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New EX 423 Evacuated Miniature Crystal Oscillator for Critical Timing in Low- and Battery-Powered Applications

Ruggedized in an ultra-high vacuum for enhanced thermal insulation, the EX-423 delivers stability and RF performance

Microchip Technology announced the EX-423 Evacuated Miniature Crystal Oscillator (EMXO), a compact, low-power timing solution designed for applications that demand high stability, accuracy and long-term reliability. Building on the company's EX-421 portfolio, the EX-423 delivers high RF performance in a low-profile 13 mm x 13 mm package for space- and power-constrained designs.

Ruggedized for demanding environments, the EX-423 is sealed in an ultra-high vacuum designed to provide optimal thermal insulation and help improve frequency stability. Its quartz crystal uses a four-point mount to enhance shock survivability and reduce g-sensitivity, making it well suited for GPS/GNSS tracking, military radios, medical devices, Ocean Bottom Node (OBN) seismic systems, test and measurement equipment and satellite communications.

The EX-423 combines ultra-low phase noise with tight temperature control, strong short-term stability (Allan deviation), fast warm-up, and long-term frequency stability. Operating over a standard 10–20 MHz frequency range, the device consumes 1W during warm-up and as little as 0.2W at +25 °C in steady state, helping extend battery life while maintaining a clean, stable reference under specified operating conditions.

Microchip offers an extensive portfolio of clock and timing systems from miniature component oscillators to small plug-in timing server cards to multi-rack time scale systems. Recognized as a contributor to the world's time, Microchip's timing solutions are trusted, reliable and resilient. For more information, visit Microchip's Clock and Timing Systems web page.

Comments

"When developing the EX-423, we focused on the key parameters designers use to evaluate high-performance reference oscillators," ***said Randy Brudzinski, corporate vice president of Microchip's frequency and time systems business unit.*** *"Delivering this level of performance in a rugged, small footprint helps customers simplify designs without compromising timing accuracy."*

- **Microchip Technology**
  www.microchip.com

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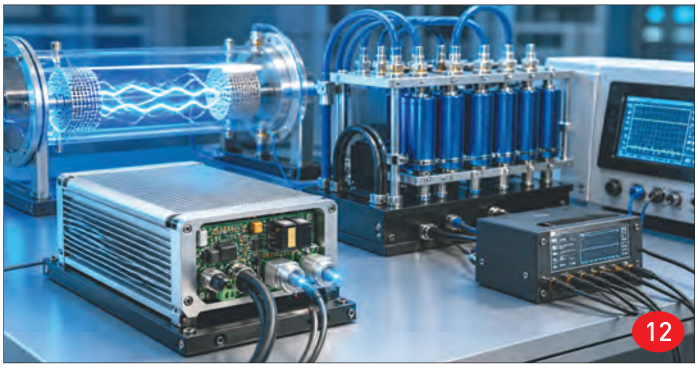

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Hardware-Anchored Security, Simplified Integration

Turnkey Security Infrastructures Aligned With CRA Requirements

As connected systems grow more complex, managing device security for the entire lifecycle is as critical as protection during manufacturing and deployment. Microchip's TA101 secure authentication IC is now available in two platforms—TA101-TFLX (TrustFLEX) and TA101-TMNG (TrustMANAGER)—that simplify adoption of regulatory-aligned security.

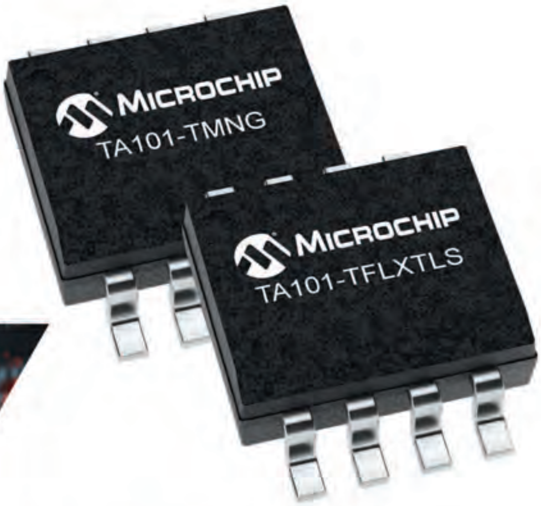
Designed for industrial, automotive, SDV and IoT applications, these solutions provide hardware-accelerated cryptography, including ECC P-521, Ed25519 and RSA-4K, alongside CRA- and IEC 62443-aligned security controls.

TA101-TFLX provides secure key storage and predefined, configurable use cases such as secure boot, device authentication and trusted communications, ideal for teams integrating the TA101 into their own PKI.

TA101-TMNG extends lifecycle control through cloud-managed services via keySTREAM SaaS, supporting remote configuration, credential provisioning, certificate rotation, ownership transfer and authenticated firmware updates eliminating the need for an in-house PKI or lifecycle infrastructure.

Key Features

- CRA-aligned device lifecycle security
- Hardware-anchored secure key storage
- Streamlined onboarding with auto-claim provisioning
- Remote key, certificate and firmware management
- Predefined and customizable security configurations
- Host-agnostic design compatible with any MCU or MPU



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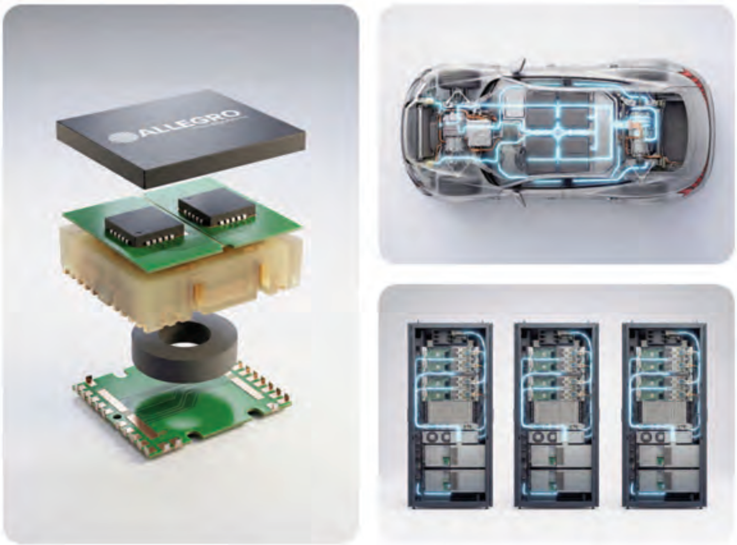


Allegro MicroSystems Optimizes Switching Performance in SiC and GaN Power Designs

At PCIM 2026, Allegro MicroSystems, Inc., a global leader in power and sensing solutions for motion control and energy-efficient systems, will demonstrate how power designers can unlock the full switching potential of wide bandgap (WBG) devices without the complexity and overhead of legacy architectures.

While SiC and GaN devices support high-frequency switching, they frequently encounter system-level limitations – from bulky external bias supplies to slow protection loops – that impede optimal performance. Allegro will show how integration of sensing and gate driving removes these constraints to enable faster switching, improved efficiency and higher power density in applications like AI data centers and 800V electric vehicle (EV) architectures.

What to expect at the booth:

- **Live Demonstrations**: of Allegro's Power-Thru™ gate drivers, eliminating the need for external isolated bias supplies and simplifying multi-level designs
- **Active Gate Drive Voltage Control**: in action, enabling real-time optimization of SiC switching behavior via SPI
- **High-Bandwidth Current Sensing**: up to 10 MHz for fast transient detection and protection
- **Ecosystem Demos**: with partners including Coilcraft and Innoscience that illustrate real-world implementations

*"The industry has built the equivalent of an unrestricted Autobahn for power electronics using WBG materials, but legacy gate drivers and sensors are holding back performance," **said Ram Sathappan, Vice President of Global Marketing and Applications at Allegro**. "At PCIM, we are showing how Allegro's high-bandwidth current sensors and isolated gate drivers can eliminate today's speed limits on the power conversion freeway."*

Together, these demonstrations show how reducing design complexity enables engineers to operate WBG systems closer to their theoretical performance limits – translating directly into efficiency gains and higher system density.

■ **Allegro MicroSystems** | www.allegromicro.com

Powered by Silicon Labs, Comminent Ships 500,000 Wi-SUN Modules

Comminent®, an innovator in next-generation IoT communication network platforms, and Silicon Labs, the leading innovator in low-power wireless, today announced a major milestone for India's smart grid infrastructure with the successful shipment of over 500,000 Wi-SUN-compliant communication modules powered by Silicon Labs' EFR32FG28 Wireless SoC.

Scaling Wi-SUN for India's Smart Grid Modernization

India's Revamped Distribution Sector Scheme (RDSS) is driving one of the world's largest infrastructure transformations. To support this ambitious smart meter rollout, the Bureau of Indian Standards (BIS) officially adopted the global Wi-SUN Field Area Network (FAN) specification (IEEE 2857-2021 and ISO/IEC/IEEE 32857:2026) as the national standard (IS 18010) for smart meter RF communication networks. This standardization ensures secure, interoperable wireless mesh networks for large-scale Advanced Metering Infrastructure (AMI), smart cities, and IoT applications.

Solving Complex Deployment Challenges at Scale

Comminent's deep focus on solving India's complex deployment challenges is central to delivering scalable and reliable rollouts. As utilities move closer to real-time monitoring and grid resilience, interoperable and self-healing networks like Wi-SUN are functioning as the primary infrastructure for large-scale deployment.

Dual-Band EFR32FG28 Wireless SoC Enables Secure, Interoperable RF Mesh Networking for India's Smart Energy Meter Rollout

Built on the EFR32FG28 Wireless SoC for Resilient, Utility-Grade Connectivity

To meet these demands, Comminent's communication module is powered by Silicon Labs' EFR32FG28 Wireless SoC, architected specifically for large-scale smart grid and industrial IoT applications. The EFR32FG28 platform enables reliable, long-range connectivity in demanding field environments, offering key advantages including:

- **Optimized Dual-Band Connectivity**: Combines a high-performance, long-range Sub-GHz radio optimized for India's RF environment with a 2.4 GHz Bluetooth LE radio for increased design flexibility.
- **Resilient Processing & Infrastructure**: Features a high-performance multi-core architecture with dedicated ARM cores for application processing, radio, and edge intelligence, complemented by ample memory to deliver robust mesh networking performance in dense urban and geographically distributed deployments.
- **Enterprise-Grade Security**: Powered by Silicon Labs' Secure Vault™ technology with PSA Level 3 certification, delivering secure key storage, anti-tamper capabilities, and advanced hardware cryptographic acceleration.

This combination enables utilities to deploy scalable, secure, and future-ready Wi-SUN networks capable of supporting millions of endpoints. With capabilities proven in India's large-scale deployments, Comminent is expanding into global smart grid markets, including the United States, Japan, and emerging energy-transition regions.

To learn more about how Silicon Labs is powering the next generation of smart grids, explore the EFR32FG28 Wireless SoC and our Wi-SUN solutions.

■ **Silicon Labs** | www.silabs.com

ETH WIZ 3 Click provides Ethernet connectivity with integrated dual-core processing and hardware TCP/IP networking

Add Ethernet connectivity with onboard processing for IoT gateways using the W55RP20 SiP

ETH WIZ 3 Click is a new Ethernet interface Click board™ from MIKROE, the embedded solutions company that dramatically cuts development time by providing innovative hardware and software products based on proven standards. The compact Click add-on boards enable developers to rapidly provide proof-of-concept, then prototype and code new embedded projects. ETH WIZ 3 Click provides Ethernet connectivity combined with onboard processing capabilities for embedded and IoT applications.

Nebojsa Matic, CEO of MIKROE: *"This new Click board is ideal for IoT gateways, industrial automation, smart devices, network-enabled controllers, and embedded systems requiring efficient and simplified Ethernet integration. It is part of our 188+ strong family of interface Click boards and over 873 projects – with working code – featuring the ETH WIZ 3 Click can be found on MIKROE's embedded projects platform, EmbeddedWiki."*

ETH WIZ 3 Click is based on the W55RP20 System-in-Package (SiP) from WIZNet, which integrates the industry-standard W5500 Ethernet controller with the powerful Raspberry Pi RP2040 dual-core microcontroller into a single solution. It features a hardwired TCP/IP stack supporting multiple network protocols, an integrated Ethernet PHY, a dual Arm Cortex-M0+ processor running at up to 133MHz, on-chip Flash and SRAM memory, selectable SPI or UART communication via a COMM SEL jumper, and a USB Type-C interface driven by the internal USB 2.0 controller. Additional functionality includes TCP activity indication, status LEDs for link diagnostics, exposed Ethernet magnetics centre taps for optional PoE implementation, and accessible debugging test points.

