



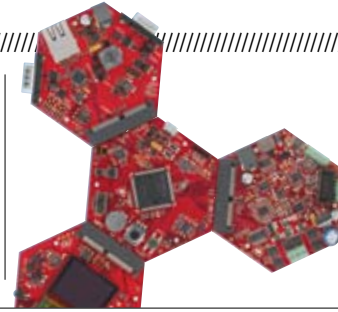
■ **XMC4000 Microcontroller**  
„A true all-rounder for industry“

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ICs and switches with galvanic isolation

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■ **Hexagon Application Kit**  
Versatile development platform for XMC4000

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## MEGATRENDS

### Strong solutions for global challenges

The world's population is spiraling. More and more megacities with populations of 10 million and more are forming. Rising living standards, above all in emerging economies, are fuelling an increase in energy consumption. Yet the earth's energy resources are limited. And so new solutions are



needed to meet the challenges of these global megatrends. „Energy conservation is key to meeting the world's rising power needs,” explains Peter Bauer, CEO of Infineon AG. „Which is why Infineon is focused on energy efficiency, mobility and security.” Semiconductor technologies from Infineon are already making industry, transport and everyday activities more secure and efficient.

## TICKER

### Bright prospects for semiconductor market

**Outperforming the market:** In fiscal 2011, Infineon grew 14% relative to the previous year. Excluding memory chips and microprocessors, the semiconductor market expanded by only 3%.

**Stable market:** Experts predict that demand for industry microcontrollers will grow by an impressive 7% every year through 2014.

# Tailored to industrial applications

// **New XMC4000 family with ARM® Cortex™-M4 processor**



Infineon presents XMC4000 family with ARM® processor

## ■ INDUSTRY

Infineon will be unveiling its new 32-bit XMC4000 microcontroller family to the general public at the Embedded World 2012 fair. The microcontroller units (MCUs) with ARM® Cortex™ M4 processors were custom-developed for industrial environments and are extremely versatile – as the name XMC (cross-market microcontroller) suggests. The controllers are optimized for industrial motor control, manufacturing and building automation, renewable energy, logistics, and medical applications. „The

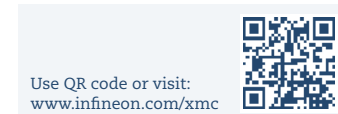
XMC4000 family increases energy efficiency, supports a wide range of communications standards and simplifies software development,” says Dr. Stephan Zizala, Senior Director, Industrial and Multimarket Microcontrollers.

The new MCUs are built on an advanced CPU subsystem delivering 80 - 180 MHz performance at temperatures of up to 125 degrees Celsius. They also offer outstanding DSP functionality, a floating point unit and fast flash memory with an access time of just 22 nanoseconds. The extensive range of peripherals includes four 12-bit

AD converters, delta-sigma demodulators and timer modules as well as Ethernet, USB 2.0, CAN and SD/MMC interfaces. „We've channeled over thirty years of development expertise into the XMC4000 family, also leveraging the benefits of a widely used processor architecture,” confirms Zizala. Infineon's free DAVE™ 3 tool ensures quick and easy software development, giving engineers intuitive access to full microcontroller functionality with minimum programming effort.

The XMC4500 series is the first member of the XMC4000 fam-

ily launched by Infineon. It features a 120 MHz CPU, 1 Mbyte embedded flash memory and 160 Kbyte RAM. Samples are available now. This device will go into series production mid-May 2012. Depending on the variant and type of housing, the price for 10,000 microcontrollers will be between one and seven euros.



Use QR code or visit:  
[www.infineon.com/xmc](http://www.infineon.com/xmc)

# Fast and simple

// **User-friendly software development with the DAVE™ 3 toolset**

## ■ INDUSTRY

**Software development is the most labor-intensive process in embedded system design.** The software for these systems is becoming increasingly complex – at a rate that even outpaces Moore's Law. Infineon's free development environment, DAVE™ 3 (Digital Application Virtual Engineer), was created to simplify programming and reduce development times. This Eclipse-based platform

makes it easy for engineers to develop application software that exposes the full potential of Infineon's powerful hardware.

