number of errors either in testing blood or in transcribing the results. The sample provides a snapshot of the patient's health at a single point of time. Continuous data capture over a period of time provides a more reliable and informative picture of the patient's health.

A similar description could be made of many other types of patient testing or monitoring. The common thread running through them all is the requirement for specialised, expensive – and often large – equipment, and skilled and expensive staff to operate it in dedicated premises.

Colin Weaving is Technology Director of Future Electronics (EMEA) – www.futureelectronics.com

The demand for accurate diagnostic measurements has, as a result, spawned a large and lucrative industry. The medical profession attaches a high value to the improved treatments they are able to offer when advances in the technology of medical equipment provide more accurate or precise views of patients' state of health. Manufacturers of medical equipment can therefore enjoy wide margins on big-ticket items, supplemented by regular and predictable maintenance fees for calibration, servicing and support.

The business model of the health monitoring equipment industry is, however, about to be turned upside down. In other kinds of equipment, tiny MEMS (Micro-Electro-Mechanical Systems) devices made by semiconductor manufacturers such as Freescale and STMicroelectronics are already replacing conventional electro-mechanical sensors. Microphones, accelerometers and gyrometers in mobile phones and tablets are now routinely implemented in MEMS SoCs.

Now bio-technology pioneers are starting to develop new kinds of medical devices that use MEMS technology. In the future, doctors will be implanting tiny health monitors into the patient's skin, or prescribing to patients 'pills' that contain a blood test kit-on-chip: an integrated MEMS device that the patient swallows.

The early medical uses of nanotechnology will see the implementation of relatively simple functions such as pumps

and pressure monitoring. Further into the future, devices might be performing the direct electro-chemical measurement of specific molecules. It is quite realistic to imagine a MEMS sensor consisting of a vibrating element coupled to a surface element designed to attach to a molecule. The attachment would change the frequency of the MEMS oscillator. By building multiple copies of this MEMS element on one die, the device could detect concentrations of the molecule.

Once in the bloodstream, such a device might, for instance, be able to measure the level of chemicals such as cholesterol in the blood, and transmit the results via a standard wireless protocol such as Bluetooth. These results could then be displayed on the patient's smartphone running an app supplied by the device manufacturer.

In this vision, the patient can acquire a continuous, real-time stream of data about their blood simply by taking a blood test pill each day. It requires no fixed equipment, premises or specialist staff. The data can be uploaded continually to medical practitioners, so that treatment, alerts and advice can be admin-



istered in real time, providing for far better health outcomes. The same vision – home-based, self-administered monitoring providing real-time data – is also driving developments in heart monitoring, digestive system monitoring, and even psychological monitoring. For patients and medical professionals, this vision is wholly benign.

But what of the manufacturers of today's fixed monitoring equipment, selling high-priced items to hospitals and health services? What happens when a gadget metamorphoses into a pharmaceutical?

Some lessons can be learned from other industries. Electricity meters, for instance, are being transformed from simple, stand-alone electro-mechanical devices, into connected smart appliances. SoC manufacturers such as Freescale are integrating nearly all the important functions of the meter into a single chip or chipset. Yet while Freescale provides enormous value to the meter manufacturer, it does not replace it: the meter manufacturer still designs the meter's display, its interface to utility systems and its housing. And the meter manufacturer owns the relationship with the utilities: it understands their requirements, and has a brand trusted to meet those requirements.

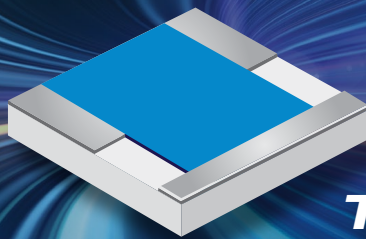
Medical equipment manufacturers can enjoy a similar kind of relationship with semiconductor suppliers. The large medical equipment manufacturers have proven sales and marketing programs for addressing medical practitioners, and strong and trusted brands. While there are numerous bio-technology start-ups trying to disrupt the medical equipment industry, the incumbents have a far greater ability to sell new technology to the medical profession.

But their relationship with components suppliers is going to change: where before the equipment manufacturer entirely controlled the way digital, analogue and peripheral components were integrated into a complete system, in future this integration will largely occur on-chip. This will require far more collaboration between equipment OEMs and semiconductor manufacturers than in the past. In effect, the two sides will need to work together to define the specifications of the device that the semiconductor manufacturer will produce.

Component distributors have a role to play here as well, providing an expert interface between the OEM and the semiconductor supplier. The OEM will be more reliant on the SoC manufac-

turer than ever in the past, yet semiconductor manufacturers do not have the resources to serve more than a handful of OEM customers directly. This means that the ability of distributors to smooth the supply chain from chip to end equipment looks set to become even more important.

So while patients and practitioners can look forward with excitement to the possibility of improved diagnoses and treatments, for medical OEMs and distributors there is now much to learn if the transition to medical nanotechnology is not to lead to commercial casualties.



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Data Fusion: the next frontier of software integration

By Pierre Jallon

IN THE LAST few years, the functionality of our mobile devices has come so far that consumers now treat them more like personal assistants, using them for everything from remembering to complete a task to planning a night out to finding their way around to creating, sharing and enjoying content. In fact, consumers have come to expect their mobile devices to be intelligent enough to sense the world around them and even learn to anticipate their needs. This is the future, but while improvements in hardware in terms of better cameras, sound, battery life, and additional sensors are an indication of great progress, these will only take us so far.

Software will make the difference between a device laden with many great but disparate features and a truly intelligent device able to synthesize its many features and offer users the most intuitive and seamless experience. In order to achieve this, the hardware must be raised to an intelligent level via the integration of a top grade software solution. Although the industry reached an advanced level of software integration with compelling functionalities, it remains application specific, with the ability to agglomerate data for smarter services yet to come. Advanced services and applications require more integrated data from several sources, which individual designers and developers cannot master on their own due to the breadth of data available and limited individual expertise. As such, there is a need for data fusion, which has the ability to meld data from different sources and platforms, whether the data resides on devices, on accessories, or in the cloud.

Software: the key differentiator

A currently significant trend is that sensors manufacturers, such as Invensense, ST Microelectronics believe that adding a software layer will increase value of their hardware, which is becoming increasingly less expensive. In addition, microprocessor providers wish to increase the value of their package by adding intelligence to their systems using data from sensor fusion to generate data results from multiple sensors that measure many physical parameters in the intended devices' environment.

To illustrate the added value of software on a mobile device, let's look at the Galaxy S4, that includes unprecedented software capabilities, enabling Samsung to create new game-changing applications such as "Group Play," "WatchON," or even the "S Band" accessory and its activity monitoring services, enhancing user experience with their device.

Given the plethora of disbursed information from all of these data sources and platforms, one now needs to meld everything for next-generation services and apps. Advanced data fusion models and application layer services can merge and process data to analyze specific situations and adapt or propose options without the user being aware.

Pierre Jallon is Data Fusion product manager at Movea – www.movea.com

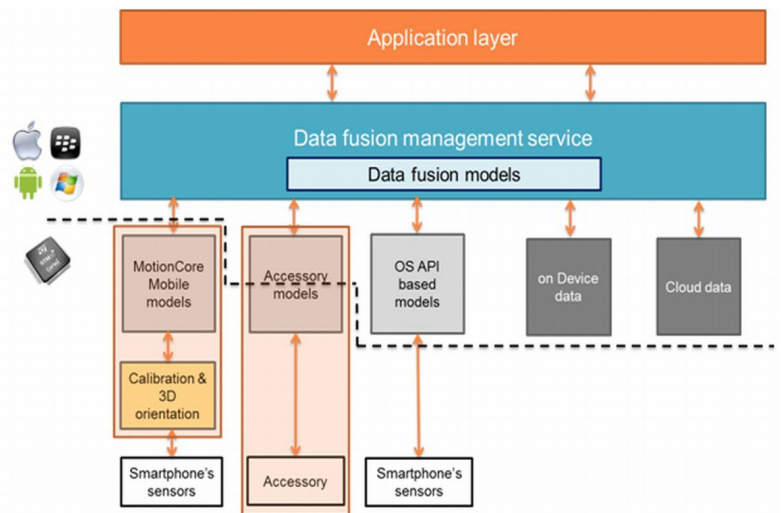


Fig. 1: Data fusion implementation architecture (source: Movea)

To do this, services need to combine the Web, email, GPS, calendar, etc. with embedded sensors data and information from a user's personal-area-network data.

So how is this accomplished?

The first step is to merge the data, which is not easy to do because data sets come from a variety of sources that are not meant to work with each other. Higher intelligence - a collation and a central piece - is needed. For example, Movea can provide the sensor expertise at the device level as well as at the operating system level, merging different data, processes and packages making it easy for applications developers to use the data. Data fusion becomes a necessity to enable the integration of multiple sources of information and processes to generate smarter content. The data fusion platform relies on three pillars as shown in figure 1.

Hardware as a data source

The sensor hub is a dedicated entity that processes sensor data and activity and provides high-quality calibrated sensor data output that can be leveraged in the applications space such as continuous activity monitoring, indoor navigation, and context aware apps, requiring the sensors to be active even when the rest of the phone is idle. Sensor hub embedded models are optimized for low power consumption and use input from accelerometer, gyroscope, magnetometer and pressure sensors and deliver qualitative output data, such as auto-continuous calibration, 3D orientation, step count and posture recognition. A sensor hub implementation will not only deliver better quality data as input for advanced models, but also optimize device power consumption, externalizing the sensor data processing to a smaller, less power-hungry processor.

Another data source to be considered is mobile accessories, which have begun to proliferate the market thanks to the increasing popularity of activity monitoring devices, such as Nike Fuelband, Fitbit, Ondaily, etc.

Models residing on the accessory will be cost and power-optimized to create a sensing platform for multi-sport activity monitoring, providing high quality sensor data that will then be processed on mobile devices for compelling applications, such as activity monitoring, sleep analysis, and sport performance tracking.

A third-party data source

Beyond sensors on the device, third party and external data are necessary to create the next generation of intelligent applications. Data from users' GPS, agenda, email, the cloud and social networks are collected and processed by data fusion models, enabling application developers to quickly and easily integrate useful functions into their smart apps.

Data fusion models can be device models, based on data processing from the phone, such as an indoor map, a user's agenda or habits, or processed data from the cloud. The cloud model can leverage data from a Facebook or Twitter API, Big Data analysis connection, etc. Using models that combine sensor data with external data enables applications developers to create more integrated apps, delivering intelligent services based on their location, activity, agenda, weather, etc.

Data fusion as a service

The data fusion service functions at the operating system layer, merging sensors, device and cloud models, enabling applications developers to create advanced intelligent applications. Data fusion service manages models and data fusion models (installation, enumeration, instantiation) with messages that define management features. These messages can be between multiple data fusion models, or between data fusion models and the application interface.

Merging different data sources and formats is an ecosystem challenge and should be tackled automatically and systematically. Many sources of data in vastly different formats need to be accommodated across heterogeneous networks. Solutions need to be tuned to new data types and new use cases. Different data rates, data synchronization, and data loss need to be taken into account, which is why smart apps integrating several complex data sets are not easy to create. In addition, effective learning strategies need to be implemented when no a-priori knowledge exists about mappings from data to response. The challenges are due to a lack of data and metadata representation standards in the industry.

Then if we extend the model and enable third parties to contribute to data fusion models, adding bricks and models to offer additional services, it is uncertain that they could all work together, hence the need for standards.