ETH WIZ 3 Click is a recent addition to MIKROE's 1970-strong mikroBUS™-enabled Click board family. The board also features the ClickID function which enables automatic identification by the host system, simplifying use. Devices can be used on any host system supporting the mikroBUS™ standard, and come with the mikroSDK open-source libraries, offering excellent flexibility for evaluation and customization.

■ **MIKROE** | www.mikroe.com

Murata Type 2FR Tri-Radio Module now available from Rutronik

Hostless Wi-Fi 6 + Bluetooth® LE 5.4 + IEEE 802.15.4 for industrial IoT and Matter applications

Rutronik expands its wireless portfolio with the Murata Type 2FR, a highly integrated tri-radio module based on the NXP RW612. The compact module combines dual-band Wi-Fi 6, Bluetooth® LE 5.4 and IEEE 802.15.4 in a hostless architecture with integrated Arm® Cortex®-M33 MCU and flash memory – ideal for industrial IoT edge devices, smart factory connectivity and Matter-enabled systems. The Type 2FR module is available at www.rutronik24.com.

The Murata Type 2FR integrates complete wireless connectivity for modern IoT and industrial applications into an ultra-compact LGA module measuring just 12.0 mm × 11.0 mm × 1.55 mm. It is based on the NXP RW612 wireless MCU featuring an integrated 260 MHz Arm® Cortex®-M33 processor, 1.2 MB SRAM and 16 MB flash memory. This enables the module to run applications in a hostless architecture, significantly reducing development effort and system complexity.

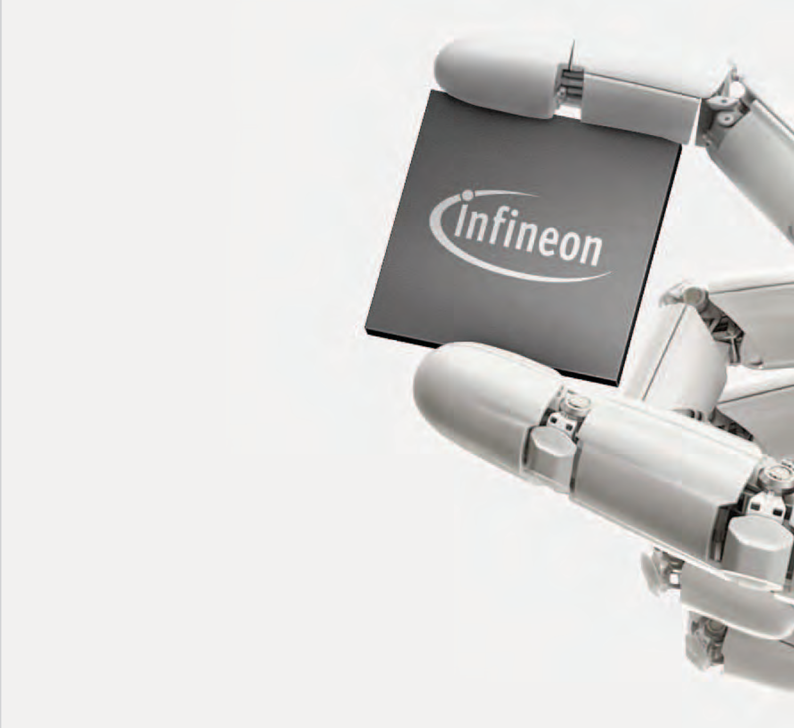
Tri-radio connectivity for industrial IoT and Matter applications

The tri-radio concept combines dual-band Wi-Fi 6 in the 2.4 GHz and 5 GHz bands, Bluetooth® LE 5.4 and IEEE 802.15.4, enabling simultaneous support for modern IoT protocols such as Matter over Wi-Fi, Thread and Ethernet. Thanks to its high interoperability, the module is particularly suitable for connected industrial and building automation systems.

In addition to wireless connectivity, the module provides a comprehensive peripheral and security concept. Up to 64 GPIOs are available alongside numerous interfaces including USB 2.0 OTG, Ethernet, SPI, I²C, UART, SDIO 3.0 and ADC/DAC functionality. Integrated security features such as NXP EdgeLock™, TrustZone-M, hardware root of trust and secure boot mechanisms support deployment in security-critical industrial and IoT applications.

With support for energy-efficient Wi-Fi 6, Bluetooth® LE Long Range and IEEE 802.15.4, the module is ideally suited for scalable and power-optimized edge designs. The extended operating temperature range from -40 °C to +85 °C also enables deployment in demanding industrial environments.

■ **Rutronik** | www.rutronik.com



Infineon Startup Challenge 2026 puts humanoid robotics in the spotlight

Infineon's Startup Challenge brings together promising founder teams and young high-tech companies from across the globe to work jointly on a highly relevant topic: humanoid robotics. The Challenge is a structured innovation program designed to develop technological concepts into market-ready applications. It is part of Infineon's global Co-Innovation Program, in which Infineon drives innovation together with startups as a technology and development partner.

Technological focus areas of the challenge

The 2026 Challenge is aimed at emerging technology companies working on solutions for humanoid robotics, particularly in the following areas:

- Artificial sensing: virtual skin and hand concepts based on advanced sensor technology
- Environmental and situational perception using camera, radar, microphone and sensor fusion solutions
- Virtual feedback and interaction mechanisms, for example using laser beam scanning projectors
- Innovative motor control and motion technologies for precise, dynamic operations

From application to industrial application

Ambitious startups can submit their ideas up until 27 May 2026. Following the application phase, an expert jury will conduct a multi-stage selection process. The teams selected will take part in a multi-month technology and development program, gain access to Infineon technologies, prototyping kits as well as hardware and software solutions and will participate in pitch events and workshops.

Additionally, the teams will receive technical support and mentoring for prototype development, as well as business and presentation training. The program concludes with demo and pitch sessions, where results are presented to an expert audience of industry representatives, deep-tech investors and decision-makers.

Strong partner network and expert jury

The program is being implemented together with a network of technology, industry and financing partners. The jury combines deep technological expertise with entrepreneurial and strategic investment know-how. A key component of the Challenge is direct interaction with investors and financing partners from the deep-tech and innovation ecosystem. The goal is to make promising technologies visible at an early stage and support them during growth and scaling.

The program is supported within the framework of the Important Project of Common European Interest (IPCEI) for microelectronics and computer technology, which promotes the development of European innovation ecosystems, and other sources.

Further information and participation links: Applications are open until 27 May 2026. www.infineon.com/SUC

- **Infineon Technologies** | www.infineon.com

Melexis Integrates On-Chip DC/DC Power to Simplify LIN RGB Automotive Lighting

Melexis announces the MLX81119, an 18-channel LIN RGB LED controller with an integrated DC/DC converter, designed to simplify and optimize automotive lighting systems. By generating the LED supply voltage locally on chip, the MLX81119 significantly reduces power dissipation, external components and space requirements in increasingly dense vehicle applications such as door panels, dashboards and charge port lighting.

Lighting has become a key element of modern automotive design. Across both interior and exterior domains, OEMs are increasing the number of lighting deployments to support new functionality, personalization, and brand differentiation. However, physical, efficiency, and thermal constraints are becoming more severe as more electronics are deployed deeper within the vehicle. In conventional architecture, supplying LEDs via external DC/DC converters increases heat generation, component count, and layout complexity, making it harder to meet these constraints at scale.

Integrated DC/DC conversion for reduced thermal stress

The 18-channel MLX81119 addresses this challenge by integrating a 1 A DC/DC converter that generates an optimized local LED supply voltage, programmable between 2.5 V and 6 V. Rather than dissipating excess voltage as heat, the device dynamically adapts the LED supply to the active color mix and operating conditions, significantly reducing power losses and thermal stress. This level of voltage optimization is not achievable with fixed external DC/DC converter solutions.

With 18 low-side current sources configurable up to 60 mA and independent 16-bit PWM control, the MLX81119 supports up to six RGB LEDs per device, enabling smooth color transitions and advanced lighting animations. Built-in direct and indirect temperature sensing allows active compensation across all channels, maintaining stable color points over the full automotive temperature range.

Building on the proven MLX81118 architecture, the MLX81119 integrates a complete LIN system, including transceiver and protocol handler, fully compliant with LIN 2.x and SAE J2602. Developed according to ISO 26262, the device supports up to ASIL B implementations depending on the system safety concept, making it suitable for functional safety-relevant interior and exterior lighting applications.

- **Melexis** | www.melexis.com

Navitas to Showcase Breakthrough GaN and SiC Based Solutions for AI Data Center, Energy and Grid Infrastructure, and Industrial Electrification at PCIM 2026

Highlights include two SST solutions for converting the MV grid to 800V HV DC, a 10 kW, 800 V-to-50 V DC-DC full-brick platform, along with a 20 kW 800 V-to-6 V power delivery board for AI data center.

Navitas Semiconductor, a leader in GaNFast™ gallium nitride (GaN) and GeneSiC™ silicon carbide (SiC) power semiconductors, will showcase its latest GaN and SiC products for AI data center, energy and grid infrastructure, and industrial electrification at PCIM 2026.

Product highlights include the latest in Navitas GaNFast FETs starting from 0.8 mOhms at 100 V to 11 mOhms at 650 V, along with expanded offerings across the GaNSafe™, GaNSlim™, and Bi-directional GaN IC product families. Navitas will showcase 3300 V, 2300 V, and 1200 V Trench Assisted Planar (TAP) SiC devices using advanced reliability SiCPAK™ press-fit modules, alongside recently announced 5th-generation GeneSiC TAP MOSFETs for AI-Data Center in QDPAK and TO247-LP.

For the AI data center, Navitas will exhibit two solutions that enable a swifter transition to the 800 VDC standard using GaN:

- 20 kW 800 V-to-6 V power delivery board aiming 97.5% peak efficiency, eliminating the traditional 48V intermediate bus converter (IBC) stage while enhancing overall system efficiency, reliability, cost-effectiveness, and power density.
- 10 kW 800 V-to-50 V DC-DC platform featuring 2.1 kW/in^3 power density and 98.5% peak efficiency, leveraging the latest 650 V and 100 V GaNFast FETs to deliver industry-leading efficiency, power density, and performance for 800 VDC and ±400 V power architectures.

For grid and energy infrastructure, Navitas will showcase two SST topologies enabled by Navitas GeneSiC UHV and HV technology:

- An EPFL-developed full SST cell integrating the primary converter stage, transformer, and secondary conversion stage using a novel single-stage topology, leveraging Navitas 3300 V and 1200 V SiC technology.
- 50KVA Bi-Directional Active Front End, DAB SST solution based on Navitas 3300 V SiCPAK MOSFET modules, using Texas Instruments' C2000TM real-time microcontrollers and UCC218915-Q1 gate driver.

■ **Navitas Semiconductor** | www.navitassemi.com

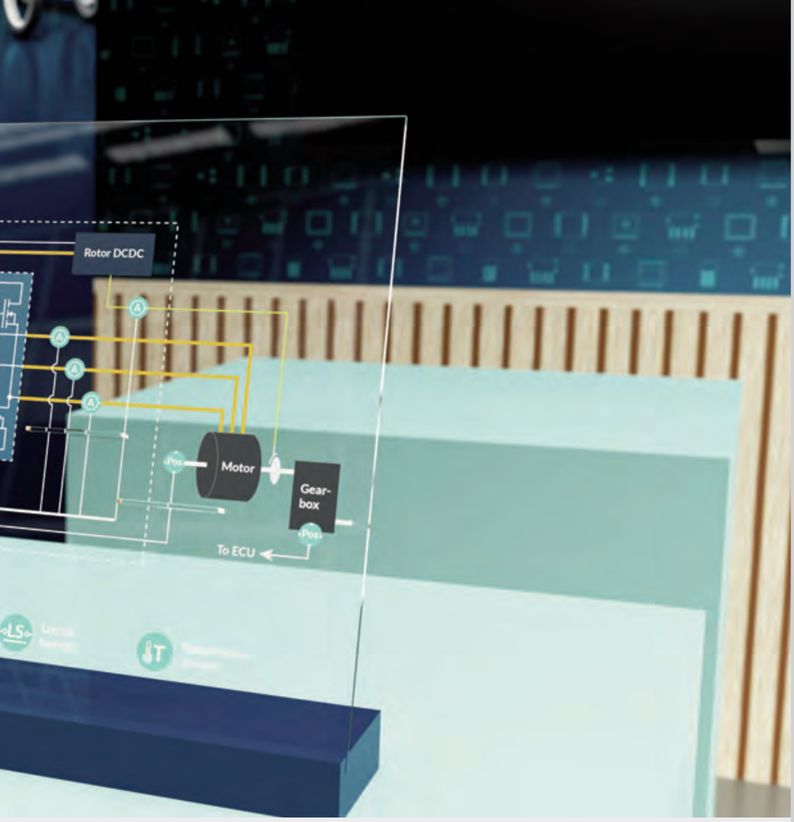
Discover Melexis' Power Electronics Solutions in Action at PCIM 2026

Melexis will showcase its latest sensing and protection technologies for ePowertrain and power electronics at PCIM 2026. Visit the team in Hall 7, Booth 0230 from 9-11 June in Nuremberg to see live demonstrations of Si-RC snubbers, IMC-Hall® current sensors, Triaxis® position sensors, and far-infrared (FIR) solutions.