DAVE™ 3 includes a GNU compiler, a debugger and data visualization utilities. Other commonly used compilers and debuggers can be easily added to this development environment. The platform is built around the DAVE™ apps manager. Using predefined, tested apps, DAVE™ also supports au-

tomatic code generation. Alternatively, developers are free to integrate their own apps.

Apps can be easily configured using the graphical user interface and adapted to the widest range of applications. Examples include peripheral drivers based on PWM, SPI, CAN or ADC, middleware components such as TCP/IP, USB, file systems or graphical user interfaces, application abstractions for motor control or automation, and even fully configurable em-

bedded applications.

To further facilitate XMC4000 designs, Infineon collaborates with over 20 other providers of complementary development tools, software solutions, training and consulting services.



## INFINEON'S FOCUS

### Quality and cutting-edge technologies

From cars to robots; from industrial motors to solar inverters – Infineon microcontrollers are used across the widest range of applications. Almost every second new car, for example, has a TriCore™ controller in its engine or powertrain system. „We have a strong reputation for premium quality among automotive manufacturers and – in general – for our cutting-edge technologies such as embedded flash memory,” states Peter Schäfer.



**Peter Schäfer**  
Vice President and General Manager, Microcontrollers

The Munich-based semiconductor giant is also a global leader in the industrial microcontroller sector, both in terms of market share and technology. „The new XMC4000 family is the perfect complement to Infineon's microcontroller offering, slotting neatly between the established 16-bit XE166 devices and the 32-bit TriCore™ platform,” explains Schäfer. Industrial and automotive applications offer huge potential. Together, they account for over half the global market for microcontrollers.

## AUTOMOTIVE

### Chips lower energy consumption

Cars have to become more efficient. This applies to electric and hybrid vehicles just as much as it does to gas and diesel engines. Lower consumption means lower emissions, or – in the case of electric cars – longer driving distances because the batteries last longer. Infineon's chips are making a valuable contribution to sustainable mobility through innovations such as the TLE9267QX system basic chip for partial networking and the powerful AUDDO MAX microcontroller family for energy-efficient drivetrain.

→ PAGE 2



**Innovative products:** Infineon is ideally placed to capitalize on the growing market for industry applications with innovative products such as the XMC4000 microcontrollers.



# Hitex evaluation board for XMC4000

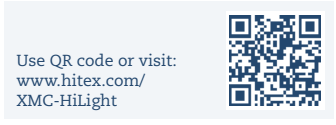


■ ALL-IN-ONE

To coincide with the recent launch of Infineon's XMC4000 architecture based on the ARM® Cortex™-M4 Hitex Development Tools GmbH has in-

troduced a compact, all-in-one evaluation board, the XMC-HiLight. This new Hitex tool bundles a wide range of functions on a single board, including communication (WLAN, LAN, USB), touch-sensitive slide sig-

nal control, LED matrix control, RGB and A/D conversion. The board has been designed as an add-on to Infineon's Hexagon Application Kit and is therefore compatible with DAVE™ apps. XMC-HiLight has direct interfaces to Hexagon's human-machine interface (HMI) and actuator (ACT) satellite cards. Developers can easily add their own hardware extensions using an optional prototype board that attaches to XMC-HiLight. Various assembly options are available, enabling distributors to easily create OEM variants for training and promotion campaigns.