Data fusion opens new opportunities for smarter applications to do the following automatically, for example:

- Turn off a cellphone when entering a theater
- Analyze activity and schedules to indicate the best route to an appointment
- Locate where you are, what you are doing (walking, sitting, running) and send useful notifications in certain situations.

For example, notifying you when your train is late, so you can



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Fig. 2: Activity monitoring analysis through data fusion (source: Movea)

stop rushing to the platform, find out the updated ETA as well as alternate itineraries; or easily locating a store in a mall

Sports applications

Data fusion offers the ability to measure and track a wider array of sports and personal activities for advanced analyses of running, tennis, cycling, etc. making the mobile device the single entry to a brand new way of better knowing and improving yourself and what you do. By adding data fusion models to enhance sports applications, we can expect more groundbreaking developments in the very near future.

An example of smart devices and applications enabled by data fusion is an intelligent multisport mobile accessory – see figure 2. Today, accessories and apps are very specialized-- for running, step counting, tennis game play analysis, etc. Now, imagine a simple wearable accessory, which you can wear at all times, that detects your activity and sport and automatically starts tracking your performance accurately. It then connects to the Web to upload your data to a service, shares info with your

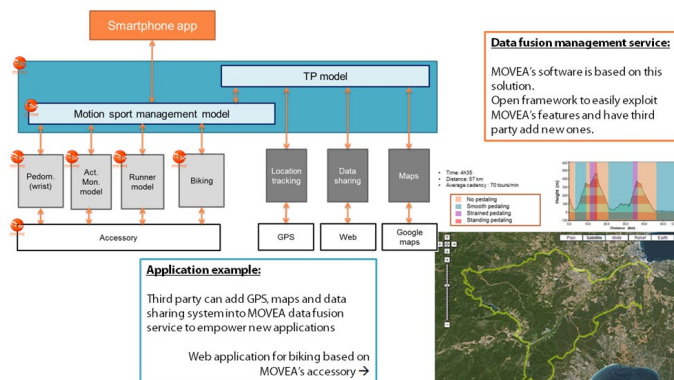


Fig. 3: Data fusion service inputs activity data from hardware device for third party use and application development (source: Movea)

social network, builds a database of your different activities to better anticipate your actions next time and so on.

Building such a smart accessory does present challenges. One potential difficulty is the management of third-party additions and the ability to make them easily accessible to the apps developers. Another is making such an ecosystem scalable, with tracked activities and other functionalities continuing to increase, under the current low power and cost efficiency constraints.

With the advancements of software capabilities, we see more user-experience enhancing functions on mobile devices as illustrated in figure 3. A simple architecture at the hardware and software level enables application developers to take advantage of an extendable set of models to create compelling apps, while maintaining low power consumption and cost efficiency. To fully realize this potential, we need to foster collaboration among industry players so that our collective expertise can be used to enable people to use their mobile devices for every possible purpose.

Test card evaluates mobile device behaviour in extreme temperatures

With the increase of M2M (Machine to Machine) communication, mobile device requirements are increasing as well. Comprion's new test card helps confirm the proper functioning of mobile phones in extreme temperature zones, from the Arctic to the Sahara.

M2M UICCs are perfect for devices that must perform in rough environments and meet extended lifetime expectations. The 64K/J LTE Test (U)SIM – M2M UICC examines mobile device behaviour at temperatures between -40 to +105°C, instead of the previously-required -25 to +85°C. Thus, the card meets the ETSI specification TS 102 671. Additionally, the M2M Test (U)SIM includes new LTE data fields and carries a GSM and a USIM application. The card supports 1.8V, 3V and 5V voltage classes and is available in the Plug-In/2FF format.

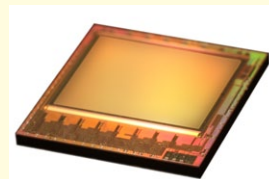
Comprion
www.comprion.com



3D image sensor chip enables touchless gesture control

Infineon Technologies has released a family of 3D Image Sensor chips for implementation of touchless gesture recognition. Developed in cooperation with pmdtechnologies GmbH, the new chips are the first to combine a 3D image sensing pixel array with the digital conversion and control functionality needed to design very compact and accurate monocular systems for gesture recognition applications in computers and consumer electronics devices. The chips include a photosensitive pixel array, sophisticated control logic, digital interfaces with ADCs and digital outputs. The IRS1010C has a resolution of 160x120 pixels and the IRS1020C has a resolution of 352x288 pixels. Both are dynamically configurable via I²C interface, allowing adjustment in real time to changing lighting and operating conditions. The chips are delivered as bare die for integration with camera lens and Infra-Red (IR) illumination source in a camera module.

Infineon Technologies
www.infineon.com/3d-imaging



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High density optical fiber enables stress analysis over large areas

The ability to measure multiple sensing points over large intricate surfaces can be a difficult task. Traditionally engineers have used electrical strain gauges to monitor many points over a structure such as an aircraft wing or large composite component. However applying many individual gauges is both time consuming and adds significant weight to the structure in the form of cabling. Fiber optic sensing techniques make this task easier by combining many Sensors on a single fiber. However with the launch of the FBGS 'All Grating Fiber' it is now possible to position sensors adjacent to one another, making it possible to monitor changes throughout the complete structure and see how mechanical influences at one point can affect another. DTG-LBL-1550-AGF is a low bend loss fiber with densely spaced Draw Tower Gratings (DTGs) over the full length of the fiber. It is designed to be used with an OFDR (optical frequency domain reflectometry) system that allows fast and precise measurements over a wide strain or temperature range with spatial resolution down to a few mm over the entire fiber length. The chain can be configured such that more than 95% of the fiber contains gratings.

FBGS
www.fbgs.com

4-channel analog input device for voltage and sensor-based measurements

The M-SENS2 4-channel analog input device from Ipetronik offers a direct CAN (Controller Area Network) bus output. Compatible with the previous M-SENS, the new module has a higher internal sample rate and a newly designed 500Hz hardware filter to support higher input frequencies. M-SENS2 covers twelve unipolar and twelve bipolar voltage measurement ranges from ± 0.1 V to ± 100 V. All inputs also support the often used 0 to 20 mA or ± 20 mA current input without adding external hardware. Each input provides a selectable sensor excitation of up to 15 VDC and a maximum supply current of 60 mA. Measurement inputs, sensor excitation, CAN bus and Power Supply are completely galvanically isolated from each other. The output data is transmitted using CAN bus 2.0B the automotive standard according to ISO 11898-2 with up to 1 MBit/s. All configuration settings can be set up conveniently using IPEmotion, the company's configuration and Data Acquisition software.



Ipetronik
www.ipetronik.com

Digital and analogue I/O modules have built-in web servers

Audon Electronics' ControlByWeb family comprises a set of DIN rail mounting digital and analogue I/O modules with built-in web servers. This allows their remote monitoring and control across the Web or any other IP network using a standard



web browser on a computer, tablet or smartphone. Setup is simple, fast and cost-effective, with no special software to download, no drivers to install, no batteries to change and no monthly licensing fees. ControlByWeb modules

can be assembled into an unlimited range of remote control, data acquisition, remote monitoring and industrial automation applications. The ControlByWeb family is exemplified by the WebRelay-Quad Ethernet Relay Unit. This has four independent 28V 1A SPDT relays, each of which can be activated, deactivated or pulsed remotely through its web server. Alternatively the unit can be integrated into other computer control schemes using HTTP, XML, SNMP or Modbus/TCP protocols.

Audon Electronics
www.audon.co.uk

High-precision dual Op Amp operates from -55 up to +225°C

CISSOID's high-precision dual Op Amp OPAL remains operational at temperatures from -55°C up to +225°C and is specifically designed to meet the toughest environmental constraints of Sensors in automotive, industrial and general high reliability applications. Key features include low input offset (50µV typical), low noise (5 µVpp typical) and operation from a single +5V ±10% power supply. The first product in the series is the CHT-OPAL, guaranteed for operation from -55°C up to +225°C. It is available in a thin dual flat pack (TDFP) surface mount, hermetically sealed ceramic package, with footprint of only 5x5.5mm. A second version will be available in the coming weeks, the CMT-OPAL, with a maximum temperature of +175°C. Packaged in a Plastic SOIC16, it brings a cost-optimized solution for 175°C max requirements, while taking full advantage of CIS-SOID' best-in-class lifetime en reliability features. A TSSOP16 version will also be available upon request for applications where component size must be minimized. A product datasheet is available now from CISSOID's website (OPAL datasheet).

Cissoid
www.cissoid.com



LVDT/RVDT signal conditioner with analog and RS485 outputs

Macro Sensors's Eazy-Cal LVC 4000 signal conditioner features analogue (4-20mA or user selectable voltage) and RS-485 outputs, it is compatible with most LVDT and RVDT Linear position sensors, including half bridge, and can communicate digitally with up to 16 devices simultaneously. The unit can be connected together in master/slave configuration for multiple channel applications, remotely located by up to 100+ feet to facilitate LVDT Linear position sensor operation in extreme environments. The Eazy-Cal LVC 4000 simplifies setup with easy, digital calibration using two pushbutton front panel controls to set zero and full scale. An intuitive, sequencing four LED status indicator guides operators through the calibration process and provides feedback to insure calibration integrity. This CE-approved din rail signal conditioner is provided with swap pluggable terminal blocks for quick replacement. The device comes with a 5 year warranty.

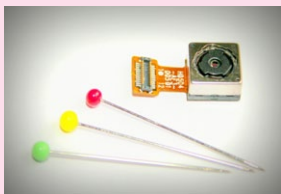
Macro Sensors
www.macrosensors.com



8.5x8.5x5.91mm CMOS camera module features 8 megapixels

Suyin Optronics' CM 8013 AF05 OV01 miniaturized camera module features a maximum resolution of 8 megapixels in a 8.5x8.5x5.91mm footprint, it also combines autofocus capabilities with a high-performance lens consisting of five plastic elements for sharp imaging. The OV8825 CMOS image sensor comes in a PLCC housing, in the 1/3.2-inch or 1/4 inch format. The size of the active image sensor area (the effective resolution) is 3296x2460 pixels. Using the standard "serial camera control bus" (SCCB), the images are read out as 10-bit RAW RGB (MIPI) files (full-frame, sub-sampled, windowed). Users have comprehensive control over output of the image files with regard to image quality and formatting. The supported image sizes include 8 megapixels, EIS1080p, 1080p, EIS720p, EISQ 1080p, Q 1080p, EISVGA, VGA and QVGA, among others. Depending on the resolution, the maximum image transmission rate is 24 fps (8 megapixels), 30 fps (EIS1080p), 60 fps (EIS720p), etc. All required image editing functions such as the exposure setting, white balance, or the masking of defective pixels can be programmed via the SCCB interface. Black level calibration is performed automatically (ABLC). Among other features, the miniature camera module offers integrated 256-byte one-time programmable (OTP) memory for storing serial numbers and similar details, a chip-integrated phase-locked loop (PLL), as well as a built-in 1.5 V voltage controller for the core supply. Signals and power are delivered via a micro connector (24 pins, 3x2mm), which is also connected to the module via a highly miniaturized flexible PCP.