At PCIM 2026, Melexis' team will showcase how its expansive IC portfolio helps engineers increase system performance and solve key design challenges across high-power automotive and industrial applications. Melexis will highlight key ePowertrain trends and the role of sensing and protection technologies in next-generation electrified systems, supported by dedicated application displays for 3-phase traction inverters, high-voltage batteries, and on-board chargers (OBCs). Its experts will also be on hand to help engineers connect individual technologies to broader system-level requirements, supporting higher levels of efficiency, integration, safety, robustness, and scalability.

The Melexis stand will feature solutions including:

- **Current Sensor ICs**: Visitors will be able to compare a wide range of modern current sensing architectures in one place, from shunt, C-core and U-shield approaches to coreless PCB and busbar implementations. Demonstrations will include a real mixed technology three-phase PCB integration, the DVK91235 coreless sensor showing PCB/busbar sensing, and electric motor control using integrated coreless, external primary coreless sensors, and IMC-Hall®.



Attendees can explore Melexis' current sensor range up close with Melexis experts, discussing key themes such as innovation in automotive inverter design and the latest trends across battery, MPPT solar and other high-current applications.

- **Si-RC Snubber Protective Devices**: As SiC devices operate at higher switching frequencies and voltages, voltage overshoot, ringing and electromagnetic interference can affect reliability, efficiency and layout flexibility. Melexis' groundbreaking integrated Si-RC snubber addresses these effects at module level by suppressing voltage spikes and high-frequency oscillations close to the switching components. Demonstrations will include an inverter HPD power module fitted to the Si-RC snubber, allowing the show's visitors to see how this innovative device can support compact, robust power-module designs in person.

- **FIR Temperature Sensor ICs**: Melexis will present its far-infrared temperature sensing technologies, including a new busbar-focused demonstration for contactless temperature monitoring. The showcase will cover how FIR sensing arrays can deliver thermal data without direct contact with the measured surface, supporting applications, like busbars, inverters, e-motors, and battery systems, where conventional contact-based approaches can add complexity, slow response or restrict mechanical design.

- **Position Sensor ICs**: For motor-control enthusiasts, Melexis will demonstrate position sensing technologies that support accurate feedback in electrified motion systems. The stand will include rotor position sensing, an inductive resolver for traction inverter applications and Melexis' Triaxis® magnetic sensing technology. Visitors can explore where magnetic and inductive sensing approaches fit within applications such as e-motor architectures, and how precise position feedback supports efficiency, torque control and system responsiveness, even within challenging electrified systems.

Visitors to PCIM 2026 can meet Melexis at Hall 7, Booth 0230 from 9 to 11 June. For more information please see melexis.com/pcim-europe-2026

▪ **Melexis** | www.melexis.com

Sfera Labs Announces UL Listing of Strato Pi CM and Strato Pi CM Duo

Sfera Labs is pleased to announce that its Strato Pi CM and Strato Pi CM Duo industrial Raspberry Pi–based servers have been UL Listed for the United States and Canada as Process Control Equipment, under UL 61010-1 (3rd Edition) and CSA C22.2 No. 61010-1 (Edition 3). The certification, issued under UL file E526642, opens these platforms to deployment in regulated applications across North America where compliance with recognized safety standards is required.

A Milestone for Regulated Deployments

UL Listing is a widely recognized mark of compliance with North American electrical safety standards. With this certification, Strato Pi CM and Strato Pi CM Duo can be more readily specified and deployed in:

- Industrial automation and process control systems
- Building and energy management infrastructure
- Data acquisition and edge computing installations
- OEM solutions requiring a certified embedded platform

For system integrators and OEMs, incorporating a UL Listed subassembly materially reduces the testing burden when certifying a finished product for North American markets, helping shorten time-to-market and contain compliance costs.

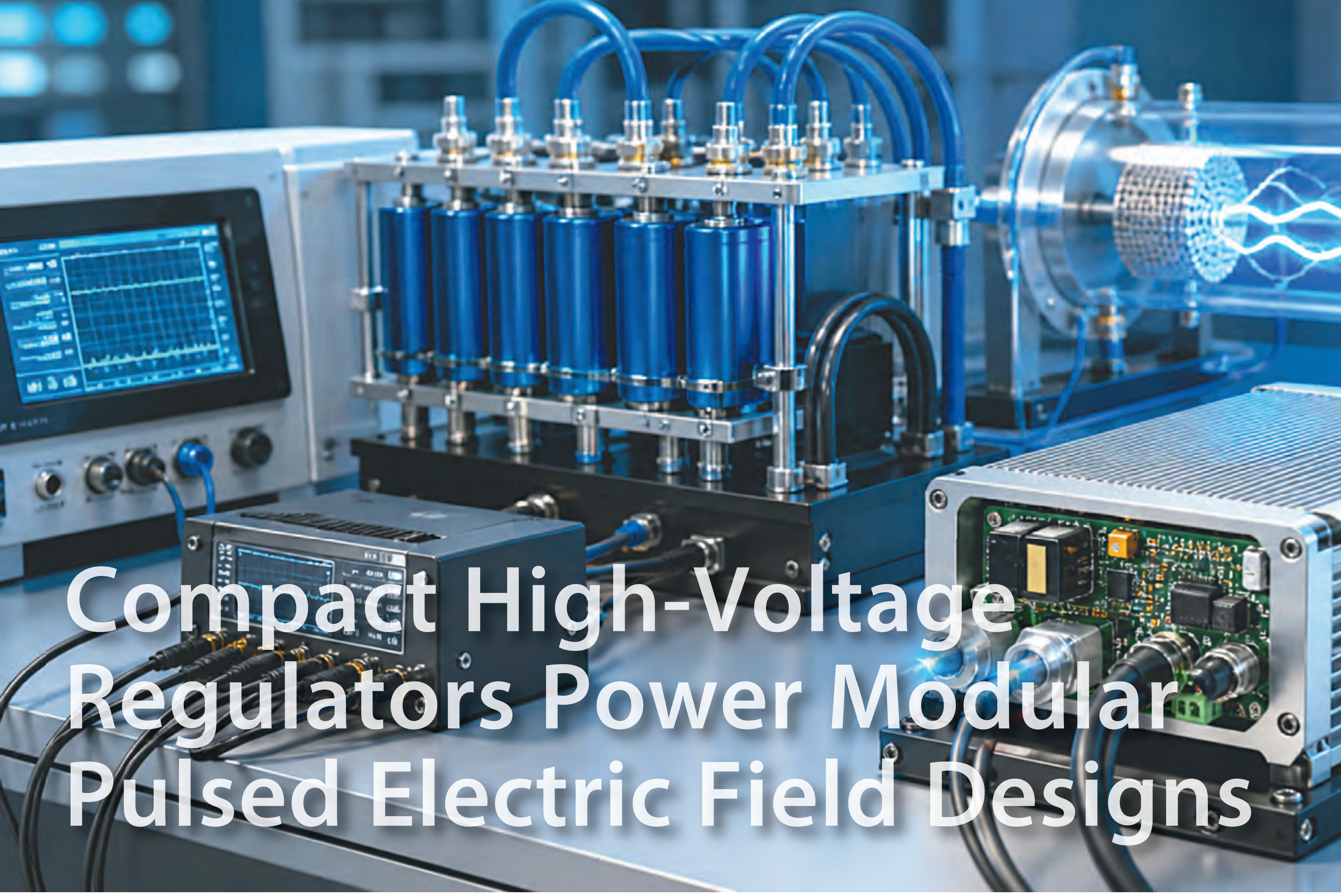
Designed for Continuous, Unattended Operation

Built around the Raspberry Pi Compute Module, Strato Pi CM and Strato Pi CM Duo combine the flexibility of the Raspberry Pi ecosystem with industrial-grade hardware features engineered for 24/7 unattended operation.

Key capabilities include:

- **Hardware watchdog**: autonomous recovery mechanisms for fault resilience.
- **Wide-range power input**: protection circuits engineered for industrial environments.
- **Real-time clock**: battery-backed timekeeping for scheduled operations and accurate logging.
- **Serial interface**: RS-485 port for field connectivity.
- **Remote update support**: firmware and system updates designed for long-lifecycle deployments.
- **Dual microSD architecture (CM Duo)**: redundant storage and safe in-field system upgrades with rollback capability – critical for remote or mission-critical installations.

▪ **Sfera Labs** | www.sferalabs.cc



Compact High-Voltage Regulators Power Modular Pulsed Electric Field Designs

Commercial pulsed electric field (PEF) applications are designed to deliver massive, repeatable pulses that inactivate microbes and extend the shelf life of food and beverages without heat or chemicals. Optimized for scale, reliability, and long operating lifetimes, they are typically custom-built, generally expensive, and inflexible. That creates market opportunities for modular, pilot-scale designs utilizing off-the-shelf components.

Author: **Rolf Horn,** Applications Engineer, **DigiKey**

XP Power offers a line of regulated high-voltage power converters that designers can use to build modular PEF systems across lab, pilot, and commercial applications without relying on fully-custom power solutions. The company's HRL30 30 W converters function as the regulated high-voltage supply that can charge capacitors or pulse-forming networks (PFNs), which then feed controlled pulses through a switching stage to electrodes, sensors, or treatment cells.

Supporting controlled, repeatable downstream pulses without requiring a custom high-voltage supply, the HRL30 converters provide designers with more freedom to experiment, rapidly iterate, and create new application-specific innovations.

Smaller, modular designs

Designers can build modular high-voltage systems around an HRL30, treating it as the regulated energy core for a range of subsystems.

From there, charged PFNs feed controlled pulses through switching modules to electrodes or treatment cells, while monitoring and control electronics track voltage, current, and temperature.

Mechanical enclosures and baseplate cooling simplify safe integration into lab rigs, pilot-scale PEF modules, or OEM subsystems. By combining these building blocks, teams can rapidly prototype, iterate, and adapt designs without having to design a custom high-voltage supply for each application.

The regulators operate in constant voltage and constant current modes with automatic crossover, allowing for a controlled charge rate to a capacitor.

The output voltage can be programmed from 0% to 100% via a 0–5 V analog signal, allowing the system to dynamically adjust the target charge voltage, and thus pulse intensity.

The XP Power converters provide voltage and current monitoring outputs (V_{mon} and I_{mon}) for automated testing, logging, or closed-loop control.

These signals allow an external microcontroller or programmable logic controller to detect when the capacitor is fully charged, trigger the pulse, and initiate the recharge cycle.


AI-generated illustration: Electronica Azi

Stable, controlled energy delivery

The HRL30 architecture supports a wide range of systems that deliver high voltage as a defined, repeatable function. This allows design teams to focus on application performance and system integration instead of designing custom high-voltage supplies. Compact mechanical enclosures and baseplate cooling enable easier, safe integration with larger systems.

The key challenge with PEF applications is not just generating high voltage but delivering it safely and predictably. The HRL30 series provides stable, regulated energy to PFNs, capacitor banks, or other high-voltage storage elements that feed downstream pulses.

PFNs are combinations of capacitors and inductors that store energy and release it as short, repeatable pulses. The PFN defines the pulse shape, duration, and amplitude, while the HRL30 manages safe, reliable energy delivery and allows designers to focus on tuning performance rather than building a custom high-voltage supply.