Use QR code or visit:  
www.hitex.com/  
XMC-HiLight

# Raising efficiency levels

// AUDIO MAX family boosts performance in new automotive applications

■ AUTOMOTIVE

Microcontrollers are built into every modern vehicle. They regulate the engine, cut fuel consumption and CO<sub>2</sub> emissions, and increase safety. Yet the performance requirements for MCUs are continually increasing. Infineon's AUDIO MAX family delivers the computing horsepower these parts need. Built on the TriCore™ architecture, AUDIO MAX delivers around 52 percent more performance than its predecessor, AUDIO Future, with clock frequencies of up to 300 MHz in 90 nanometer technology. This makes AUDIO MAX a powerful core for future motor control generations. The proven asymmetrical single-core architecture comprising a main processor and peripheral control processor (PCP) also minimizes development costs. "Switching an application from a single to a dual-core architecture means a lot of

software development effort for our customers," explains Product Manager Günter Hank. The AUDIO MAX family also meets rising demands for data and operating reliability with ASIL (Automotive Safety In-

tegrity Level) certification. The controller's GPTA module enables up to four electric motors to be controlled at the same time, making this solution also ideal for motor control in electric or hybrid cars.



# »A true all-rounder for industry«

// Interview with Dr. Stephan Zizala



**Dr. Stephan Zizala**  
Senior Director, Industrial & Multimarket Microcontrollers, extols the virtues of the XMC4000 family

■ INTERVIEW

**MC-News:**  
Where does the XMC family fit into Infineon's MCU portfolio?  
**Dr. Stephan Zizala:**  
The XMCs close the performance gap between the XE166 family and TriCore™. We are offering our customers more choice, enabling them to find the right controller for their specific applications.

**MC:** The new microcontrollers are dedicated to industrial applications. What makes them so special?  
**SZ:** We have looked very closely at what our customers in the industrial sector expect. With optimized peripherals, communication interfaces and a high temperature range up to 125 degrees Celsius, the new



controller is a true all-rounder. From automation through electric drive control to solar inverters, it is the perfect fit for the widest range of industrial applications.  
**MC:** Why did Infineon chose the ARM® architecture for the XMC family?  
**SZ:** With its DSP functionality and floating point unit, the ARM® Cortex™ M4 processor meets the performance requirements of our industrial target markets. ARM® is a widely used architecture with an extensive ecosystem. This is a particular plus for developers as many of them are already familiar with

the ARM® core. It also comes with a large range of third-party software and tools.  
**MC:** How does DAVE™ 3 simplify software development?  
**SZ:** DAVE™ 3 is a free, Eclipse-based software development environment that provides a free GNU compiler and debugger. Developers can use it with their own commercial tools. DAVE™ 3 also supports automatic code generation using a graphical interface and predefined, tested DAVE™ apps. This really simplifies the development process, saving both time and money.

**MC:** What's next in the development pipeline at Infineon?  
**SZ:** Over the coming months, we will be launching further DAVE™ apps and development kits. We are also continually expanding DAVE™ functionality. In the fourth quarter of 2012, we will be releasing a low-end XMC4000 series. At the same time, we are working flat out on the XMC4700 series at the high end of the spectrum. We will be channeling feedback from our customers at Embedded World into our development work here.

FAST PROTOTYPING

# Infineon XMC application kit

The Hexagon Application Kit is a versatile new tool for the XMC4000 family. At the heart of this development platform is the CPU board with the new XMC4500 microcontroller. Kit functionality can be expanded to suit specific applications by means of satellite cards. The actuator satellite, for example, provides an extensive range of motor control functions thanks to its resolver circuit, encoder interface and shunt current sensing. The human-machine interface (HMI) board comes with an OLED display plus audio, touch and SD/MMC functions. The communication satellite enables developers to implement remote control via Ethernet. This board also supports MultiCAN and RS485 interfaces. In addition to these three satellites, developers can

also connect their own boards.  
» Easily adapt the hardware to individual application requirements. «

Thanks to its extensive functionality and easy expandability, the Hexagon Application Kit is the ideal platform for developers interested in evaluating XMC microcontrollers and quickly creating prototypes.