Suyin
www.suyin-europe.com



Integrated temperature sensor in BAP RFID chip for wireless real-time monitoring

EM Microelectronic, the semiconductor company of the Swatch Group, has introduced a versatile and multipurpose, battery-assisted passive (BAP) RFID chip with a calibrated temperature sensor. The EM4325V11 chip enables accurate remote temperature monitoring using industry standard EPC Gen2 wireless protocol. Temperature data logging can easily be implemented with a companion Microcontroller connected to the EM4325V11 via a standard SPI interface. The integrated temperature sensor monitors ambient temperature from -40°C to +60°C with 9-bit measurement accuracy of up to 0.5% over the full temperature range. In pure passive mode, the temperature sensor can be used for field-powered snapshot readings. But the chip can also be programmed to perform self-monitoring with user-programmable alarm conditions (upper and lower temperature thresholds). Self-monitoring operation is supported with an on-board real-time clock (RTC) to control sampling intervals and provide a timestamp for alarm conditions. The sensor may be configured to provide Simple sensor Data reporting according to the data formats defined in ISO/IEC 18000-6 and ISO/IEC 24753. The EM4325V11 expands the viability of UHF RFID for new applications by offering longer read range, increased communication robustness and more configuration options and Interface capabilities for auxiliary functions. EM Microelectronic designed all the EM4325 ICs with an advanced feature set which leads to performance and functionality well beyond that of ordinary Gen2 chips. Operating in the UHF frequency range, the EM4325V11 is compliant with the following standards: ISO/IEC 18000-6 Type C and Type D (TOTAL); EPC Class 1 Gen2; ALIAG B-11 and ATA 2000. EM4325's BAP RFID technology combines the lower complexity, simpler communication protocols and lower cost of passive RFID with significantly higher read range.

EM Microelectronic
www.emmicroelectronic.com

Miniature Rogowski coils enable accurate non-contact current measurement

Power Electronic Measurements' latest generation of Rogowski coils for non-contact current measurement, is designed specifically for monitoring today's most advanced power systems and semi-conductors. The new CWT Ultra-mini probe offers higher maximum frequency and increased stability over a wider operating temperature range. The CWT Ultra-mini current



transducer is a powerful development or diagnostic instrument for examining switching waveforms, ripple currents, transients or harmonics. The extended temperature range of -40°C to $+125^{\circ}\text{C}$ and improved temperature coefficient of $50\text{ppm}/^{\circ}\text{C}$ allow accurate measurement of semiconductors operating at increased temperatures. In addition, the wider 3dB bandwidth of 30MHz enables engineers to analyse high-order harmonics in systems operating at high switching frequencies, or accurately monitor switching waveforms with rapid rise-times. The coil has a cross section of 1.6mm, allowing users to take measurements at locations that are difficult to access. It can be positioned between the pins of MOSFETs or IGBTs in packages such as TO-220 or TO-247. The complete CWT Ultra-mini range comprises several variants suitable for measurements from as low as 1A to a maximum full-scale current of 6000A. The new family also has enhanced transient response, and can measure fast-changing currents up to $80\text{kA}/\mu\text{s}$ and has typical measurement accuracy: $\pm 2\%$.

Power Electronic Measurements
www.pemuk.com

3D motion development kit targets wireless orientation tracking

Xsens has released a new development kit specifically for system integrators with a need for wireless orientation tracking, the MTw, suitable in markets which require wireless communication,



like training and simulation, pedestrian navigation, test and measurement and robotics. The MTw Development Kit Lite contains a highly accurate, small, lightweight and wireless IMU with full AHRS capabilities, providing drift free orientation. It also includes

a miniature wireless receiver, convenient mounting tools and Xsens' user-friendly MT Software Suite, compatible with the MTi product portfolio. The proprietary Xsens wireless communication protocol enables real-time performance with a range of up to 10 meters. With the addition of the MTw Development Kit Lite, Xsens expands its portfolio of motion tracking solutions. In 2012, Xsens released its 4th generation MTi-10 and MTi-100 series, including IMU, VRU and AHRS options, as well as the flagship MTi-G-700 GPS/INS.

Xsens
www.xsens.com

USB data acquisition unit offers four differential inputs for thermocouples

The DT9828E thermocouple measurement module from Data Translation is designed for users looking for a very cost-effective module, with all the basic features for temperature measurements and analyses without galvanic isolation and four instead of eight differential inputs for thermocouples. The DT9828E provides the same 24-bit A/D technology as the other modules of the series, and achieves a typical accuracy of $\pm 0.1^{\circ}\text{C}$. Like all DAQ modules from Data Translation, the DT9828E comes with an extensive set of drivers, tools and interfaces (e.g. for LabVIEW, MATLAB, etc.) and with the QuickDAQ 2013 data logging software. The module thus offers users a ready-to-measure solution for acquiring, displaying and saving data, and for exporting it to an Excel file. It achieves sampling rates of up to 600 Hz and runs entirely on USB power. The thermocouples are connected via screw terminals and automatically linearized on-board. The DT9828E supports the thermocouple types B, E, J, K, N, R, S and T. In addition to the four differential analog inputs, the module features four TTL digital inputs and four TTL digital outputs.

Data Translation GmbH
www.datatranslation.eu



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Extending data security to configurable SoCs

By Dave Beal

THE REQUIREMENT FOR security is perennial; anything with a perceived value is and most likely always will be subjected to unwelcome interest from the nefarious elements of society. Typically, the form of attack will be subject-dependent and so it follows that any form of protection should be appropriate to the subject and the expected nature of the attack.

In this era of accelerated technological development, the 'subject' can often be described simply as 'data'; be that security information such as passwords or encryption keys, or even the very software running on a given platform.

The forms of attack now used against these 'soft targets' include physical probing as well as the commonly cited 'cyber attack'; both of which have very specific defence requirements and, subsequently, solutions.

In response to the general need for greater security in embedded devices, ARM developed an extension to its basic architecture, called TrustZone, which offers OEMs a platform on which to build secure solutions.

For OEMs using devices that integrate the ARM architecture, such as the Zynq-7000 All Programmable SoC platform from Xilinx, TrustZone offers one way of increasing the security credentials of an end-application, but it's important to understand how it can be used, what manufacturers like Xilinx are doing to augment TrustZone's features, and where and how these features are most appropriately deployed.

Secure boot and run

Keeping embedded devices secure relies heavily on embedded software today; for FPGAs this includes the bitstream used to configure the programmable fabric. This level of security has long been understood and addressed by FPGA vendors and Xilinx devices offer a number of security features, separate from features like TrustZone, to ensure the bitstream cannot be intercepted, modified or altered during the crucial boot sequence at power-up and during run-time.

In addition to the protection of the bitstream, any ASIC, SoC or FPGA that integrates powerful processing must ensure that the processor boot sequence is secure and also that the embedded software is also protected during run-time. These aspects were formerly beyond the remit of an FPGA vendor but are now key to offering security in a programmable platform like the Zynq-7000 All Programmable SoC.

The very fact that the processor sub-system is integrated in to the FPGA makes this challenge less daunting; the Zynq-7000 platform integrates physically secure on-chip memory (OCM) that is inaccessible to external probing, making the boot sequence vastly more defensible. However, Xilinx has gone beyond a simple boot case by providing 256KB of OCM as shown in figure 2; large enough to run critical safety or security functions where they are both physically inaccessible, and hidden from software behind ARM TrustZone technology.

Dave Beal is Senior Product Marketing Manager at Xilinx – www.xilinx.com



Safe and secure

Product designers typically use TrustZone in devices like smart phones to store and run code that encrypts sensitive data, such as a PIN or password. It can also be used to implement secure key storage for decryption algorithms, supporting DRM (digital rights management) in audio/video streaming applications. These applications often use an ARM architecture but not necessarily a single chip. The particular strengths of an ARM multicore solution with TrustZone, that is tightly integrated with an FPGA fabric within the Zynq-7000 All Programmable SoC, are that it can form a complete System on a Chip (SoC); a customer and application-specific device that is capable of subsuming all of the major (and minor) functions of a system into a single device. When coupled with TrustZone, such an SoC is equipped to address a range of applications where both security and safety are paramount.

Safety-critical end-applications are as vulnerable to security issues as, for example, a mobile payment device; the risk of subversive tampering could render a safety-critical application a potential hazard to life or property, making them a target which needs the same level of protection now inherent within secure devices.

Fundamentally, TrustZone provides two zones or, in ARM's terms, 'Worlds' for software; a 'Secure World' and a 'Normal World'. Together they form a hardware platform for the creation of secure devices by allowing trusted software to run with full system access in the 'Secure World', while restricting untrusted software from accessing certain system functions and resources when running in the 'Normal World'. TrustZone allows a single processor to be partitioned to create two 'virtual processors', one for handling typically small but critical security functions, and one for general purpose processing. Although only one of the virtual cores can run at any given time, there is a very small overhead of just a few clock cycles to switch between the secure and normal modes, managed by the TrustZone hardware and aided by commercial and open-source software, to deliver a seamless symmetric multicore processing solution.

In the Zynq-7000 platform the benefits of a virtual core are extended further by the presence of two physical cores.

A multicore platform is much more capable of addressing complex systems, allowing a symmetric multi-processing (SMP) solution to run secure and normal software on one physical core, and another (real-time) operating system to run on the

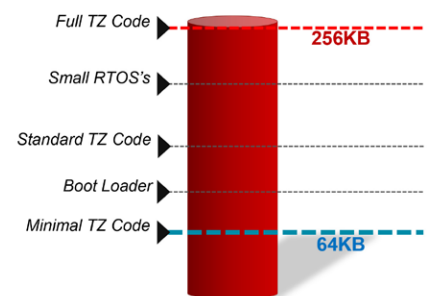


Fig. 1: The Zynq-7000 integrates 256kbyte of on-chip memory (OCM) which is hidden and inaccessible to probes.

second core. This results in a much more capable SoC design while retaining the security functions offered by hardware-based technologies such as TrustZone.

Beyond SMP

As explained above, TrustZone can be configured to allow a single core to function like two (albeit virtual) cores, each running their own software stack. Another approach to system partitioning, often implemented to support security requirements and particularly applicable in a multicore platform such as the Zynq-7000 device, is to run two operating systems; one on each core. This creates an asymmetric multicore processing (AMP) environment and is an approach garnering widespread adoption when developing high-performance applications, where a real-time operating system may run alongside a general-purpose OS.

The Zynq-7000 platform supports various approaches to AMP; either with or without an operating system running on one/both cores, from running two different operating systems on each core, or even running multiple operating systems on either/both processors as illustrated in figure 2.

These approaches include unsupervised AMP, TrustZone and hypervisor-based solutions.

Choosing the specific technology that will best meet your performance, safety and security requirements will depend largely on the application's certification requirements or regulations affecting certain applications (such as medical devices), ease of implementation, and system performance.

In modern, connected applications, safety and security are almost synonymous and often intrinsically linked. Designing complex SoCs that are able to offer both safe and secure protection from the (ever growing) forms of attack requires a platform that is inherently able to offer secure boot capabilities and to integrate the protection needed in today's end-applications, whether that is security of data or robust defences against unintended or malicious intrusion.

TrustZone is already recognised to provide security for commercially sensitive software and data. By integrating the same technology in to the Zynq-7000 platform, Xilinx is able to extend those security and safety benefits to more general embedded needs; actively developing solutions to bring that same level of security to a wider audience of developers and OEMs.