Designers can map the electrical requirements of their applications to HRL30 variants that share a compact, baseplate-cooled form factor of 3 in. x 2 in. x 0.73 in.

For example, here are three parts that illustrate how voltage and current can be matched to electrical requirements:

- At the lower-voltage end, a model like the **HRL3024S350P** delivers up to 350VDC at roughly 85 mA, making it well-suited for designs that benefit from higher current, such as faster charging of capacitor banks, moderate-field PEF experiments, or electrophoresis-style systems where energy per pulse matters more than extreme field strength.

- Stepping up, the mid-range **HRL3024S600N** delivers up to -600 VDC at about 50 mA, balancing voltage and current for lab-scale or pilot PEF systems that need meaningful electric fields without pushing insulation, spacing, or system complexity too far.

- At the higher end, the **HRL3024S5K0P** delivers up to 5 kVDC at approximately 6 mA, prioritizing electric field strength over current. It is suitable for small pilot-scale PEF modules, laboratory electroporation setups, or instruments requiring precise high-voltage biasing rather than high delivered energy.

Conclusion

As designers push PEF into pilot-scale, modular, and application-specific systems, the ability to generate high voltage safely, predictably, and without custom power design represents a market opportunity for modular approaches that lower costs, accelerate development, and open the door to a wider range of practical implementations.

XP Power's HRL30 series provides a regulated high-voltage foundation that lets teams focus on pulse shaping, electrodes, and system performance rather than the risks of high-voltage supply design.

About the author

Rolf Horn, applications engineer at DigiKey, has been in the European Technical Support group since 2014 with primary responsibility for answering any development and engineering related questions from customers in EMEA, as well as writing and proof-reading German articles and blogs on DigiKey's TechForum and maker.io platforms. Prior to DigiKey, he worked at several manufacturers in the semiconductor area with focus on embedded FPGA, microcontroller and processor systems for industrial and automotive applications. Rolf holds a degree in electrical and electronics engineering from the University of Applied Sciences in Munich, Bavaria and he started his professional career at a local electronics products distributor as system-solutions architect to share his steadily growing knowledge and expertise as trusted advisor.

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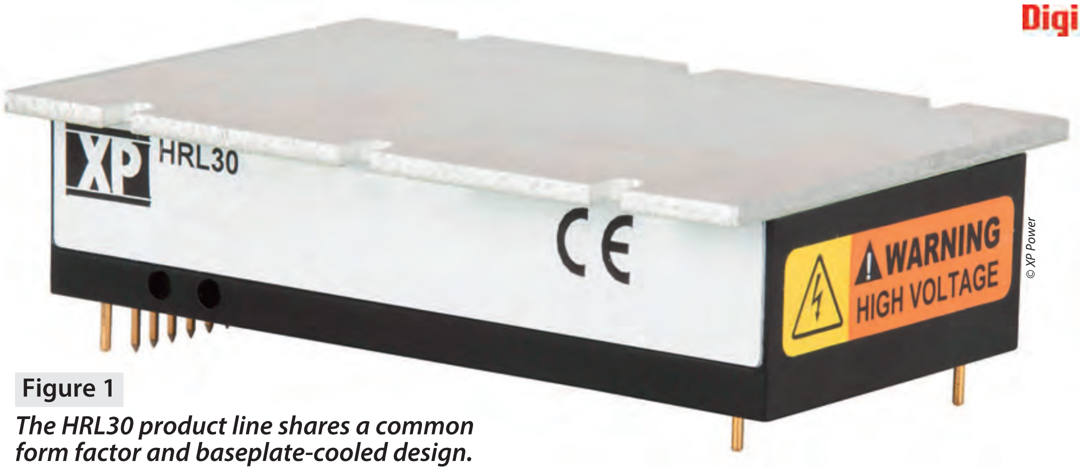

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Figure 1

The HRL30 product line shares a common form factor and baseplate-cooled design.

Mouser Highlights Medical Resource Centre for Next-Generation, Deployable Healthcare Designs

Mouser Electronics highlights its extensive medical resource centre enabling deployable healthcare tools. This hub provides engineers and healthcare innovators with the resources to develop advanced medical technologies and stay informed on emerging trends shaping patient care.

Connected healthcare technologies for patient-centred care

Accelerated by the demand for connected and personalised healthcare, secure Wi-Fi® modules power Internet of Medical Things (IoMT) wearable devices, enabling continuous, real-time monitoring beyond traditional clinical settings. These innovations support more proactive, preventive care by allowing earlier intervention and reducing the need for hospital visits. Technologies like 3D printing and smart glasses further enhance personalisation and clinical efficiency, delivering patient-specific implants and hands-free tools that improve accuracy, training, and remote collaboration.

At the same time, PFA power design ensures emerging therapies are both safe and reliable in real-world deployment. With efficient machine learning models and embedded sensors, engineers can also bring intelligence to everyday health products, such as toothbrushes, toilets, and other consumer devices, enabling local data processing that improves privacy, responsiveness, and user experience. Together, these advancements are driving a shift toward more decentralised, data-driven healthcare that improves outcomes, reduces strain on the system, and expands access to quality care.

Curated by Mouser's technical team and trusted manufacturing partners, the medical resource hub offers content including articles, blogs, eBooks, and new products for medical technology from top manufacturers. Also featured is the Digital Therapeutics Puts Healthcare in Your Hands infographic, which highlights how software and connected devices are becoming clinically validated care tools that expand access, lower costs, and support personalised treatment beyond traditional settings. Readers will also have access to Mouser's New Tech Tuesdays, which provides engineers with insights into how innovations in AI, hardware security, and biometric technologies are driving the development of smaller, faster, and more efficient medical devices.

Featured products include:

- The ST1VAFE6AX by STMicroelectronics is a compact biosensor for wearables and digital health devices that combines biopotential sensing with motion tracking in a single chip. It features a vertical analogue front-end (vAFE) for single-ended or differential biopotential inputs, embedded sensor-fusion, and a machine-learning core. Designed to capture signals such as heart rate, pulse, and ECG, while synchronising those readings with motion data so developers can do more context-aware analysis.
- The BL54L modules from Ezurio are a family of Bluetooth® LE Low Energy modules built on Nordic's nRF54L platform, designed for secure, high-performance, low-power wireless connectivity in compact embedded devices. This series is made for engineers who want a ready-made BLE module that balances performance, miniaturisation, and security without having to build the RF design from scratch.
- The AR0145CS Hyperlux™ SG image sensors from onsemi are built for applications that need fast, accurate capture of moving scenes without motion distortion. These 1MP image sensors use a 1280 × 800 active-pixel array and are optimised for clear, low-noise imaging in both low-light and bright conditions.
- The FXLS8971CF 3-axis MEMS accelerometer by NXP Semiconductors is designed for medical and IoT applications that need reliable motion and orientation sensing with stable performance across temperature.

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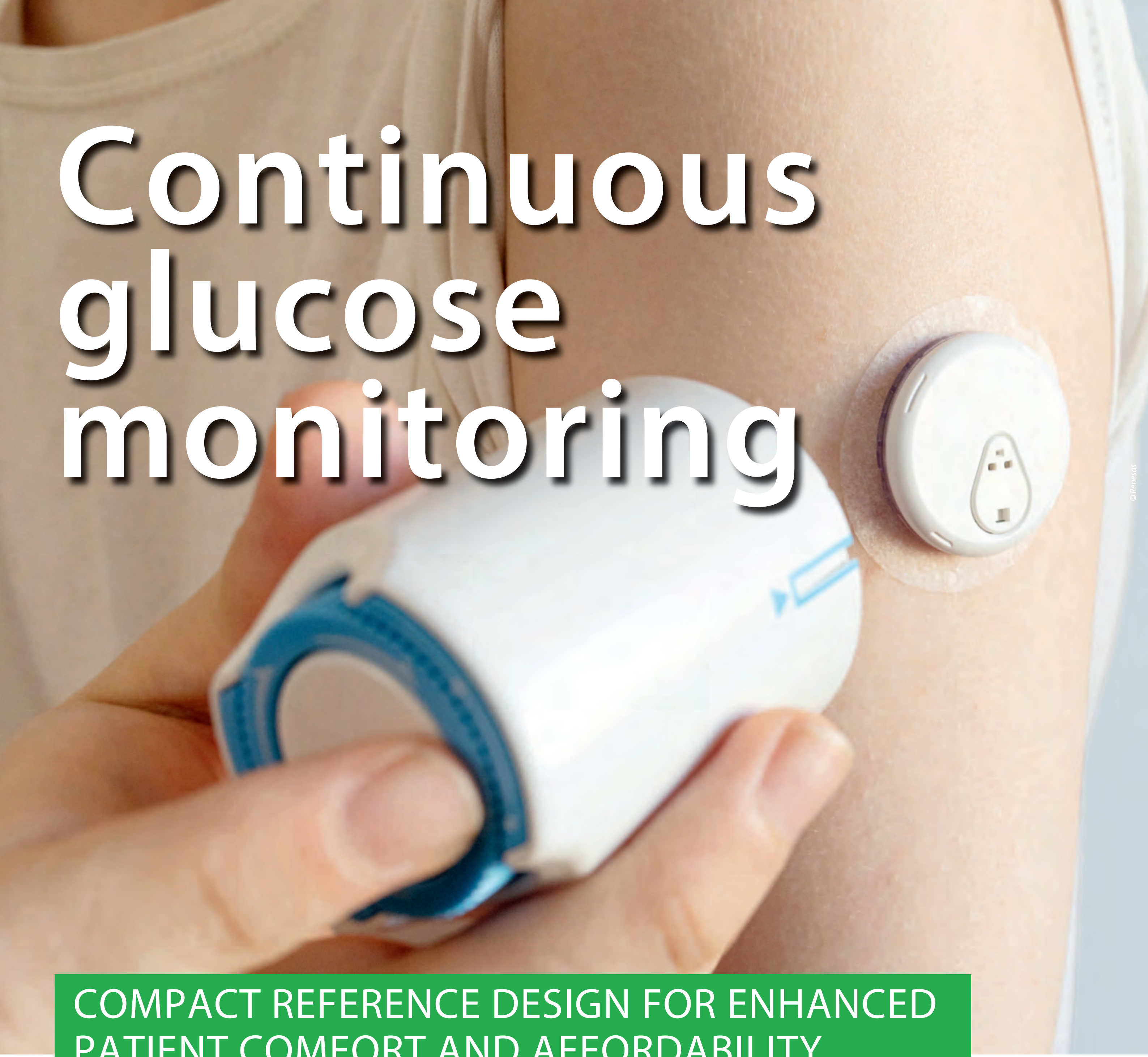
Continuous glucose monitoring



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COMPACT REFERENCE DESIGN FOR ENHANCED PATIENT COMFORT AND AFFORDABILITY

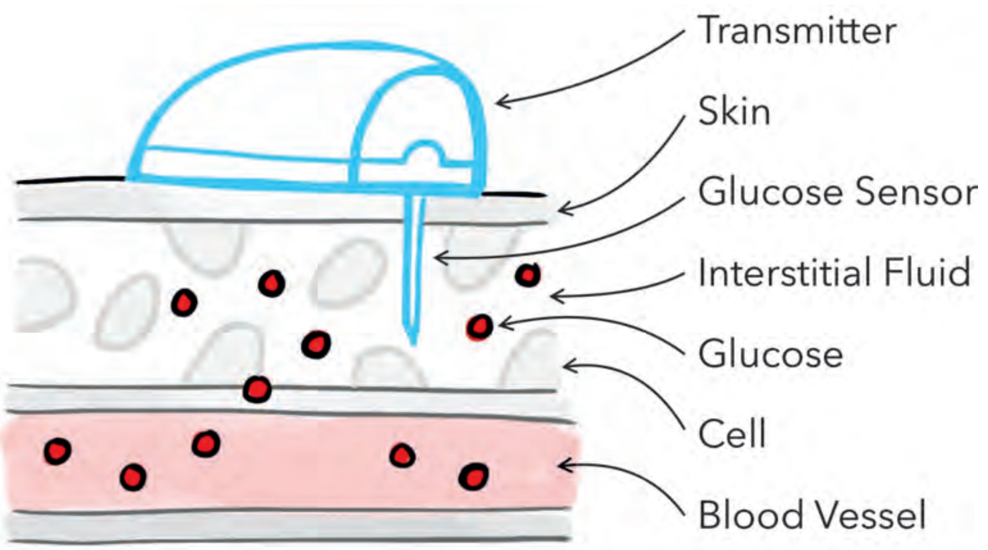
Diabetes mellitus, affecting over 10% of the global population (source International Diabetes Federation), presents significant health risks due to its wide range of complications and the absence of a straightforward cure. Continuous glucose monitoring (CGM) has proven to be a game-changer for patients, improving their quality of life by empowering them to make informed decisions about their daily routines.