# Intelligent safety concept

// PRO-SIL™ concept simplifies the development of safety-relevant systems

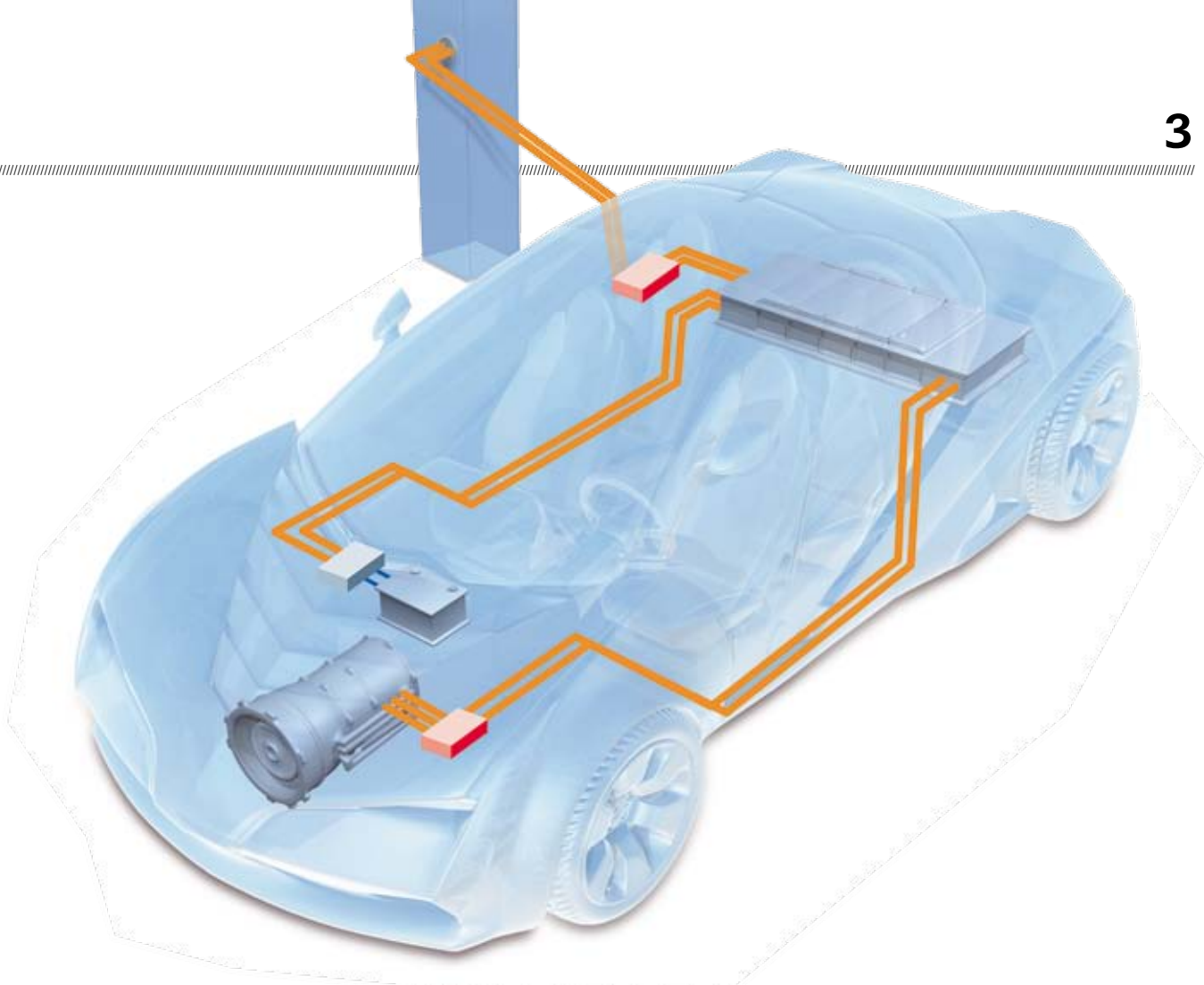
## ■ SAFE SYSTEMS

**Electronic systems should never fail.** This is especially true of safety-relevant systems in automotive and industrial applications. ISO and IEC (Automotive) Safety Integrity Level (ASIL/SIL) standards define the exact criteria these systems have to meet.