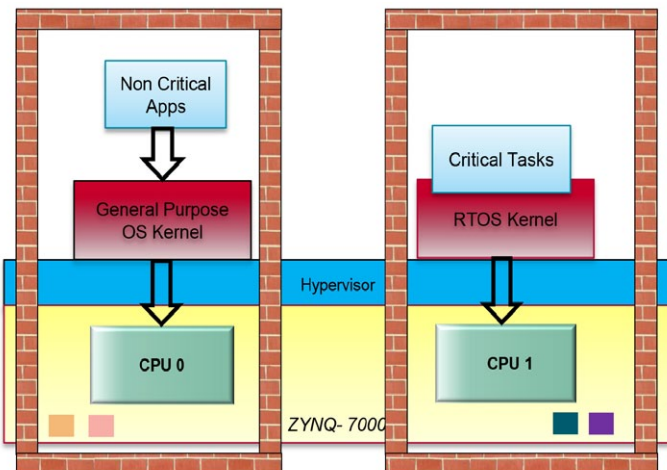


Fig. 4: Hypervisor technology can further segregate software or even entire operating systems.



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EVERLIGHT

Compliance in the Cloud with regard to data protection EU rules

By Richard Walters

THE EUROPEAN GENERAL DATA PROTECTION REGULATION (GDPR) was outlined on 25th January 2013. It proposes to provide a single set of data protection rules binding all twenty seven member states. Penalties for non-compliance include fines of up to two per cent of an organisation's global turnover.

Key parts of the GDPR proposals include the requirement for data controllers to inform the relevant Data Protection Authority within twenty four hours of becoming aware of a breach. Affected individuals also have to be informed if there is a potential for the breach to cause additional harm, for example if the security breach compromised passwords, email addresses or other personal information that could be used to perpetrate identity theft.

The scope of GDPR extends to both European organisations and companies based outside of the EU that process the personal information of EU citizens.

The rules are still being hotly debated and the content of the regulation is yet to be finalised, however, the goal of the European Commission is to have GDPR adopted by 2014, with regulation enforced from 2016.

Compliance in the Cloud

One of the main aims of the European Commission is to enable business transactions through a trusted internet. EU Justice Commissioner, Viviane Reding has said: "This piece of legislation is one of the biggest market-openers of the last few years." To underpin that trust, the EU GDPR aims to provide consumers with the reassurance that their information is being governed and protected by data controllers and gives citizens the right to request that their data is deleted if they stop using the services of a provider.

With so many organisations currently adopting cloud services for storage and backup of data and services such as email; CRM; file sharing; and enterprise resource planning, the European GDPR has caused many European CIOs to pause for thought. How do they effectively control employees' access to corporate and customer data that is within scope of EU GDPR, when the data might be processed outside of the corporate firewall, using Web applications that are accessed using personal devices?

Enabling visibility in the Cloud

Currently, Web application use represents a blind spot for CIOs and CISOs. They can authenticate users and secure employees' access to applications using single sign-on linked to enterprise directories, but they cannot see what employees are doing between logon and logoff. If they don't know what's happening to data, how can they prove governance and compliance with EU GDPR, or PCI DSS, or HIPAA?

The issue with adopting Software as a Service (SaaS), or any other public cloud service, is that this forces organisations to

accept the security policies of the SaaS vendor. Often, this results in security being downgraded to a "one size fits all" model, which may not be sufficiently granular for the organisation adopting that service. What is required is a method of managing and auditing the use of Web applications that is an extension of the existing security policies and controls used by the organisation for its on-premise applications.

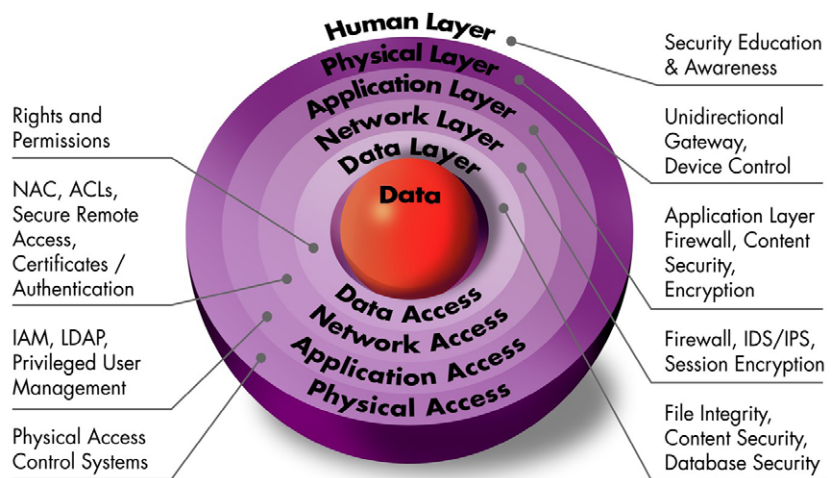


Fig. 1: The traditional approach to data protection

The browser is the common access point

The first thing to recognise is that Web-based applications are not going away. The productivity, accessibility and cost benefits of consuming services hosted in the cloud are too attractive for businesses to ignore. CIOs who have delayed adoption of Web-based applications have often discovered that employees have simply gone ahead and subscribed to their own applications in order to facilitate flexible working and maximise their productivity while travelling. This "shadow IT" is now creating a growing governance, risk and compliance issue for organisations. If CIOs don't know an application is being used to store or process corporate data, then how can they prove that user access was managed appropriately and how will they know if there is a breach? This lack of visibility will make it extremely difficult for organisations to comply with the EU GDPR mandatory breach disclosure.

Shadow IT is not a symptom of malicious employees, it is a result of employees becoming more familiar with consuming Web applications such as Dropbox in their personal lives and then applying the 'search, download, use' principle to their professional life. In fact, the growth in browser-based application use led to SaaSID developing a radically new approach to authentication, management and auditing of employees' application use. "Work" is an activity not a place. The browser is the new endpoint.

Figure 1 shows the traditional layered approach to data protection. The rising adoption of public cloud services and consumer Web applications, along with bespoke enterprise

Richard Walters is Chief Technology Officer of SaaSID - www.saasid.com

applications that are accessed via the browser, has challenged this model.

IT teams need to accept that the consumer cloud has come into the enterprise environment, along with the use of personal devices. To ensure risk management and compliance, IT must embrace the use of these services and provide equivalent secure alternatives. CIOs, CISOs and risk and compliance managers need to address how they will enable SaaS and bring your own device (BYOD), while still controlling access to data and auditing application use.

Corporate data that is accessed via a Web-based application is prone to the same insider threats and computer fraud as traditional corporate applications. The browser is simply the new end point. Therefore, access to applications through the browser needs to be managed and audited in the same way as traditional corporate computing devices.

Auditing browser-based data access

To address the security, governance and compliance issues associated with BYOD initiatives, SaaSID developed software that works within the browser, so that all browser-based applications can be controlled and audited, regardless of the devices employees use to access those applications. Embedding enterprise-class security within the browser has significant benefits. It enables organisations to introduce flexible BYOD schemes, with the attendant availability and productivity benefits of SaaS.

If the browser is tightly locked down and Web application access and activity can be managed and audited, then employees can be given much wider freedom over the device they choose, regardless of whether it is owned by, or even known to, the enterprise.

This approach also overcomes the HR issues created when organisations are using mobile device management (MDM) and introduce a remote lock and wipe policy for lost or stolen devices, which has resulted in employees losing personal pictures, documents, films or music that they have stored on the device.

Alternative approaches to managing Web applications

One of the biggest inhibitors to the increase in SaaS adoption is the forced downgrade to the one size fits all security model offered by SaaS vendors. The vendor models typically lack granularity, which risks non-compliance with EU GDPR, PCI DSS, and HIPAA Omnibus regulations, to name just a few. Organisations should look to restore access control and auditing of Web-based applications that is equivalent to existing on-premise security controls, independently of the cloud vendor if necessary. This will allow organisations to maintain compliance by detecting and preventing insider misuse of applications, whether inadvertent or intentional. Our software, Cloud Application Manager, takes the logical step on from single sign-on (SSO) tools and enables centralised authentication, application feature control and auditing of browser-based activity. This extends corporate governance to any device being used by authorised users and enables CIOs to create an audit trail of employees' interactions with Web applications for compliance with European regulations.

Proxy versus agent-based security

When developing our browser-based security and compliance software an alternative would have

been to develop a proxy instead. The proxy-based approach to managing Web applications is a valid solution for sites that are delivered using the traditional model where each individual page within the application has a unique URL. Proxies are able to filter by URL and block access to specific pages.

However, proxies cannot be used effectively to manage content when a web application is a single-page application (SPA), also known as a single-page interface (SPI). An SPA is a web application that has a single URL. SPAs are designed to provide a user experience that is more akin to that of a desktop application.

Within an SPA, typically all necessary code (HTML, JavaScript, and CSS) is retrieved with a single page load. Updates to the page as the user interacts with it may or may not involve further interaction with a server. The page doesn't automatically reload during user interaction with the application and control doesn't transfer to another page. The URL in the browser, the attribute that a proxy-based solution relies upon, rarely changes across the entire functionality of the application.

Google Apps is a well-known SPA. Within Google Apps, as the user accesses Gmail and Google Calendar for example, the core URL never changes. With a proxy-based solution there is one choice: CIOs can allow access to Google Apps in its entirety or block it completely. For organisations that need to filter individual components, such as specific buttons, links or menu options on the screen (within the page), in order to prevent certain employees from handling particular corporate information, proxies simply cannot be used.

The majority of modern pages are built on the user's machine and rendered within the browser window. The base HTML is delivered to the client's browser first, and then additional functionality is delivered (by JavaScript for example) that enhances the core structure with event handlers and builds the page up into a richer Document Object Model (DOM).

Using proxies, specific URLs must be filtered. The choices are therefore limited. CIOs can either block the base page or individual scripts within a page. If the base page is blocked then the user will see no content at all.

Blocking individual scripts typically breaks all functionality within the page. While the user may see some or all of the content, the application is effectively crippled.



Fig. 2: Agent-based web applications allow a highly granular control over access to individual page elements.

To provide restrictions to specific page elements, such as removing tabs, disabling links, the only option is to use an agent on the device, alongside the browser – see figure 2.

Agent-based browsers

The agent-based approach not only allows highly granular control over access to individual page elements but also enables control over access to browser functions such as Print, Copy, Save As, View Source. It supports the option to take a screenshot of the browser content to provide a visual audit trail for compliance, eDiscovery and forensics. This approach can force users to always access applications via the agent. Whilst proxies can be bypassed if accessing applications outside of the corporate network, agents always require the user to authenticate to the agent first before accessing browser-based resources. This enables the delivery of single sign-on (SSO) across a

wide range of devices, not just those known to, or owned by, the enterprise.

The Cloud Application Manager interacts with existing enterprise directories to permit, or restrict access to Web application features, according to employees' roles. An intuitive dashboard shows CIOs and IT Managers exactly how employees are interacting with Web applications and associated corporate data, regardless of whether employees are working on company or personally-owned devices. Detailed analytics provide managers with a complete overview of Web application use, with ability to drill down into reports for additional information. Activities that could compromise compliance with EU GDPR, PCI DSS or HIPAA Omnibus, such as exporting customer lists, or attaching sensitive files to Webmail, are tracked and clearly displayed, to enable organisations to prove that data access was appropriately governed.

Ensuring IP protection at system level to prevent embedded software cloning

By Min Wei Ang

IN TODAY'S CHIP business, one increasingly common market model involves an Original Equipment Manufacturers (OEM) buying microcontrollers from a chip supplier and then, engaging an Independent Design House (IDH) to develop custom embedded software (Intellectual Property – IP) for the chips used in the end product. The OEM pays royalties to the IDH depending on the volume of the end products that are using the IP. The OEM further engages an external programmer house to program the chips with the IP.