Authors:
Kevin Fu, China Regional Marketing lead, Connectivity
Rossella Guiot, Central Marketing manager, Connectivity
Renesas Electronics

CGM measures glucose concentration of the interstitial fluids of the skin (figure1). As such, it is less invasive compared to blood measure and can be comfortably worn on the skin of the patient body for several days.

The data collected through CGM systems every few minutes, can be transmitted to a medical reader or smartphone and then shared with healthcare facilities to be recorded and analyzed by professionals.

Additionally, the continuous flow of data from connected patients is driving the development of advanced AI-based predictive models for more effective diabetes management and research purposes.



© DiabetesWise.org

Figure 1

The picture describes the skin layers above the blood vessels and shows how a reliable glucose information resides in the interstitial fluid further than in the blood.

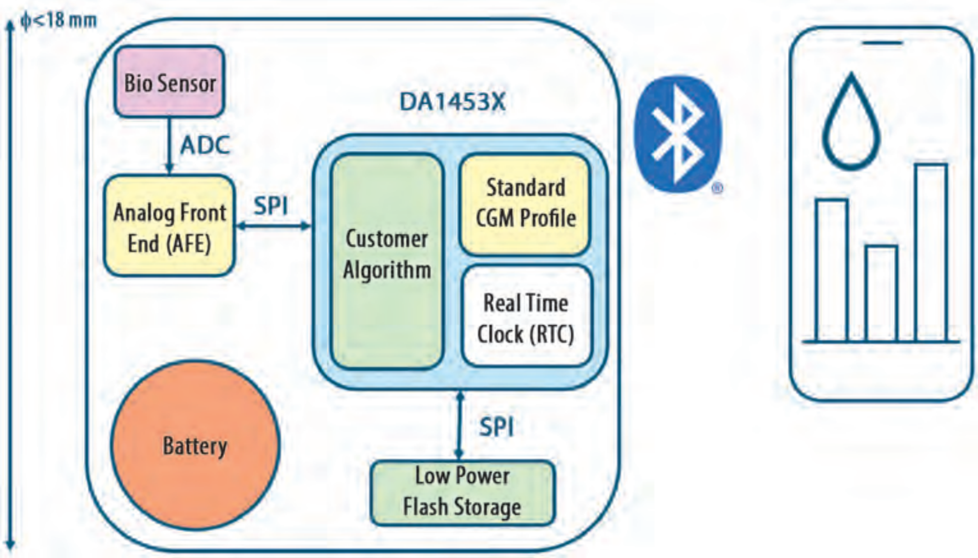


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Figure 2

The reference design incorporates an Analog Front-End (AFE) developed by Xmoore and a Bluetooth® System-on-Chip (SoC) supplied by Renesas Electronics.

Research in CGM technology is focused on developing solutions that are more accurate, secure, miniaturized, durable, and cost-efficient. The goal is to ensure long-term accessibility and widespread use, with electronics playing a critical role in overcoming these challenges.

Most commercial CGM systems utilize electrochemical amperometric sensors placed on the patient's skin. These sensors measure a small current proportional to glucose concentration, which is then processed by an analog front-end (AFE) circuit and converted into a digital signal. This signal is processed by a microcontroller (MCU) and transmitted via Bluetooth Low Energy (BLE) to a medical reader. The system is powered by a disposable coin cell battery.

A recent reference design developed by Renesas Electronics Corporation and Xmoore Microelectronics introduces some of the latest advancements in CGM technology.

The design features a compact and efficient system that includes an AFE, a BLE SoC, and a small external flash memory for data storage.

The BLE SoC not only processes the glucose data but also wirelessly transmits it to a medical reader or smartphone, making the system highly convenient for both patients and healthcare providers.

As shown in figure 2, the reference design showcases an ultra-compact solution where both BLE SoC and AFE are powered by a 1.5V silver oxide cell with no need of any external DC boost, which gives a significant improvement in terms of size and power efficiency. The entire system fits within a space of just 18mm, including the battery, allowing CGM manufacturers to create smaller, thinner skin patches compared to those currently available on the market.

This miniaturization reduces the bulkiness and discomfort often associated with traditional CGM devices, thereby improving patient comfort and encouraging better adherence to glucose monitoring protocols.

Additionally, the use of a low-voltage commercial battery further contributes to reducing the overall cost of the device. This cost-efficient and compact solution - as also figure 3 demonstrates - makes the reference design highly competitive in the market.

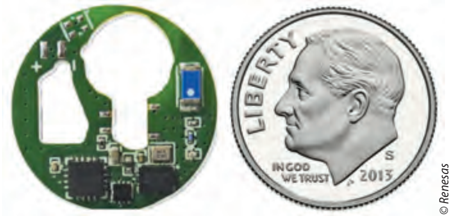
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Figure 3

The system is powered by a standard 1.5V battery and can be integrated into a compact 18mm patch, the same as a dime US coin.

The smaller form factor, coupled with the power efficiency of both BLE SoC and AFE, ensures that the CGM system remains affordable without compromising on functionality or performance. This cost-effectiveness is particularly important in making continuous glucose monitoring more accessible to a wider segment of the population, especially in regions where insurance coverage may be limited or where patients face financial barriers to obtaining expensive medical devices. By improving the accessibility of diabetes management tools, this technology can play a critical role in reducing the long-term health complications associated with diabetes. As more patients gain access to reliable and cost-effective CGM systems, the burden of diabetes-related health issues could be significantly reduced, leading to improved health outcomes and a better quality of life for millions of people worldwide.

In conclusion, the new CGM reference design from Renesas Electronics and Xmoore Microelectronics offers an exciting advancement in diabetes care. The combination of miniaturization, power efficiency, and cost savings makes it a highly competitive solution in the market. By providing patients with more comfort and reducing overall costs, this reference design has the potential to increase access to life-changing diabetes management tools, ultimately improving the prevention and management of diabetes mellitus on a global scale.

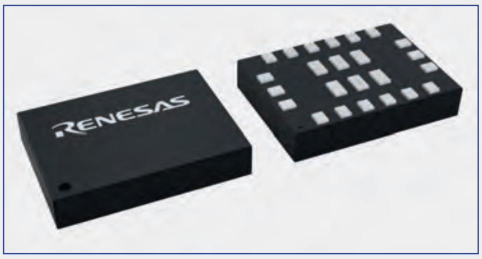
■ **Renesas**
www.renesas.com

AFE XMB1000

XMOORE AFE XMB1000 operates with 2 to 4-terminal electrochemical-sensor types and also integrates a 0°C to 50°C temperature sensor. The device can work with supply voltage as low as 1V without performance loss and is hosted in a 2.0mm × 2.0 mm pitch BGA package with very limited passive components.

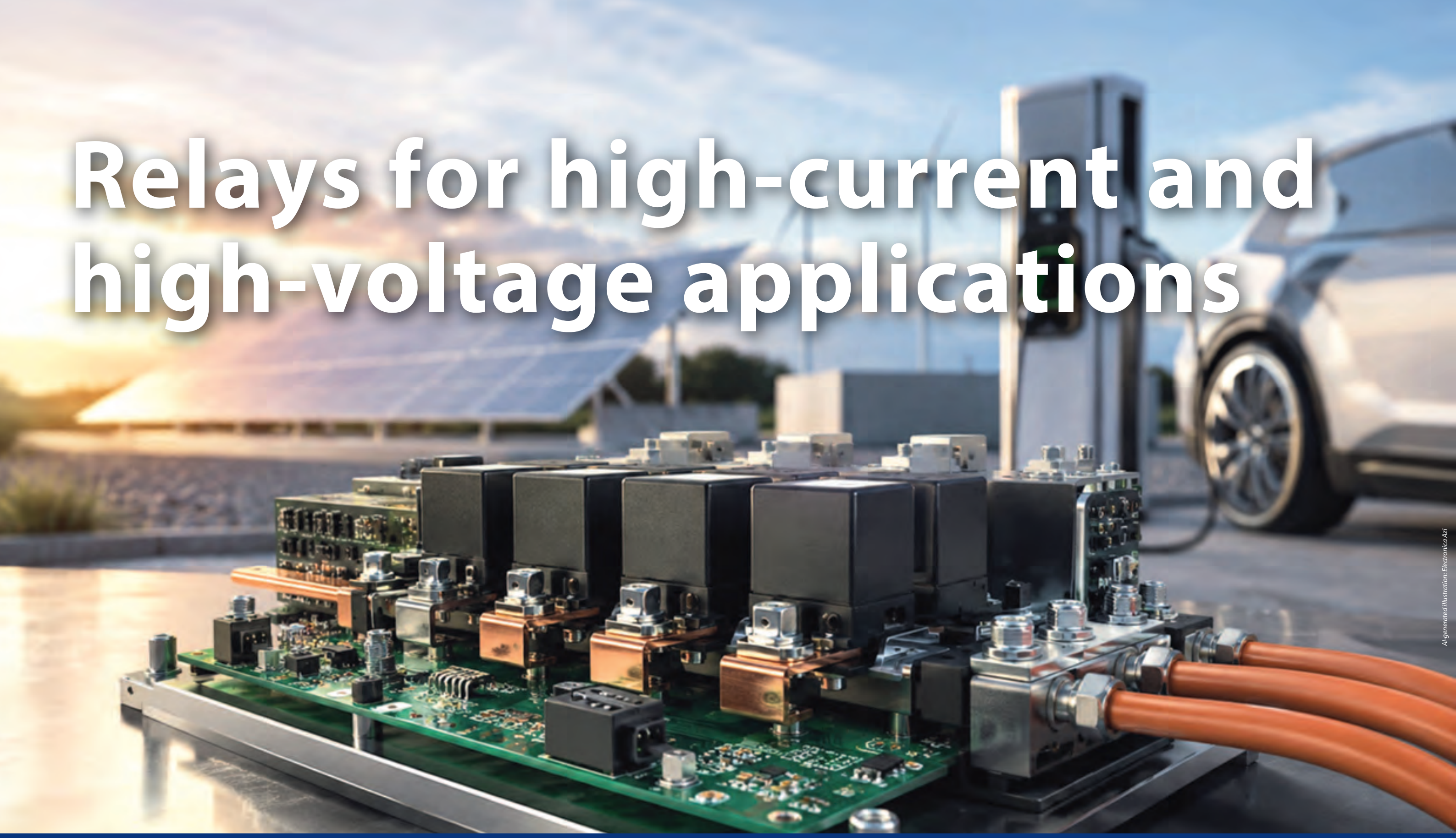
SoC Bluetooth® DA14531

Renesas **DA14531** ultra-low power Bluetooth® System-on-Chips feature a 2.4GHz transceiver and an Arm® Cortex®-M0+ microcontroller and come in a compact 3.0mm × 2.2mm package



Its configuration extends battery run-time, as it allows for continued operation far into a 1.5V battery's discharge cycle, when its output voltage has fallen below its nominal value modelul. **DA14535** is also an option when bigger RAM is needed.

Relays for high-current and high-voltage applications



AI-generated illustration: Electronica Azi

EFFICIENT SWITCHING IN THE SMALLEST OF SPACES

Rising requirements in energy and charging call for compact solutions capable of switching high currents and voltages. PCB-mounted relays combine low power loss with high switching durability and enable space-saving designs.

Authors:
Norman Majer, Corporate Product Manager Mechanics
Martin Unsöld, Senior Manager Product Marketing Mechanics
Rutronik

**The trend toward ever-larger vehicle battery capacities alongside ever-smaller charger packages with maximum charging power and durability has been unstoppable for years.
For end users, whether at home or on the go, fast charging and range anxiety are key criteria when choosing a charger. As a result, technical requirements are also increasing: Higher currents and voltages need to be switched safely in confined spaces.**

At the same time, thermal losses must be minimized, compliance with standards like IEC 62109, IEC 61851, IEC 60947-4-1 and IEC 62955 ensured and the service life of components maximized, since chargers are expected to deliver reliable performance for many years.