"Infineon has extensive experience in developing safety-relevant systems for the automotive sector. We have channeled this experience into our PRO-SIL™ products, making sure they are a perfect match for industry requirements," explains Ralf Ködel, Product Manager for Automotive Microcontrollers. The Infineon Safety Computing platform was designed to

maximize scalability, reduce costs and keep complexity to a minimum. It is based on Infineon's 32-bit TriCore™ controller or its 16-bit XC2300 microcontroller and includes the SafeT-core software library and the CIC61508 watchdog chip. "By ensuring that this solution supports all safety requirements defined in IEC 61508/ISO 26262, we reduce development effort for our customers and speed up their time to market," states Ködel. ■

Use QR code or visit:  
[www.infineon.com/sil](http://www.infineon.com/sil)



## MULTICORE ARCHITECTURE

### More core, more power

**Microcontrollers are managing more and more functionality in modern cars.** To meet the growing performance demands of today's microcontrollers, Infineon has launched a new multicore architecture that will form the basis for next-generation designs.

In the new architecture, three processor cores based on the TriCore™ series share the computing load – a move sets another benchmark for real-time performance in automotive applications. Multiple program Flash modules with indepen-

dent read interfaces boost real-time performance even further. The new architecture also features a powerful timer module that relieves the CPU as well as new AD converters and delta sigma converters that deliver high accuracy levels and high sampling rates.

However, performance is not the only success factor here. Tomorrow's architectures also have to be as energy efficient as possible. Which is why the new design also supports low-power modes that reduce standby power consumption. ■

// AUDO MAX enables complex motor control in electric cars

## ■ AUTOMOTIVE

**Electric and hybrid cars require complex motor control systems.** Infineon's 32-bit AUDO MAX family now includes the hardware and software required to control several electric motors simultaneously. Permanent magnetic synchronous motors (PMSM) in electric vehicles typically work with three-phase, sinusoidal cur-

rents. These currents generate a magnetic field that sets the motor in motion. The field oriented control (FOC) algorithm in the microcontroller regulates the pulse width modulation (PWM) pattern that controls the power supply to the motor. "Efficient FOC systems that utilize powerful microcontrollers are vital to design safe, high-efficiency drive systems in electric and hybrid vehicles," explains

Product Manager Thomas Hafner. The GPTA module in AUDO MAX microcontrollers can be used to generate any complex PWM pattern, including asymmetrical dead-time generation and individual patterns. The CCU6 peripheral module is a simple solution supporting center- and edge-aligned PWMs. AUDO MAX controllers are particularly suited to motor control

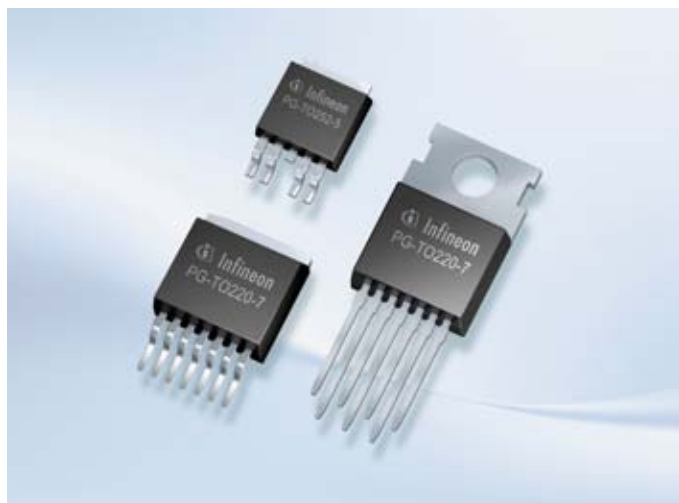
thanks to their asymmetrical architecture with a TriCore™ CPU and fast peripheral control processor (PCP). These powerful MCUs can even be used to control PMSM and BLDC motors simultaneously. Infineon's AUDO MAX family greatly increases drivetrain efficiency and lowers energy consumption in the transport sector. ■