Such a model illustrated in figure 1 carries some risks to the OEM and the IDH. For example, the IP could be leaked through grey channels to a pirate production plant and used to produce software clones. Also, since the volume of end product is not visible to the IDH, a less fair-minded OEM may attempt to pay less royalties by under-declaring the IP usage.

Infineon's XMC1000 microcontroller family addresses such risks by offering an IP protection option. The IDH will be empowered with the tools to encrypt the IP based on the 128-bit key Advanced Encryption Standard (AES) and the resulting encrypted IP only can be downloaded into authorized devices, where it will get decrypted and programmed into the devices' Flash memory. This ensures that the IP is always transported in its encrypted form until it is downloaded into the device. The IDH will now also have the means to keep track of the number of end products that would be using the IP.

Fundamental building blocks

Such an IP protection scheme requires three basic building blocks, the XMC1000 device with Secure Loader, a software encryption tool and a programming tool supporting Secure Loader – see figure 2. The Secure Loader is a start-up mode and feature, introduced in XMC1000, to process 128-bit AES encrypted data. Based on a defined protocol and command

set, the Secure Loader is able to receive the encrypted data, decrypt the data within the device and program the data into the Flash memory. Devices with the Secure Loader feature are grouped based on a pre-defined number of devices, termed a batch, and each batch of devices are assigned a unique identifier called SBSL ID. The PC-based software encryption tool is used to encrypt the IP based on 128-bit key AES (IP Key) and embed in the final output file, information to identify the SBSL ID of the target device. The above can be performed only after the encryption tool has received the IP, IP Key and SBSL ID of the target device. The IP key is generated from an Infineon smart card interfaced to the encryption tool through a PC/SC card reader. Both the encryption tool and the smart card are provided by Infineon to the IDH. A programming tool supporting Secure Loader is required to interface to the target device. When connected to a device, the programming tool sends a command to read the SBSL ID from the device and based on this SBSL ID, retrieve the matching output file containing the encrypted IP. The programming tool is also used to send the command to initiate the download of encrypted data and the subsequent programming of the IP into the device.

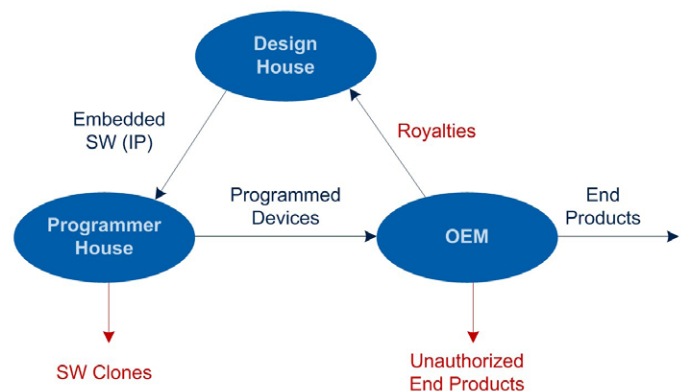


Fig. 1: Market model and possible risks.

Min Wei Ang is application and concept engineer at Infineon located in Singapore. He has more than 10 years of experience with embedded applications – www.infineon.com

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IP Protection Concept

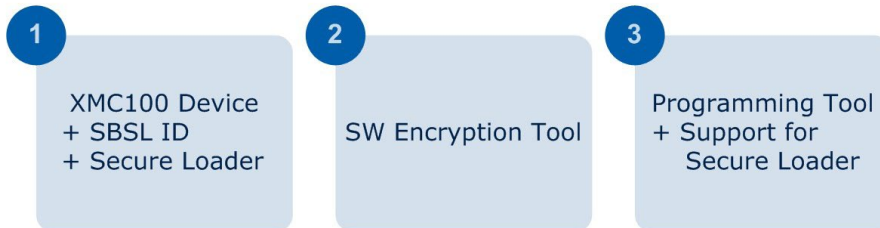


Fig. 2: Basic building blocks.

IP protection usage flow

IP protection is initiated when the OEM provides the SBSL ID of the target devices to the IDH. Once the SBSL ID of the target devices is known, the IDH encrypts the IP using the encryption tool and delivers the final output file containing the encrypted data to the Programmer House – see figure 3. If more than one SBSL ID is used, there will be a corresponding number of output files generated, one for each SBSL ID.

The Programmer House then uses the programming tool to download the encrypted data through the Secure Loader into the target device, where it will be decrypted and programmed into the Flash memory. The Programmer House must use devices that have a SBSL ID matching to the list provided by the OEM, otherwise the programming tool will flag an error and data download to the unknown device fails. The programmed devices are finally shipped to the OEM for end product assembly. The discussion in this article references a market model involving an OEM, an IDH and a Programmer House, but the IP protection scheme can be easily applied to other models as well.

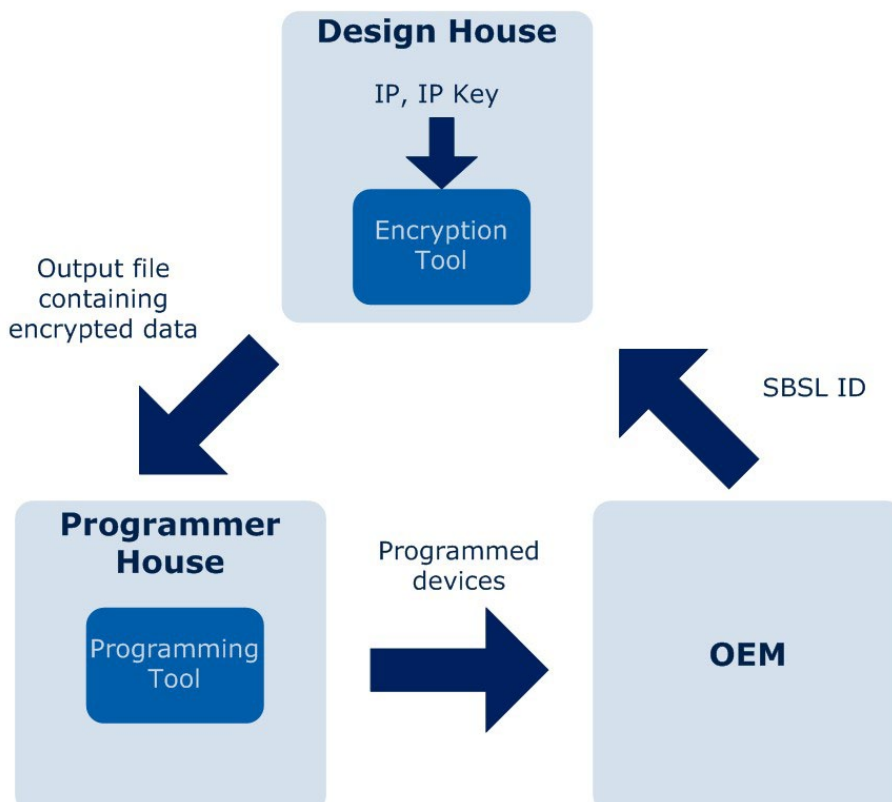


Fig. 3: IP protection usage flow.

Security facets of premium content protection on Android devices

By Dana Neustadter

CONNECTED AND MOBILE devices are revolutionizing premium video distribution and consumption. These powerful devices are high-definition (HD) video capable with impressive high-resolution touch screens that provide an immersive, intuitive and compelling video experience to their users. They enable traditional service providers to extend their offerings beyond the existing delivery models and are enabling totally new business models and opportunities. The ability to store, distribute and share programs using such attractive devices allows not only for on-device viewing, but also the ability to “mirror” or wirelessly display programming on other large displays anywhere near the device.

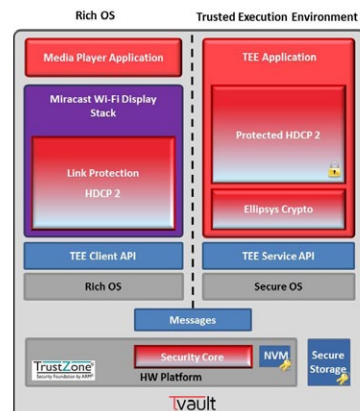
We focus particularly on Android in this article because of its increasing market and the challenges its open hardware and software ecosystems present. Android represents both a growing opportunity and a fundamental change in the way distributors view devices, users and what they can or cannot do with their devices on the network. No longer is the distributor's market limited to owners of a few proprietary devices viewing programming delivered over proprietary networks: Android devices now include a growing ecosystem of smartphones, tablets, set top boxes and other inexpensive capable devices that are all potential outlets for subscription, pay-per-view, over-the-top and video-on-demand services.

Connected consumers demand ubiquitous connectivity, streaming and sharing of high definition content among their devices, from anywhere at any time. Content providers still need to protect their investments and are demanding that content is protected into the device, on the device and out of the device. Distributors are highly motivated

to roll out mass deployments of services and applications via new business models to satisfy the customer demand. To address this technology (r)evolution, simple conditional access via hardened ICs, proprietary locked down software applications or smart cards is no longer sufficient. Robust platform security is crucial to meet these requirements, and it needs to be designed in from the lowest levels of the SoC applications processors right through to the applications that run on them and carry their data to and from the cloud.

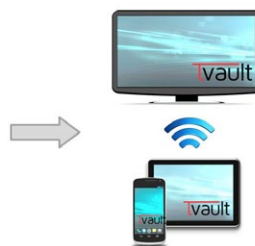
Multimedia entertainment applications drive both the high

Dana Neustadter is Director of Product Management at Elliptic Technologies - www.elliptictech.com - She can be reached at danan@elliptictech.com



A typical application for a TrustZone-enabled Android device such as a smartphone or tablet is to wirelessly transmit high-definition media content to an HDTV via the Miracast WiFi Display technology. In this application, authorization of the HDTV decryption of the program content is performed inside the TrustZone TEE. Decryption keys for the program are never available in decrypted form outside the TEE.

performance demands on new devices and high bandwidth usage on wireless networks. The most demanding applications are those that deliver multimedia content to users to render on HD displays. Premium content and services applications are exemplified by HD video and music distribution services. Content and service providers want to make easy access to their products available to legitimate users, while also protecting themselves from unauthorized redistribution of or access to those services and content. These uses require that devices have a trustworthy component that may be used to authorize access to the provider's products while remaining secure against compromise by malicious users. Netflix is a good case in point. Netflix is available now on a wide range of Android devices, but many of them cannot receive HD content. The reason is simple: today most Android devices make content owners suspicious of their suitability for premium content. And the lack of a reliable assurance of a trusted element in the devices means that every device model produced by manufacturers must be evaluated on



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its own. Given the large number of device models on the market and the rapid development cycle of new models, content providers and producers simply give up on trying to capture this market as a category.