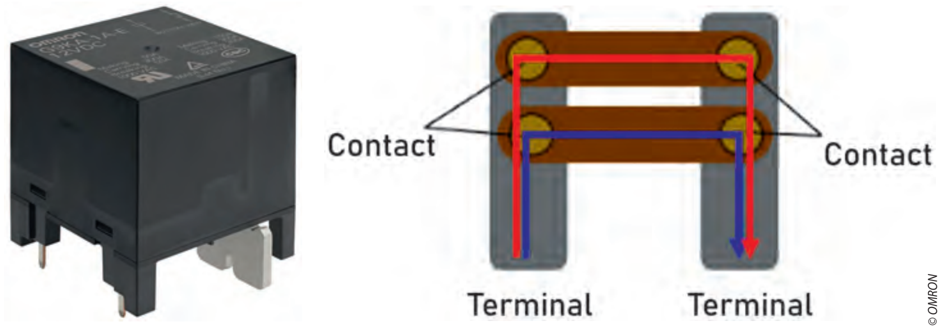


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Figure 1 *The G9KA relay (left) features a space-saving double contact structure (right).*

Limits of conventional relays

Whether in photovoltaic systems, battery storage systems, fast charging stations or industrial energy systems, conventional relays are still commonly used to switch high currents. Although tried and tested, they often require significant space, screw terminals, complex wiring and relatively high holding power. Moreover, their high contact resistance generates heat losses, increasing the need for additional cooling.

PCB relays as a compact alternative

A newly developed relay family provides a space-saving, energy-efficient option. OMRON's G9K series, designed for PCB mounting, cuts installation time and costs while eliminating potential wiring-related errors (Figures 1–3). Compared to DIN rail or panel mounting, PCB mounting also offers significant space savings.

Low contact resistance reduces heat loss and increases energy efficiency. Robust contacts and optimized mechanics guarantee a long service life, even under high loads. Energy-efficient coils enable a lower holding current. Certain versions also support control via pulse width modulation (PWM).


© OMRON

Figure 2

G9KB employs a reliable permanent magnet system for arc suppression.

With a continuous current carrying capacity of up to 300 A (AC and DC) and a switching current of up to 100 A (DC), these relays are ideal for demanding high-load applications.

The broad operating temperature range, typically from -40°C to +85°C, allows for use across diverse environments. Thanks to international approvals, including UL, IEC and VDE, this series can be easily integrated into devices for multiple markets.

The series includes several models with additional functions tailored to specific applications. Table 1 provides an overview.

Contact resistance as a critical factor

Low and stable contact resistance is crucial for all charging applications. A simulation study carried out by OMRON found that even a 1 mΩ increase in contact resistance can raise the temperature at the load connection by up to 18°C.

This not only reduces the service life of the contacts but also increases thermal stress on nearby components. Simulations demonstrate that the multipole design (G9KC) can lower the temperature rise by at least 10°C, thereby significantly enhancing the reliability of long-lasting chargers.

In practice, G9KC's reduced heat generation enables more efficient and faster charge cycles, as the lower operating temperatures allow for decreased output current limiting (crowbar).

Summary

The G9K series offers a technically advanced, space-saving and energy-efficient alternative to conventional relays. By combining low contact resistance, high switching capacity and specific model variants, both AC and DC applications can be implemented fully in line with standards. This creates new opportunities for developers of charging infrastructures, photovoltaic systems and energy storage devices to design compact, efficient and reliable systems. The trend toward enhanced monitoring capabilities and further miniaturization is expected to continue.
The G9K series thus provides a solid technical foundation for the next generation of powerful, sustainable energy systems.

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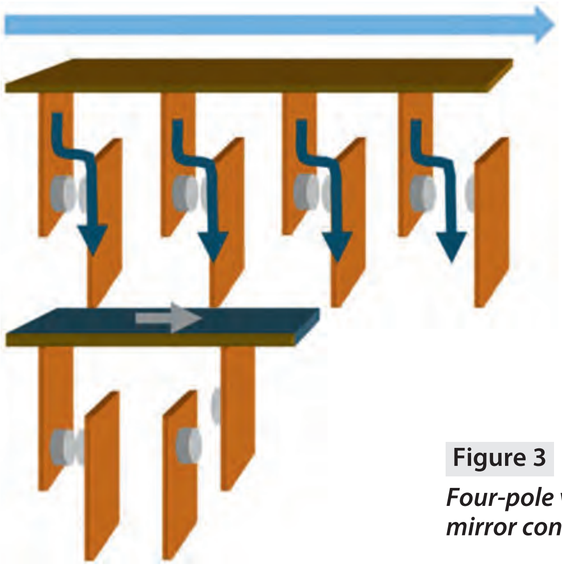


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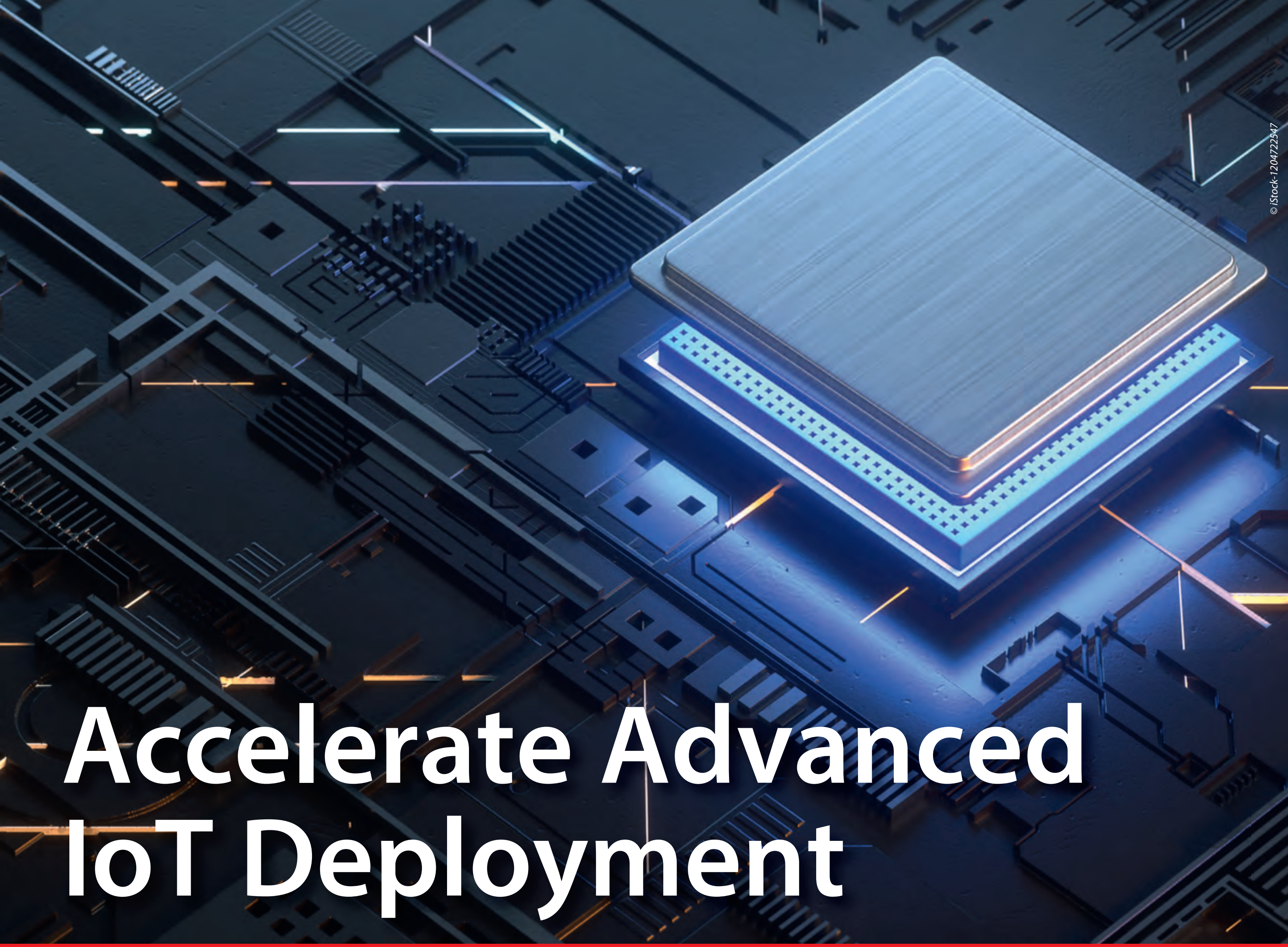
Figure 3

Four-pole version of G9KC with integrated mirror contact .

Model	Switching configuration	Max. voltage and current	Coil voltage	Contact resistance	Special characteristics	Applications
G9KA	SPST-NO double-break contact +A Aux (optional)	Up to 1,000 VAC, at 300 A continuous load; 10 kV pulse strength	12 V DC / 24 V DC	0,2 mΩ (@200A 6 VDC min. 30 minutes)	Ultra-low resistance due to twin-contact design, high energy efficiency	Photovoltaic inverters, UPS systems and industrial energy storage devices.
G9KB	SPST-NO, bidirectional	Up to 800 VDC, 100 A	12 VDC / 24 VDC	≤ 5 mΩ	Polarity-free design, arc cut-off technology, bidirectional direct current	Focus on energy storage (DC-DC converters, DC fast chargers, solar power systems, battery storage systems, vehicle-to-grid systems).
G9KC	4PST-NO + Aux (option)	480 VAC, 40 A per pol; short-circuit-proof up to 10 kA	12 VDC / 24 VDC	≤ 6 mΩ (typ. 1 mΩ, 40 A @ 480 VAC ref. only)	Multi-phase AC switching, mirror contact	Three-phase wall boxes (up to 22 kW), HVAC systems, industrial motor controls.

Table 1: **Key technical data for the model variants.**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Accelerate Advanced IoT Deployment

WITH MULTIPROTOCOL WIRELESS MCU MODULES

*This article provides a brief overview of the connectivity challenges facing designers of wireless devices for the IoT. It then introduces an off-the-shelf wireless platform from **u-blox**, that accelerates advanced IoT design by reducing the delays associated with radio bring-up, protocol integration, security implementation, and standards and regulatory compliance.*

Author: **Rolf Horn,** Applications Engineer, **DigiKey**

Advanced Internet of Things (IoT) designs now require secure wireless connectivity options that ensure network efficiency, optimal performance, and interoperability in heterogeneous operating environments, which include Wi-Fi, Bluetooth Low Energy (BLE), Thread, and Matter protocols. Suitable solution platforms must integrate seamlessly with sensors and peripherals as well as feature an ecosystem that enables rapid development from evaluation to deployment of globally certified devices.

Meeting these requirements through custom solutions designed from the ground up remains challenging, primarily due to the complexity of radio-frequency (RF) and mixed-signal design and device certification. Designers need a more integrated approach.

How changing connectivity demands are driving a move to integrated modules

Emerging applications, such as industrial control systems, commercial building automation, and smart-device ecosystems, require flexible IoT device solutions that can support specialized requirements for hardware, software, and communications without compromising security or power budgets. In a growing number of applications, IoT devices are also expected to support multiple connectivity options. Each must be capable of maintaining reliable communications in increasingly crowded RF environments with various sources of radio-frequency interference (RFI) and electromagnetic interference (EMI).

In these applications, different wireless protocols are essential for serving specific application requirements. Dual-band Wi-Fi 6 provides improved quality-of-service scheduling to maintain throughput in dense networks; BLE supports the need for low-power operation in short-range communications; and Thread enables large-scale, self-healing IPv6 mesh networks with device authentication and AES-128 encryption. These multiple connectivity options provide the foundation for the Matter protocol, which is an IP-based application layer that can operate over Wi-Fi or Thread, while relying on BLE for device commissioning and secure onboarding.

Meeting all of these requirements simultaneously has become a significant engineering challenge. Traditional discrete-radio designs need multiple chipsets, RF front-ends, and host interfaces, which increases layout complexity, power consumption, and certification effort. Each added interface becomes a potential failure point during compliance testing or when operating across multiple protocols.