# Switching high currents safely

// PROFET™ provides protective functions for automotive and industrial

## ■ AUTOMOTIVE

**PTC ceramics are becoming increasingly popular in the automotive sector.** They are used, for example, as self-regulating heating elements in seat and auxiliary heating systems and for pre-heating diesel engines. Yet these components require a special switch. "Low cold resistance leads to extreme inrush currents," explains Technical Marketing Manager Alexander Schmidt. "And that can result in dangerous short circuits. A powerful electronic control mechanism is therefore crucial – also for safety reasons." Protected high-current PROFET™ (PROtected FET) high-side switches from Infineon meet all the protection challenges of PTC heating elements. High-current PROFET™ switches comprise a DMOS power transistor and a CMOS logic cir-



cuit, delivering extensive protective functionality for a wide variety of applications in the automotive and industrial sectors, including overvoltage and overtemperature protection. These high-side switches are robust and capable of resisting even repeated short circuits. They also feature highly ac-

curate diagnostic functions for measuring current. Low cost, small footprint and easy integration are further key benefits for the automotive industry. ■



# Efficient ECUs

// Optimized electronics cut power consumption in cars by up to 30 %

## ■ EFFICIENCY

**Today's cars face a number of challenges. They have to increase safety and comfort levels while keeping fuel consumption to a minimum.** Nowadays, a single car contains over 50 electronic control units (ECUs). These components control a host of safety, assistance and comfort functions. They are also a continuous drain on power from the car's electrical system and thus increase energy consumption while the car is in use.

Optimizing ECUs can cut power consumption by up to 30 percent. This is because ECUs are only required in specific situations. As a result, they can be deactivated whenever they are not needed. The rear view camera, for example, can simply be deactivated when the car is driving forwards.

When they are needed, however, the ECUs have to be immediately available and fully functional. This rapid transition from energy-saving sleep

mode to full power is managed by the bus on the CAN partial network. A group of European car makers and semiconductor manufacturers are advancing the energy efficiency of this technology and have already taken the first steps toward ISO standardization. Infineon is also part of this initiative. At the heart of each partial network is a system basic chip (SBC) such as Infineon's TLE9267QX. The chip's integrated partial networking function enables it to trigger the rapid transition from sleep to active

mode. However, it does face one major challenge: Despite consuming only a small amount of energy, the SBC must reliably identify wake-up calls for ECUs and efficiently ensure they are powered up. Infineon's TLE9267QX delivers exactly these capabilities. Samples of the chip are already available. Further pin- and software-compatible versions of TLE9267QX will round off this generation of the family. The first series cars with efficient CAN partial networks will on the road from 2014 on. ■





## GETTING IN TOUCH

### Student Day

March 1 is Student Day at Embedded World 2012. This event gives up-and-coming engineers a unique opportunity to find out more about the latest products in the embedded systems sector and to network with embedded companies.



Infineon is also taking part in Student Day. "We want to meet young people with a passion for technology and show them our latest products. We will be providing information on different graduate opportunities and career paths at our human resources stand in the foyer of Embedded World 2012. We will also be giving away microcontroller kits so students can try out Infineon technology first hand and get to know our products in more detail," explains Rainer Schmidt-Rudloff, HR Manager at Infineon.

Use QR code or visit:  
[www.infineon.com/careers](http://www.infineon.com/careers)



Register now for the XMC Student Design Contest:  
[www.infineon.com/student-design-contest](http://www.infineon.com/student-design-contest)



## DESIGN:LINK

### Latest product news

Infineon's online customer magazine Design:Link is packed full of in-depth news, product descriptions and data-



sheets. Published in eight languages, it gives readers invaluable design tips based on the latest innovations from Infineon. The magazine is clearly structured into power semiconductors, high power, R&F protection devices, microcontrollers, automotive power, sensors, wireless control and wireless communication sections. Detailed articles explain the exact functionality and target applications of the featured products. Subscribers to the Design:Link newsletter also receive product e-mailers, six to eight times a year.