In an attempt to change this situation, there has been a move from wide open to trusted Android devices. These trusted devices incorporate a secure subsystem beyond the reach of the Android operating system that can include cryptographic keys and credentials together with security algorithms and protocols that can be used to provide protected services to Android applications. The leading technology for these devices today is ARM TrustZone. ARM's processors are the outright

market leader in smartphones and tablets, but also increasingly in other market segments such as set-top boxes and media players. TrustZone enables hardware-enforced software security via a Trusted Execution Environment (TEE). TrustZone is now a standard feature of the ARM processor architecture. However, this alone is not sufficient for end-to-end security solutions, which require a well-defined set of APIs for applications to use to pass data to and from secure services running inside TrustZone. To facilitate multiple separate secure services, a secure OS operating inside TrustZone is used. The Global Platform TEE initiative is one attempt to develop a standardized secure OS. Efforts are presently underway to provide features important to content protection such as protected data path between security engines and the graphics processing unit. Other

aspects of these efforts include definitions of standard services including the ability to load new trusted applications into TrustZone, as well as a certification scheme. Once the facilities are in place, content providers should have a considerably easier path to providing premium content to a broad class of Android devices.

A good example is the increasingly popular Miracast Wi-Fi Display technology. Miracast provides a standard wireless display link protocol capable of sending HD content from a mobile device to an HDTV or other similar large format displays. When playing DRM protected content purchased from an on-line store or streamed from an on-line service, Miracast uses the High-bandwidth Digital Content Protection (HDCP) version 2 security protocol. To maintain continuous protection of the content, the DRM protection is removed and the content is passed directly to the HDCP content protection engine configured by the Miracast connection, entirely inside the TEE. This ensures that the decrypted program is never accessible to Android applications and therefore is less vulnerable to being shared without permission. In certain applications there are still some gaps in the video processing datapath. Ongoing work by SoC and device manufacturers is addressing these limitations.

The security model for Android continues to evolve, and it is on its way to becoming a robust platform for a wide variety of applications and users, from social media junkies to corporate users and as a great mobile multimedia engine for all kinds of free and licensed content. The need for strong protection of premium content is making SoC and device manufacturers, as well as system software suppliers pay greater attention to overall issues of system security. This in turn has the potential to benefit all Android users if some care is taken to provide a general framework that apps can use to secure their data on behalf of their owners.

Web 2.0-enabled remote terminal unit integrates powerful cyber security protection



CSE-Semaphore's latest SCADA remote terminal unit (RTU) integrates powerful cyber security protection and wireless communications in a compact package. The TBox LT2 RTU is an all-in-one SCADA system featuring a web server, 3G wireless communications and a complete cyber security application suite, all tightly integrated with programmable automation, alarm notification, data logging and Ethernet communications in a single, rugged module. The

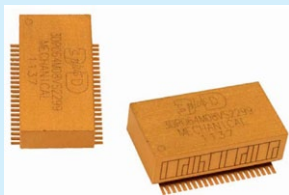
TBox RTU line provides up to 50% cost savings over other systems that seek to combine PLC, communications, and SCADA components. It is built on CSE-Semaphore's decentralized TBox architecture that enables the complete integration of programmable automation, alarm management, data logging and IP telemetry in a single, rugged package. The platform leverages web technologies and push messaging via e-mail, SMS text and FTP. TBox systems are easy to configure and offer dramatically reduced costs versus traditional PLC and SCADA architectures.

CSE-Semaphore

www.cse-semaphore.com

Space-grade 32Mb PROM memory has 20 years of guaranteed life data retention

3D Plus has released a space-grade 32Mb PROM memory chip, the 3DPO32M-08VS1419 One-Time-Programmable (OTP) Rom memory designed to store



configuration bit streams for FPGA devices, such as Xilinx Virtex FPGAs. It is organized as 4Mx8b, and can operate in either a serial or byte wide mode. The 3DPO32M08VS1419 has a guaranteed 20 years life data retention and can also be used as Processors Boot and Program PROM in a variety of high performance and high reliability computer boards. The chip

operates from a +3.3 +/- 0.3V power supply, it is available within the military temperature range of -55 to +125°C. The 2.1 gram device is radiation tolerant to over 50 kRad (Si) and is latch-up and SEU immune to LET>120 MeV/cm²/mg.

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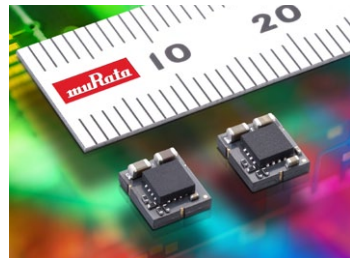
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Ultra compact DC-DC converters offer a voltage trim capability

Murata has added to the company's LXDC series of ultra compact DC-DC Converters with new devices that comprise the LXDC55F and LXDC55K step down converters. Both models offer a voltage trim function that allows adjustment of the output voltage within the range of 0.8 to 5.3 VDC for the 55F and up to 3.6 VDC for the 55K converter. The LXDC55FAAA-203 measures 5.0x5.7x2.1mm and can support an input voltage in the range of 4.0 to 14.0 VDC. Maximum output current is up to 1.5 A. Capable of supporting an output current up to 3 A the LXDC55KAAA-205 operates with an input voltage within the 2.7 to 5.5 VDC range. The Converters are constructed on a Multilayer ferrite substrate that integrates an embedded Inductor and the power IC. Using this approach the LXDC family exhibits good EMI suppression and reduced harmonic noise characteristics. The Converters use a synchronous rectifier technology. They are ideal for applications that require an extremely small DC-DC conversion footprint where a discrete approach is not possible due to space limitations. The LXDC series are aimed not only at consumer electronic devices such as cellular phones, tablets, games consoles, digital cameras but also at communication applications such as base stations.

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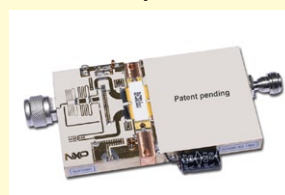
Industry's first ultra-wideband Doherty amplifiers support broadband operation

NXP Semiconductors N.V. has introduced an ultra-wideband Doherty reference design using the BLF884P and BLF884PS – the industry's first wideband Doherty power Amplifiers

capable of broadband operation (470 to 806 MHz). The new 70 W DVB-T LDMOS designs bring the high-efficiency gains of Doherty topologies to broadcast transmitters, using NXP's patent-pending architecture

capable of operating across an ultra-wideband spectrum. Whereas traditional UHF technologies such as class AB typically reach only 30% efficiency, Doherty solutions are capable of reaching 45-50% power amplifier efficiency. The ultra-wideband Doherty design uses NXP's mature leading-edge 50 V LDMOS technology, and the ruggedness of the BLF884P and BLF884PS make them ideal for digital broadcast transmitters. Mark Murphy, director of marketing, RF power and base stations, NXP Semiconductors, said: "Given the immense pressure to deliver richer content via high-performance TV transmitters, we believe that the impact of ultra-wideband Doherty architectures on the overall digital broadcast market will be wide-ranging. At an average DVB-T power level of 70 W, the BLF884P/PS ultra-wideband Doherty reference design is extremely well suited for gap filler applications."

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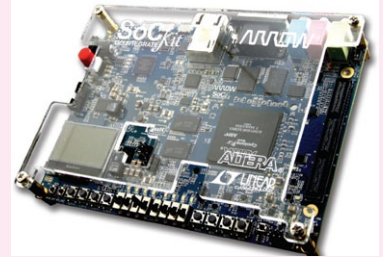
Win one of five SoCKIT evaluation kits

The SoCKIT evaluation kit is Arrow's latest development tool, featuring an Altera Cyclone V SoC with a dual-core ARM Cortex-A9 MPCore processor integrated within its 28nm FPGA fabric.

Altera SoCs allow embedded system developers to differentiate their end product with customized hardware and software, and extend the product lifecycle through hardware and software updates in the field.

This month, Arrow Electronics gives away five SoCKIT evaluation kits featuring Altera's ARM-Based SoCs,

worth €249 each, together with the free entrance to one of Arrow's SoC workshops organized throughout Europe. The SoCKIT evaluation kit is fitted with a High Speed Mezzanine Connector (HSMC) including transceivers, two banks of low-power DDR3 memory, a MicroSD card and Ethernet 10/100/1000 interfaces, as well as an adjustable clock output by Silicon Labs. A 128x64 graphic LCD, VGA and audio connections, USB 2.0 OTG (Full Speed) and USB to UART connections, a 3-axis digital accelerometer and a temperature sensor complete the board. The kit comes with a user's manual and USB and power cables.



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Industrial USB camera delivers 2592x1944 pixels at 15fps in a 23x26.5x21.5mm casing

With the XS, IDS is launching a generation of cameras that combines the convenient operation of a standard consumer camera, along with the versatility of a robust industrial camera. The 23x26.5x21.5mm unit weighs just 12 grams and can be integrated very easily into any system. Its magnesium housing makes it very robust. The camera is connected using USB 2.0 and a mini-B socket, and the Power Supply is provided by the bus cable. The 5 megapixel Aptina CMOS sensor with a pixel size of 1.4 µm delivers exceptionally detailed true color images, with a choice of seven fixed image formats: 5 MP, 3 MP, Full HD, UXGA (1600x1200), 1.2 MP, 720p, VGA. The frame rate is freely adjustable (e.g. for long exposures), and at full resolution of 2592x1944 pixels 15 frames per second can be captured in JPEG mode. Binning can be used to achieve frame rates as high as 30 fps. The integrated auto focus optical system delivers a crisp image from distances of just 10 cm, either automatically or manually using software. The associated API function also enables the current focus position to be read. A digital zoom allows easy and almost continuous enlargement of smaller sections of the image. The XS comes complete with the comprehensive IDS Software suite, including drivers, tools and interfaces.

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Select resolution from 8 to 16 bits in a USB oscilloscope

Pico Technology has used reconfigurable ADC technology to offer a choice of resolutions from 8 to 16 bits in a single product; the company says this is the first time this facility has been possible in an oscilloscope. Most digital oscilloscopes gain their high sampling rates by interleaving multiple 8-bit ADCs. Pico asserts that, despite careful design, the interleaving process introduces errors that always make the dynamic performance worse than the performance of the individual ADC cores. PicoScope 5000 Series scopes have a significantly different architecture in which multiple high-resolution ADCs can be applied to the input channels in different series and parallel combinations to boost either the sampling rate or the resolution. In series mode, the ADCs are interleaved to provide 1 Gsample/sec at 8 bits. Interleaving reduces the performance of the ADCs, but the resulting dynamic range (60 dB SFDR) is still much better than oscilloscopes that interleave 8-bit ADCs. This mode can also provide 500 MS/s at 12 bits resolution.



Pico Technology
www.picotech.com

Single-chip sensorless, brushless DC motor driver spins motors instantly

Texas Instruments has expanded the company's sensorless, brushless DC (BLDC) motor driver portfolio with a new device designed for high efficiency and low noise, which requires a low external component count of only one capacitor. The DRV10963 is a 5-V, 3-phase sensorless BLDC motor driver that simplifies layout and reduces board space by 80 percent, allowing designers to create smaller, sleeker, more innovative designs. It includes integrated commutation logic, which enables instant motor spin with no code development, while its 180-degree pure sinusoidal outputs provide an efficient and quiet drive. The DRV10963 has a low operating range of 5.5 to 2.1 V, low RDSON of less than 1.5 ohm and ultra-low sleep currents extend battery life up to 25 percent compared to nearest competition in fans and portable, battery-powered personal health care and grooming devices, including electric razors and toothbrushes. The device provides the lowest quiescent current to further extend battery life – 15 uA compared to 30 uA for the closest competitor.