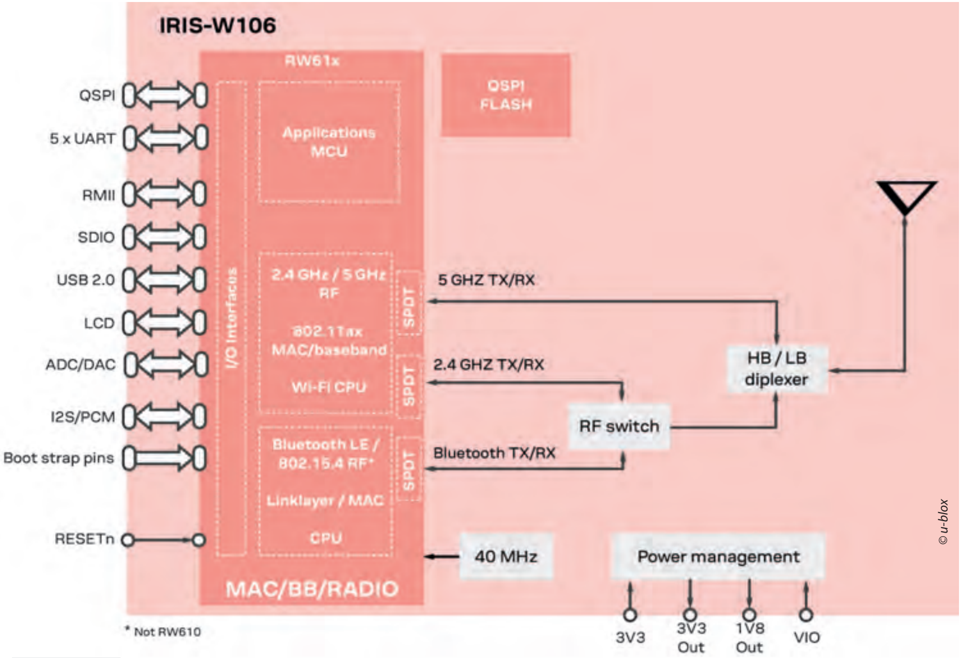


Figure 1

Packaged in a compact, globally certified module, the IRIS-W10 series combines a high-performance MCU with multiband radios, Flash memory, hardware-based security, and an internal antenna (shown here) or an RF signal output for an external antenna.

As development schedules tighten and regulatory expectations expand, more teams are moving toward standalone wireless microcontroller unit (MCU) modules that combine radio subsystems, processing resources, and integrated security within a single, prequalified component.

The u-blox IRIS-W10 series of MCU modules provides an integrated solution designed to meet the emerging challenges of advanced IoT design.

By addressing multiprotocol coexistence, network efficiency, and protection of code and data at the module level, the IRIS-W10 series provides engineers with a reliable foundation for developing connected devices that can move from prototype to certification and deployment with fewer unknowns.

How the IRIS-W10 module architecture meets emerging demands

The IRIS-W10 series is a complete wireless system (Figure 1) that integrates high-performance processing, multiband radio subsystems, eXecute-In-Place (XIP) Flash memory, and hardware-based security to form a self-contained platform for building advanced IoT products.

Based on NXP's RW612 and RW610 wireless MCUs, which integrate an Arm® Cortex®-M33 core and multiradio subsystem, IRIS-W10 modules combine high-performance processing with multiple connectivity options, including dual-band Wi-Fi 6 (IEEE 802.11 a/b/g/n/ac/ax), BLE 5.4, and Matter over Wi-Fi.

Variants built on the RW612 MCU additionally support IEEE 802.15.4, Thread, and Matter over Thread.

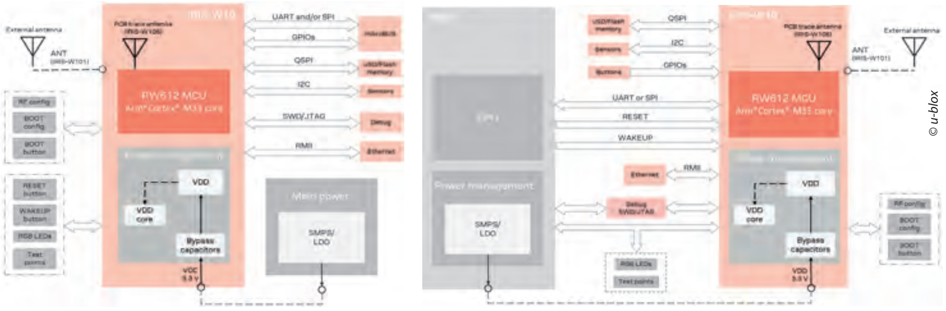
The two families in the IRIS-W10 series meet different integration needs: IRIS-W106 modules integrate a printed circuit board (pc board) antenna, while IRIS-W101 modules bring out the RF signal for installations requiring external antenna configurations.

Within each family, specific members support different memory and connectivity requirements as follows:

- RW610-based modules (**IRIS-W106-30B** and **IRIS-W101-30B**) include 8 megabytes (Mbytes) of Flash memory
- RW612-based modules provide 8 Mbytes (**IRIS-W106-00B** and **IRIS-W101-00B**) or 16 Mbytes (**IRIS-W106-10B** and **IRIS-W101-10B**) of Flash memory, as well as IEEE 802.15.4-based connectivity, as mentioned above.

The consistent architecture of these modules enables developers to scale their existing designs more easily, meeting new requirements. In fact, any of these modules can operate as a standalone host (Figure 2a) in designs built for minimal power and footprint or as a companion processor to a separate host (Figure 2b) in designs with more complex functional requirements.

With its multiple connectivity options, the series helps ensure reliable communication in congested RF environments.



(a) (b)

Figure 2

IRIS-W10 modules meet a broad range of application requirements, ranging from those that need a standalone processor (a) to minimize power and footprint to those that need the module to serve as a companion processor to a host for additional functionality (b).

Wi-Fi 6's use of orthogonal frequency-division multiple access (OFDMA) and target wake time (TWT) scheduling improves channel efficiency in these environments, while BLE's adaptive frequency hopping (AFH) minimizes interference. IEEE 802.15.4 capability extends connectivity to Thread networks for low-power mesh and Matter interoperability. Since the different RF technologies are never active simultaneously, the modules' radios share a single RF chain and operate sequentially, using an internal RF switch to route radio traffic to the shared antenna or RF output.

While the availability of multiple connectivity protocols has become essential for a growing number of IoT applications, those applications increasingly require the ability to ensure the security of communications transactions within a trusted operating environment. To meet these security requirements, the IRIS-W10 series modules feature a hardware root of trust. Application security begins with secure boot from validated non-volatile memory or USB sources using a secure bootloader preserved in the MCU's embedded read-only memory (ROM). The foundation for application security rests on a trusted execution environment based on Arm TrustZone-M.

Additional security features include the critical elements required in any security chain, such as a hardware cryptographic engine, encrypted Flash memory, and protected debug interfaces, which safeguard firmware authenticity and operational data. At the application level, these security features enable WPA2/WPA3 authentication, Wi-Fi enterprise security, Transport Layer Security (TLS) encryption, HTTPS, and BLE secure connection pairing. Together, these mechanisms establish a secure baseline for both firmware integrity and communications protection.

With their tightly integrated protections, these modules enhance application cybersecurity without requiring additional discrete security devices.
By integrating high-performance processing, multiprotocol radio, and hardware-based security in a globally certified package, the IRIS-W10 series helps developers meet the combined demands of throughput, interoperability, and regulatory compliance.

For implementing advanced IoT devices, this integrated architecture provides a robust technical foundation for the rapid development of custom IoT applications using a comprehensive set of u-blox evaluation kits (EVKs) and development tools.

Accelerating the development of advanced IoT designs

Designed to complement IRIS-W10 series hardware, u-blox's EVKs and associated software resources enable developers to progress efficiently from evaluation to application design. Together, these resources help developers examine module performance, verify radio behavior, and build custom devices.

For initial evaluation and prototyping, the u-blox **USB-IRIS-W1** evaluation tool enables developers to quickly explore the capabilities of the IRIS-W10 module. This kit integrates an IRIS-W106 module, basic user interface (UI) controls, and multiple interfaces on a small-form-factor pc board equipped with a USB Type-A connector (Figure 3).

The USB-IRIS-W1 comes preloaded with a Wi-Fi command line interface (CLI) application, allowing developers to plug it into a USB port on their workstation and immediately begin evaluating the module's Wi-Fi capabilities.

While the USB-IRIS-W1 kit offers a quick-start tool for module bring-up and CLI evaluation, the u-blox **EVK-IRIS-W1** evaluation kit (Figure 4) provides a more comprehensive, standalone platform for evaluating each module, gaining experience with its features, and extending its capabilities.

This kit includes the **EVK-IRIS-W106**, board with an IRIS-W106-10B module or the **EVK-IRIS-W101** board with an IRIS-W101-10B module. Along with the respective board, the kit includes an RJ45 Ethernet connector, a USB cable, and an antenna with a U.FL connector (for the EVK-IRIS-101 only).
Each board exposes multiple module interfaces, including UART, SPI, I^{2}C, and USB ports.

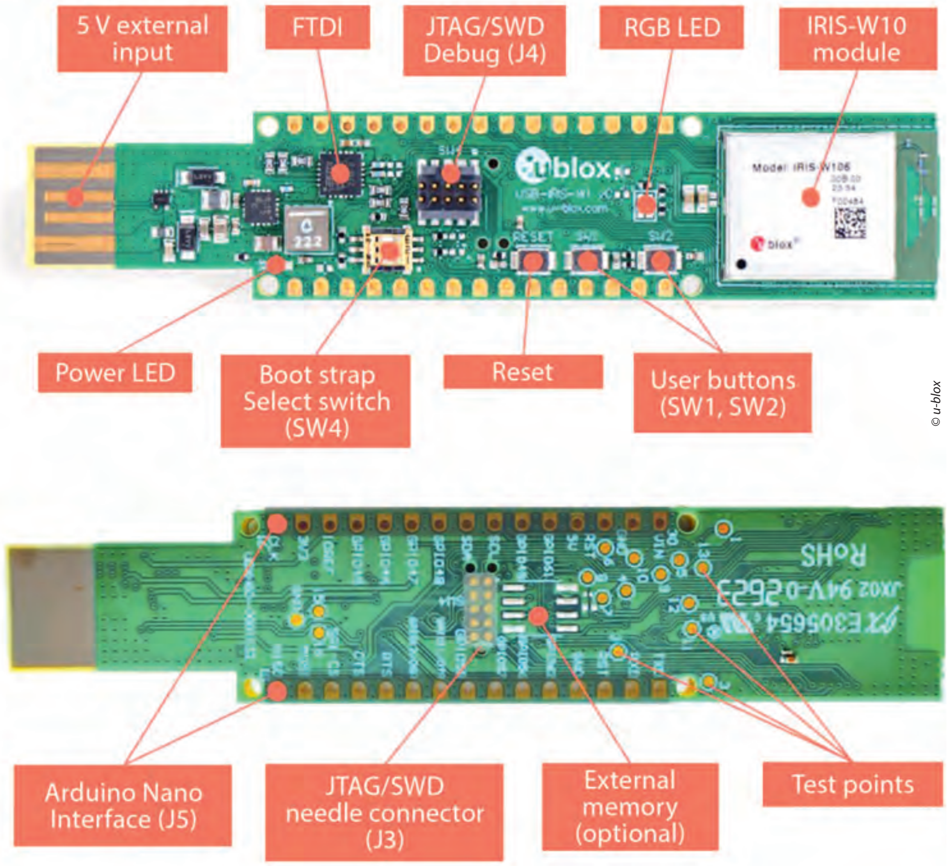


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Figure 3

Built around a pre-flashed IRIS-W106 module, the USB-IRIS-W1 compact USB Type-A board is designed to provide a quick start for evaluation of the module's capabilities through multiple interfaces, basic UI controls, and test points.

In addition, the board provides LEDs, basic UI controls, power measurement headers, a 10-pin debug connector, and four **mikroBUS** (**MIKROE**) connectors to extend the board's capabilities.