Use QR code or visit:  
[www.infineon-designlink.com](http://www.infineon-designlink.com)



# »Opportunity to network and share views«

## // Interview about social media initiatives

### ■ INTERVIEW

David Chang, student employee, explains how Infineon's new microcontroller forum and microcontroller Facebook page help customers stay up to speed, network with peers and get technical support.

#### MC-News:

Why did Infineon start the forum?

David Chang:

We wanted to create a community for our customers that focuses solely on Infineon microcontrollers. Users can share their experiences and ideas in the forum. They can also help each other with technical issues and contact Infineon experts directly if they need help solving more complex problems.

MC: Who can register on the site?

DC: The forum is aimed at smaller customers, developers and students. However, anyone interested in microcontrollers can register, regardless of whether they want to just read the discussions or contribute to the threads.

» We want to promote direct dialog with customers and stakeholders. «

MC: Does Infineon provide support?

DC: Our field application engineers regularly monitor the

forum – these experts are ideally placed to provide in-depth technical support.

MC: What was the idea behind the Facebook page?

DC: We want to promote direct dialog with customers and stakeholders and reach these groups via the information channels they typically use. Everyone who clicks "like", for example, is signing up for our info feed. This is a very useful way of getting information on a specific topic to a particular target group because it creates a direct and immediately accessible line of communication between both parties. Many students and young engineers use Facebook. We can use this social platform to reach them directly. And so first and foremost, the Facebook page is a

push channel for information on Infineon's microcontroller products.

MC: What will users find on the page?

DC: Primarily, our Facebook page gives stakeholders the chance to network and send us their feedback. We also regularly post news items and videos about microcontrollers and other technical highlights.

Forum:  
[www.infineonforums.com](http://www.infineonforums.com)



Infineon microcontrollers on Facebook:  
[www.facebook.com/infineon.microcontroller](http://www.facebook.com/infineon.microcontroller)



## DISTRIBUTION PARTNERS

Infineon maintains a dense global network of distribution partners, giving small and medium-sized companies easy access to its products.

**Infineon's partners at Embedded World 2012:**

- EBV: Hall 4/4-535
- Arrow: Hall 4A/4A-206
- Rutronik: Hall 1/1-318
- Silica: Hall 1/1-334



## SPEAKER SLOTS

Infineon experts live at Embedded World 2012

**TUESDAY, FEBRUARY 28**

**Session 1:** Smart grid / smart metering – 3.00 p.m.-3.30 p.m.: General purpose microcontrollers ready for delta sigma modulators

**WEDNESDAY, FEBRUARY 29**

**Session 5:** Cryptography and embedded security - Session I – 11.30 a.m.-12.00 p.m.: Advanced trusted computing technology for the security and privacy requirements of smart grids

**THURSDAY, MARCH 1**

**Session 20:** Embedded systems applications I – 12.00 p.m.-12.30 p.m.: Energy saving in automotive E/E architectures - Radical or smooth approach? **Session 20:** Embedded system applications II – 2.00 p.m.-2.30 p.m.: Parallel sampling of multiple signals for energy-efficient motor control

# ISOFACE™ system ICs with integrated galvanic isolation

## ■ INTELLIGENT PROTECTION



One of the major challenges facing industry automation systems is the robust isolation they require between the 3.3V/5V control side, where the microcontrollers and ASICs work, and the 24V production side. Infineon ISOFACE™ 8-channel high-side switches and 8-channel input ICs provide the robust galvanic isolation these systems need. The ISOFACE™ family combines digital input ICs or robust output switches with an intelligent, galvanically isolated ASIC interface and microcontroller. This integrated design keeps



the number of components required to develop a complete system solution to a minimum. ISOFACE™ products are isolated using silicon technology, enabling them to work continuously in temperatures

ranging from minus 25 to plus 135 degrees Celsius. The robust system layout plus diagnostic feedback from ISOFACE™ products improves system safety and supports system maintenance.

## IMPRESSUM



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