Texas Instruments
www.ti.com

Miniature connector is 45% lighter than a D-sub

An alternative to the D-subminiature connector, the microComp Quicklatch is a 100% composite miniature quick connector designed particularly for use on in-flight entertainment (IFE) screens aboard commercial aircraft. It is 32% smaller and 45% lighter than a D-sub and can save as much as the equivalent of the weight of one passenger on modern civil aircraft. This miniature design, coupled with the use of composites, makes the microComp Quicklatch one of the lightest Connectors on the market. Fitted in passenger seat backrests, the connector is compatible with Giga-bit Ethernet networks and sends signals to each video screen. Its nickel coating ensures the highest protection against lightning and electromagnetic interference and its design and shielding level allow it to support up to four 100 Mbps Ethernet lines with excellent performance. Connections are easy, with no screws and no risk of damaging the contacts even when feeling around for the socket.



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Cadence launches massively parallel timing tool to speed SoC design

Cadence Design Systems has launched a new static timing analysis and closure tool designed to run on passively parallel hardware and enable System-on-Chip (SoC) developers to speed timing closure and move chip designs to fabrication quickly. The Tempus Timing Signoff Solution leverages multi-processing and ECO features to achieve signoff faster than with traditional flows. The tool can scale to use up to hundreds of CPUs. The parallel architecture enables the tools to analyze designs in the hundreds of millions of instances without compromising accuracy.

A new path-based analysis engine leverages multi-core processing to reduce pessimism. With its performance advantage, the Tempus Timing Signoff Solution enables broader use of path-based analysis. Multi-mode, multi-corner (MMC) analysis and physically-aware timing closure leverages multi-threaded and distributed timing analysis. The Tempus Timing Signoff Solution advanced capabilities can handle designs containing hundreds of millions of cell instances without compromising accuracy.

Cadence Design Systems
www.cadence.com

Single chip integrates JTAG standards and mixed-signal test instruments

Goepel electronic's CION LX is a new generation of JTAG transceiver ICs that provides ultra-low voltage characteristics, offering a tester-per-pin architecture based on diverse Boundary Scan standards, in combination with additional digital and analogue test instruments. Various operation modes enable a wide range of applications of the IC as bus transceiver, pin driver and system monitor. For flexible signal adaptation, different Interface types with programmable transceiver parameters have been integrated into the chip. The CION LX was developed in 0.35 μm mixed-signal CMOS technology and provides four independent I/O ports. Each port can be individually operated in a voltage range from 0.9 V to 3.6 V. The integrated Boundary Scan architecture supports the standards IEEE 1149.1, IEEE 1149.6 and IEEE 1149.8.1, at a maximum TCK frequency of 100 MHz.

In addition to the single-ended pins, the CION LX provides differential signals as well as interfaces with increased driver ability. Four operation modes enable the IC's flexible utilization as purely serially controlled JTAG transceiver, parallel I/O buffer, latched bus transceiver, and pin driver. Instruments such as digitizer, arbitrary waveform generator, event counter, frequency meter and toggle detectors are integrated into the CION LX. These instruments can be accessed, depending on operation mode, either serially via the JTAG Test Access Port (TAP) or a parallel control bus. The instruments can be activated simultaneously to Boundary Scan operations and per test channel. For each channel, pull-up and pull-down resistors can be additionally connected. Moreover, there's the opportunity to program the drivers' slew rates. Sampling now, the CION LX's first series deliveries are planned for quarter three in 2013. A QFN housing with 116 pins will be used. Additionally, there will be a version with 64 pins compatible to the predecessor model Footprint.

Goepel electronic
www.goepel.com



Rugged SBC offers flexible I/O for data processing in compact displays

MEN Micro has launched a low power, rugged single board computer (SBC) with a 1.6GHz Atom processor that incorporates flexible I/O for demanding graphics environments. The SC27 is aimed at LCD TFT displays with screens from 7" to 15" and a maximum resolution of 1280 x 768 pixels and reliably operates in compact spaces where conditions are rugged, like in mass transportation, where the SBC can be used in driver consoles or for in-seat displays. Critical industrial controls also benefit from the rugged, compact structure and highly adaptable I/O of the SC27. The fanless SBC dissipates up to 7 Watts and includes a temperature sensor to monitor and control the display, enabling reliable operation over an extended temperature range of -40 degrees C to +85 degrees C. Up to 2 GB of DDR2 SDRAM memory, with an 800 MHz bus frequency, as well as 16 Mbits of boot Flash come standard on the SC27. The board also includes an mSATA slot with transfer rates of up to 3Gbit/s as well as a microSD slot via USB. For real-time data requirements, wireless communication via WiFi, WiMAX, GSM/GPRS, UMTS, HSDPA and LTE can be provided via the PCI Express Mini Card and the microSIM card slot. Standard I/O includes a Fast Ethernet port via an M12 connector, two USB ports and a GPS Interface as well as an RS232 or RS422/485 interface.



MEN Micro
www.menmicro.com

Bluetooth SoC only draws 3.8mA at transmission and reception

With SmartBond, Dialog Semiconductor has released what the company claims to be the world's lowest power and smallest Bluetooth Smart System-on-Chip (SoC), which more than doubles the battery life of an app-enabled smartphone accessory or computer peripheral in comparison to competing solutions on the market. Designed to connect keyboards, mice and remote controls wirelessly to tablets, laptops or Smart TVs, the part number DA14580 will enable consumers to use innovative apps on their smartphones and tablets connected with watches, wristbands and smart tags, to "self-track" their health and fitness levels, locate lost keys and much more. SmartBond's unique low power architecture draws just 3.8mA at transmission and reception, 50% less than other Bluetooth Smart solutions on the market according to the manufacturer, with a deep sleep current of under 600nA. This means a 225mAh coin-cell battery in a product sending 20 bytes of data per second would last 4 years and 5 months in comparison to just 2 years with previous generations of Bluetooth Smart technology. The DA14580 features a Power Management block, including a DC-DC converter and all the necessary LDOs, reducing the need for external components. The DA14580 comes in three different form factors, the smallest WLCS package measures 2.5x2.5x0.5mm.



Dialog Semiconductor
www.dialog-semiconductor.com

High temperature multilayer stacked capacitors offer high temperature reliability

KEMET has introduced the company's new KEMET Power Solutions High Temperature (KPS HT) Multilayer stacked capacitors. KEMET's KPS HT Series devices with an X8L dielectric



utilize a proprietary lead-frame technology to vertically stack one or two Multilayer ceramic chip capacitors (MLCCs) into a single compact surface mount package. The two-chip vertically stacked device offers up to double the capacitance in the same or smaller design footprint, allowing for both component and board space

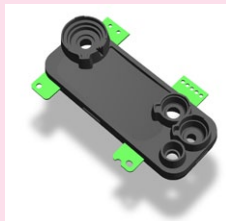
reductions. Providing up to 10 mm of board flex capability, KPS HT Series capacitors are environmentally friendly and in compliance with RoHS regulations. They are also capable of Pb-Free reflow profiles and provide low ESR and ESL. Utilizing an X8L dielectric, these devices can provide reliable operation up to 150°C and are well suited for high temperature filtering, bypass and decoupling applications. Typical markets include alternative energy, industrial/lighting, medical, telecommunications, automotive, and defense and aerospace. KPS HT Series stacked capacitors complement KEMET's extensive high temperature product portfolio, with capacitance solutions available for extreme temperature applications up to 260°C.

Kemet

www.kemet.com

Freeform packaging technology flexibly encapsulates semiconductor sensors

Independent package development and assembly specialists Sencio BV is bringing an extra dimension to sensor and MEMs encapsulation with the launch of its nCapsulate



freeform packaging technology. nCapsulate uses transfer molding with a thermosetting compound that delivers better isotropy and thermomechanical stability than the thermoplastics of standard injection molding technologies. It combines this with special mold tools developed by Sencio and a tool-

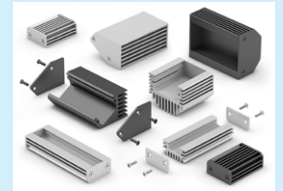
shop partner. Together, these developments enable device encapsulation that delivers the same excellent protection as traditional packages but that can be formed into any shape required. For example, manufacturers can use nCapsulate to add mounting, alignment and support features to a standard package design, or embed Sensors or MEMs directly into plastic components such as tubes and system casings. According to Jurgen Raben, manager technology, research & innovation of Sencio BV, nCapsulate's freeform nature helps manufacturers streamline or even eliminate post-encapsulation assembly steps to improve production efficiency and save money. Customers can combine nCapsulate with Sencio's other functional packaging capabilities, such as the ability to expose sensor surfaces while protecting delicate integrated circuits, to create a functional packaging solution tailored to their precise needs. nCapsulate can be applied to leadframe based packaging as well as other substrates such as PCBs or ceramics.

Sencio

www.sencio.nl

Heatsink housings avoid LEDs overheating

Fischer Elektronik has expanded its product range of heat discharge housings by adding an additional housing series, the G LED range of U-shaped housing profiles, which are open on one side with integrated guide grooves to take LED line modules and slot-in cover plates or plexiglass discs. The plexiglass discs and LED line modules are fixed by means of the lid plates at the front, which are screwed onto the housing profile. The housing profiles also have external cooling ribs, which ensure that the heat is fully discharged to the environment. The G LED housing series is available as standard in three different versions and three lengths (50, 80, 100 mm), as well as in two surface versions (natural-coloured and black anodised). Other lengths, surfaces and types of mechanical processing and printing can be manufactured to the customer's request.



Fischer Elektronik

www.fischerelektronik.de

CMOS-based isolated gate drivers provide drop-in replacements for opto-drivers

Silicon Labs has introduced the industry's first digital CMOS-based drop-in replacement solution for optocoupler-isolated gate drivers (opto-drivers). The Si826x isolated gate drivers support up to 5 kV isolation ratings and up to 10 kV surge protection. Failure-prone opto-drivers are a weak link in motor controls and other industrial power systems that require long-term



reliability, extended warranties and fail-safe operation for up to 20 years. Opto-drivers are inherently limited by their inferior LED-based technology, which is subject to large output variations over input current, temperature and age. With the Si826x, less variability, especially in input turn-on current, simplifies system design since developers no longer need to anticipate aging effects. Based on Silicon Labs' proven digital Isolation technology, the Si826x family is a pin- and footprint-compatible functional upgrade solution for commonly used opto-driver products. Si826x isolated gate drivers emulate the behavior of opto-drivers by modulating a high-frequency carrier instead of light from an LED. This simpler digital architecture provides a robust isolated data path that requires no special considerations or initialization at start-up. While the input circuit mimics the characteristics of an LED, the Si826x devices require less drive current, resulting in higher efficiency. The propagation delay time of Si826x devices is independent of the input drive current, resulting in consistently short propagation times (25 ns), smaller unit-to-unit variation and greater input circuit design flexibility. The propagation delay and skew of Si826x isolated gate drivers is ten-times lower than opto-drivers, which improves response time for feedback loops and enhances system efficiency. The chips also provide superior noise immunity for a robust glitch-free long-term performance in harsh, noisy environments. They are rated for gate drive voltages of up to 30V and a peak output current ranging from 0.6 to 4.0A.

Silicon Labs'

www.silabs.com

DSM Computer markets electro-luminescent displays from Lumineq

DSM Computer GmbH now distributes the high-quality thin film electro-luminescent (TFEL) displays made by Lumineq Displays, particularly suited for a wide range of applications with extreme environment requirements. Lumineq Displays is a newly-founded business unit of the Finnish company Beneq that has taken over the "Electro-luminescent (EL)" division of Planar Systems, Inc. based in Finland. Beneq has set the goal of ensuring that Planar's faithful customers will continue to receive problem-free and long-term deliveries of the existing products as well as comprehensive support. The displays can work under extreme temperatures in the -60° to $+85^{\circ}$ C range. In addition, the display systems exhibit a particularly high shock, acceleration and vibration resistance, and are immune to dust.

DSM Computer GmbH
www.dsm-computer.com



Mouser signs global distribution agreement with Advanced Thermal Solutions

Advanced Thermal Solutions (ATS) has signed a new global agreement with Mouser Electronics to distribute high performance heat sinks and cooling solutions. The agreement with ATS means Mouser Electronics customers will have access to a wide range of high performance heat sinks available in thousands of shapes and sizes. ATS heat sinks are designed for use in many applications including telecom, datacom, LED, automotive, medical, and aerospace. Their maxiFLOW heat sinks feature a low profile spread fin array that maximizes surface area, yielding the highest thermal performance of any heat sink on the market. ATS maxiFLOW heat sinks are available with thermal tape, push pin or its patented maxiGRIP attachment methodology. ATS maxiGRIP assemblies permit secure attachment of heat sinks to BGAs, flip chips and other hot components on a PCB

Mouser Electronics
www.mouser.com

Ginsbury introduces Kyocera's Super Wide View TFTs

Specialist display distributor Ginsbury has introduced a new family of Kyocera TFT LCD displays featuring Kyocera's innovative Super Wide View (SWV) technology. Developed to



provide superior image quality and wide viewing angles, Super Wide View achieves a viewing angle of greater than 170° and ensures that the colour fidelity of the display image is accurately represented when viewed from any direction. Kyocera's SWV technology aligns the liquid crystal cells in a horizontal direction so that the liquid crystal molecules rotate in parallel to the plane of the display panel instead of perpendicular to it.

Ginsbury Electronics
www.ginsbury.co.uk

element14 adds image and video capture with Raspberry Pi eye accessory

The eagerly anticipated Raspberry Pi camera board launched by element14 enables pictures and video to be taken with the Raspberry Pi which can be used for security and VoIP projects as well as image and video capture.



One of a strong pipeline of exclusive Raspberry Pi accessories to be launched this year, the camera board is available through Newark element14 and MCM in North America,

Farnell element14 in Europe, CPC in the UK and Ireland and element14 in Asia Pacific. The Camera board is a custom designed add-on for the Raspberry Pi which attaches to one of the small sockets on the board's upper surface. This Interface uses the dedicated CSI interface, designed especially for interfacing to cameras. The camera board has a 5 megapixel native resolution sensor capable of taking 2592×1944 pixel static images but can also record 1080p30, 720p60 and 640x480p60/90 video.

element14
www.element14.com

Avnet Supply Chain Solutions launches RaBET Tool in Europe

Avnet Supply Chain Solutions has launched the Rapid Benefit Estimation Tool (RaBET) for European customers looking to reduce their supply chain costs. This free, supply chain diagnostic tool enables customers to model the potential benefits and savings they will experience by adding Avnet as their supply chain partner. With the input of just a few data points, RaBET can swiftly calculate customer cost benefits and savings by integrating Avnet into their supply chain. Users can easily compare their current supply chain expense allocation based on factors including: working capital, purchasing, warehousing, receiving, production, finance, operations and transportation.



Avnet
www.avnet.com

EBV Elektronik releases the 'SoCrates' board

Aimed at Altera's NewSoC families, the 'SoCrates' development board from EBV Elektronik simplifies the integration and design convergence towards FPGAs. Altera SoC's incorporate ARM technology, bringing very powerful solutions for applications that need very fast data processing. Besides the typical FPGA solutions, theSoC is proving of great interest for applications that use FPGAs and Microcontrollers on two separate chips. EBV has designed the 10cm diameter circular board with the specific need of customers in mind. The main part of the SoCrates board is the SoC. It also offers drivers for Gigabit Ethernet, USB and CAN and a lot of general-purpose I/Os, plus a TFT Interface and a camera input. You can run a Linux operating system on this board and build an embedded controller for graphical user interfaces. Another application is to encode the pictures from the camera input and build a video-over-IP reference design.

EBV Elektronik
www.ebv.com/socrates

Designing with circuit protection at the forethought

By Bharat Shenoy

“SMALLER, FASTER, PRETTIER” – these are the main criteria for today’s electronics. A profitable lead for manufacturers, but also quite challenging for design engineers, that have to fit everything together in a much smaller environment.

Put safety on top of these requirements and the story is getting even more complex. Complex for both designers and manufactures and ultimately relevant for the end customers, who expect their products to be not only fully functional, but also safe.

Imagine the following scenario: morning, jogging, wet weather... running shoes, ho-siery, and nylon shirt. Taken together, for a brief moment, they can generate an electrostatic discharge (ESD) of 30,000V - a potential cardiac arrest for the smartphone or any other handheld device that plays your favourite music. Yet, problems associated with over-voltage and over-current still remain an afterthought for most engineers. Why? Because, with their duties expanding and with design cycles compressing, most engineers relegate circuit protection to the end of the to-do list. “Faster” is the word of the day!

These days, engineers have to get the form factor done, get the software done, get the prototype built, and prove out the concept. Only then, if at all, will they have time to think about circuit protection.

The unfortunate result of leaving such matters to the last minute is that design functionality suffers. With devices getting smaller and smaller, and so many parts having to fit together, engineers can’t find room anymore for circuit protection devices on their printed circuit boards. The result: they end up re-spinning the boards and losing valuable development time, time that could have been saved, had they thought about circuit protection from the very beginning. To make things worse, many times engineers do think of circuit protection, however they hurry up choosing whatever solution is at hand and the wrong protection device, resulting in functional failures, poor reliability, safety

Bharat Shenoy is Director of Technical Marketing in the Electronics Business Unit of Littelfuse - www.littelfuse.com

issues, shock, or even fire.

Considering circuit protection too late in the project can really have some serious repercussions for any design engineer. One such scenario would be to put yourself in a situation where the space is not available for your ESD device. Or, even worse perhaps, you end up settling for a non-optimal location, where the device won’t function the way it’s supposed to. To avoid these scenarios, the best time to start thinking about such matters is

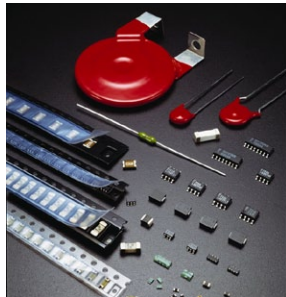
after the very moment you’ve picked out the chip set and begun laying out the circuit board.

Fuses are simple, everybody understands them, but over-voltage may not be so obvious, and people might not realize the consequences. Take lightning, for instance: people understand

lightning but they may not know it travels across the ground and can create huge glitches in power lines a mile away. And this is just one example for why, knowing and understanding the possible threats is so important.

To accurately predict a product’s circuit protection needs, the design engineer must first be able to imagine how it will be used. Once the designer understands the environment, he or she can begin making accommodations. Understanding the target environment of the product and the possible threats that might come up with that location will be crucial in selecting the right circuit protection solution.

Standards determine the design of every product, all the way down to the circuit protection. Design engineers have the duty to be aware of all relevant standards before even commencing the project. Just like the components themselves, knowing and understanding the regulations that govern certain products locally or internationally, has to be part of the very first design phase as well. Industry whitepapers, product specs, and case studies are always helpful to as a source of information and education but also as examples of what worked in certain situations, possibly similar to yours. Littelfuse, for example, offers its speed2design site, which is geared toward helping time-challenged designers find circuit protection solutions.



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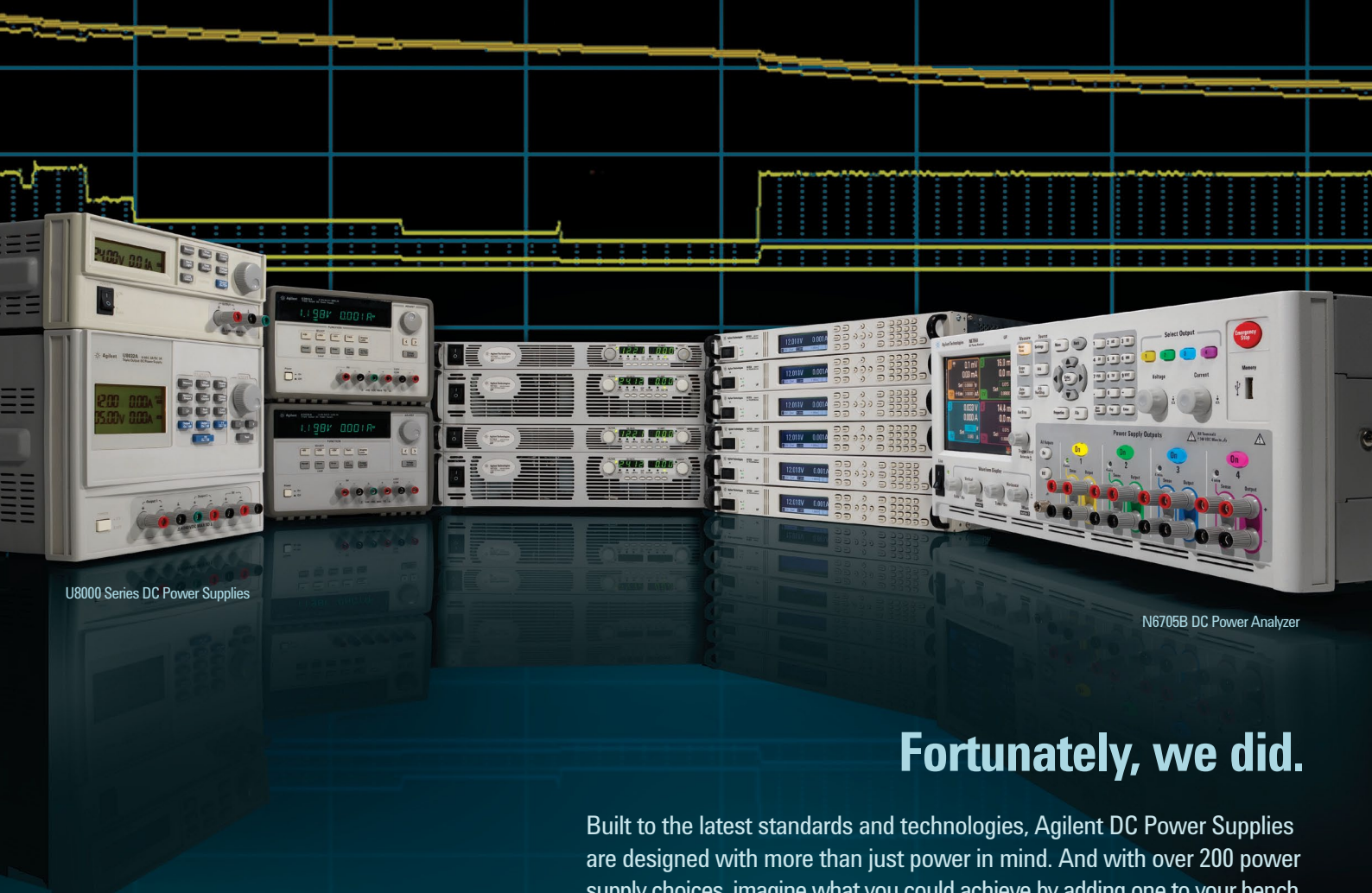
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