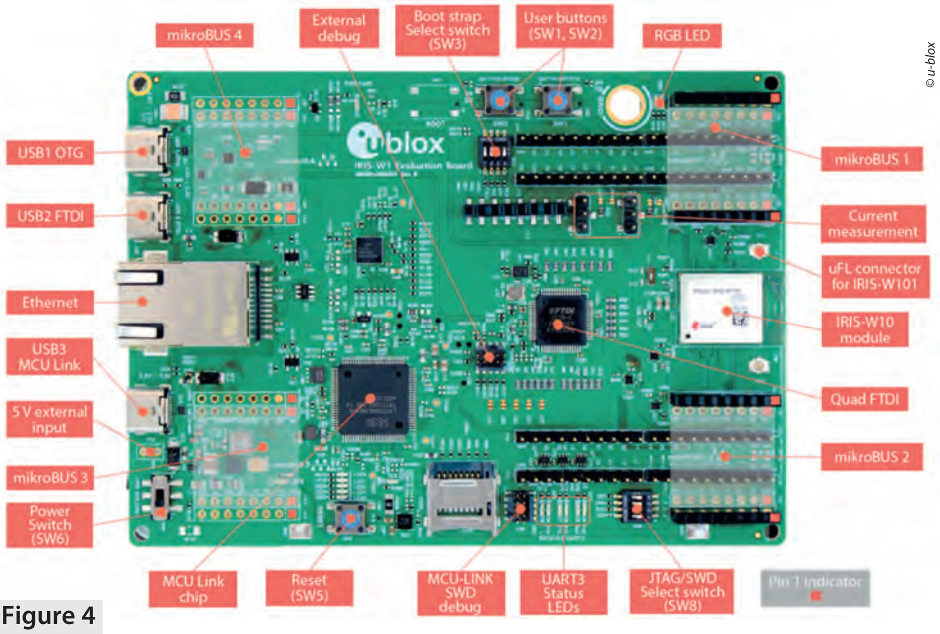

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Figure 4

The EVK-IRIS-W1 evaluation kit provides a comprehensive hardware platform for development, exposing the IRIS-W10 module interfaces for application development, power analysis, and functional expansion.

Developers can quickly bring the board up by providing power through any of its four 5 VDC power inputs, including:

- the IRIS-W10 USB port provided by a USB peripheral
- the debug/UART port
- the MCU-LINK USB port
- the power header

The EVK-IRIS-W106 and EVK-IRIS-W101 each come with a preloaded demonstration image that enables immediate evaluation of Wi-Fi 6 and BLE after power-up.

Module firmware enables engineers to measure throughput and latency, evaluate power consumption, and inspect configuration registers through the serial console. Using the EVKs' power-measurement headers, developers can quantify current draw during various communication states to validate energy-performance trade-offs in designs that must meet low-power or battery-operated requirements.

Multiple software resources help simplify application development

For custom application development, the IRIS-W10 series follows an open CPU operating model, which u-blox supports with its Open CPU repository of open-source reference code designed to run on the EVKs. In this operating model, the module processor is available for running custom applications built with NXP's MCUXpresso software development kit (SDK) or Zephyr, and is developed using popular integrated development environments (IDEs) and toolchains, including NXP's MCUXpresso IDE, the GNU compiler collection (GCC), or IAR's Embedded Workbench.

The NXP SDK offers a comprehensive set of libraries, connectivity stacks, support utilities, and reference code for developing applications based on NXP MCUs. In a runtime environment, the SDK's modular architecture helps ensure isolation of hardware-dependent layers and drivers from higher-level application logic.

By referencing sample code in the Open CPU code repository and SDK, developers can quickly implement the custom firmware needed to support their IoT application's unique requirements. For loading their custom firmware, the EVK-IRIS-W1 and USB-IRIS-W1 evaluation kits support flashing firmware through an external debugger. In addition, EVK-IRIS-W1 kit boards support firmware updates through their onboard debugger, while the USB-IRIS-W1 supports firmware updates via the UART port using NXP's MCU bootloader host application.

For ongoing test and debug, both kits support standard JTAG and SWD interfaces through onboard ports.

Because all hardware, software, and certification assets remain consistent across module variants, no major design rework is required to scale an existing design to support additional memory or communications protocols. When designs are complete, developers use the same IRIS-W10 modules and development environment to transition to production. Finally, the global certification of all IRIS-W10 modules simplifies end-product integration and regulatory documentation in target regions.

By combining globally certified hardware, a versatile SDK, and well-documented reference code, the u-blox IRIS-W10 series ecosystem enables developers to deploy secure multiprotocol IoT devices more rapidly.

Conclusion

Meeting the growing demand for secure, multiprotocol connectivity in IoT devices continues to present significant challenges in achieving low power consumption, robust wireless performance, and global certification within tight development schedules.

The u-blox IRIS-W10 series combines embedded processing, multiradio connectivity, and integrated security within a globally certified module platform. Using hardware evaluation kits and software resources optimized for the IRIS-W10 modules, developers can rapidly evaluate, prototype, and deploy secure, interoperable IoT systems efficiently.

As multiprotocol wireless ecosystems continue to expand, the IRIS-W10 series provides a scalable foundation able to adapt to emerging standards and application demands.

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The Door Just Opened to Modernized Spaceflight System Development

The RAD750 processor, which has been NASA's de facto choice for space computing, debuted 20 years ago. It has been utilized in a variety of groundbreaking missions, including those involving NASA's Deep Impact spacecraft and the Curiosity Mars rover.
Today's much larger and more diverse public- and private-sector space industry has significantly broader and rapidly expanding computational requirements. System developers need a new, more capable space-grade microprocessor (MPU).

Author:
Tao Lang, Senior Product Manager for Microchip's communications business unit

In 2022, NASA selected Microchip to build its new PIC64 High Performance SpaceFlight Processor (HPSC) MPU that will help propel space avionics and payload innovation for decades to come. PIC64-HPSC MPUs meet the needs of a space hardware and service industry that the World Economic Forum projected will grow at a CAGR of 7% from 2023's $330 billion to $755 billion by 2035.
Theyare designed to solve space computing challenges as part of a new advanced computing development ecosystem that will leverage many of the same widely adopted standards and technologies that have driven commercial and industrial innovations worldwide.

The HPSC Vision

A space-grade MPU for the next chapter of spaceflight had to meet two very different sets of requirements for long-duration deep-space missions and shorter-duration commercial Low-Earth Orbit (LEO) missions. At the same time, the MPUs had to better facilitate innovation by moving beyond yesterday's purpose-built and obsolescence-prone architectures to support open standards and open-source software while integrating many of the same scalable and extensible technologies that are simultaneously transforming everything from the data center to e-mobility. The first two members of Microchip's PIC64-HPSC MPU family illustrate the path to achieving this vision.

The radiation-hardened (RH) PIC64-HPSC-RH MPU gives autonomous missions the local processing power for such real-time tasks as rover hazard avoidance on the Moon's surface, plus the low-power consumption and radiation protection for deep-space missions. For Low Earth Orbit (LEO) missions, , the radiation-tolerant (RT) PIC64-HPSC-RT MPU provides system developers a cost-optimized solution with the necessary fault tolerance and radiation performance.

New Capabilities

Among the most significant space-grade MPU innovations is the integration of widely adopted RISC-V® CPUs augmented with vector-processing instruction extensions that support AI/ML applications. These MPUs also include industry-standard interfaces and protocols that were not previously available for space applications.

Other key capabilities include:

1. **A space-grade 64-bit MPU architecture.** The inclusion of eight SiFive RISC-V® X280 64-bit CPU cores support virtualization and real-time operation. Vector extensions deliver up to 2 TOPS (int8) or 1 TFLOPS (bfloat 16) of vector performance for implementing AI/ML for autonomous missions.

2. **High-speed network connectivity.** Supports multiple high-speed connectivity options including a) up to 10GbE Time-Sensitive Networking (TSN) Ethernet; b) a 240 Gbps TSN Ethernet switch; c) scalable and extensible PCIe® gen 3 and Compute Express Link™ (CXL™) 2.0 connectivity with x4 or x8 configurations; and d) RMAP-compatible SpaceWire ports featuring internal routers.

3. **Low-latency data transfers.** The MPUs maximize compute capabilities by bringing data from remote sensors close to the CPU. This is done through Remote Direct Memory Access (RDMA) over Converged Ethernet (RoCEv2) hardware accelerators.

4. **Platform-level defense-grade security.** The MPUs' defense-in-depth security supports post-quantum cryptography and anti-tamper features.

5. **High fault-tolerance capabilities.** The MPUs support Dual-Core Lockstep (DCLS) operation, use a WorldGuard hardware architecture for end-to-end partitioning and isolation, and have an onboard System Controller for fault monitoring and mitigation.

6. **Flexible power tuning.** Multiple controls enable the MPUs to meet computational demands across the multiple phases of space missions while also offering the tailored activation of functions and interfaces.

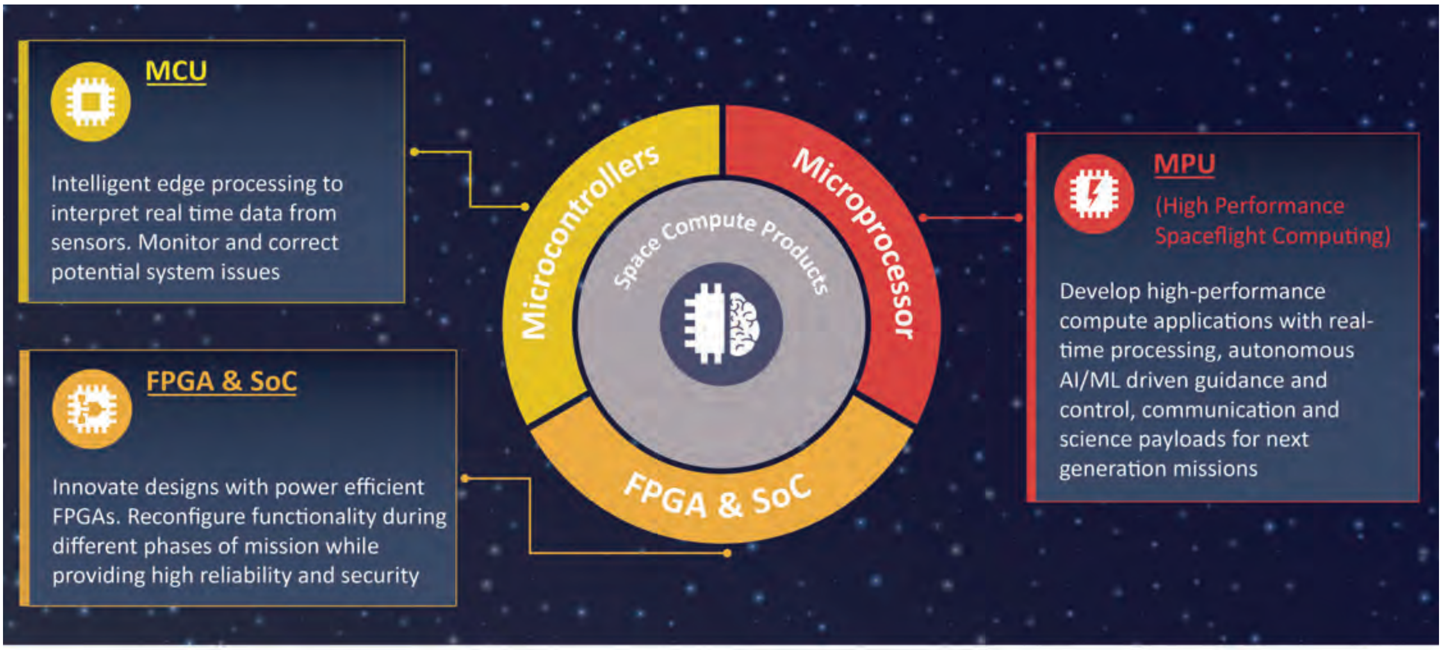
A New Innovation Ecosystem

These new MPUs for high-performance computing are part of a triad of space-grade processing solutions within a new innovation ecosystem. This triad also includes microcontrollers for intelligent edge processing and FPGAs and SoCs to provide reconfigurable functionality during different mission phases along with high reliability and security (see Figure 1).

The PIC64-HPSC MPUs' larger ecosystem of space-grade products and third-party software that will collectively expedite the development of system-level integrated solutions.

In addition to Microchip's evaluation platform consisting of the MPU, expansion card and a variety of peripheral daughter cards, the ecosystem features flight-capable single board computers (SBCs) that implement common commercial form factors and industry standards. The first ecosystem members providing resources and expertise include SiFive, Moog®, IDEAS-TEK, Ibeos, 3D PLUS, Micropac, Wind River®, Linux Foundation, RTEMS, Xen, Lauterbach®, Entrust® and many more.

The ecosystem also includes space-grade companion components with proven flight heritage. These components are designed and qualified to deliver the necessary reliability for withstanding the rigors of the harsh environments found in space.



Intelligent edge processing to interpret real time data from sensors. Monitor and correct potential system issues

Innovate designs with power efficient FPGAs. Reconfigure functionality during different phases of mission while providing high reliability and security

Develop high-performance compute applications with real-time processing, autonomous AI/ML driven guidance and control, communication and science payloads for next generation missions

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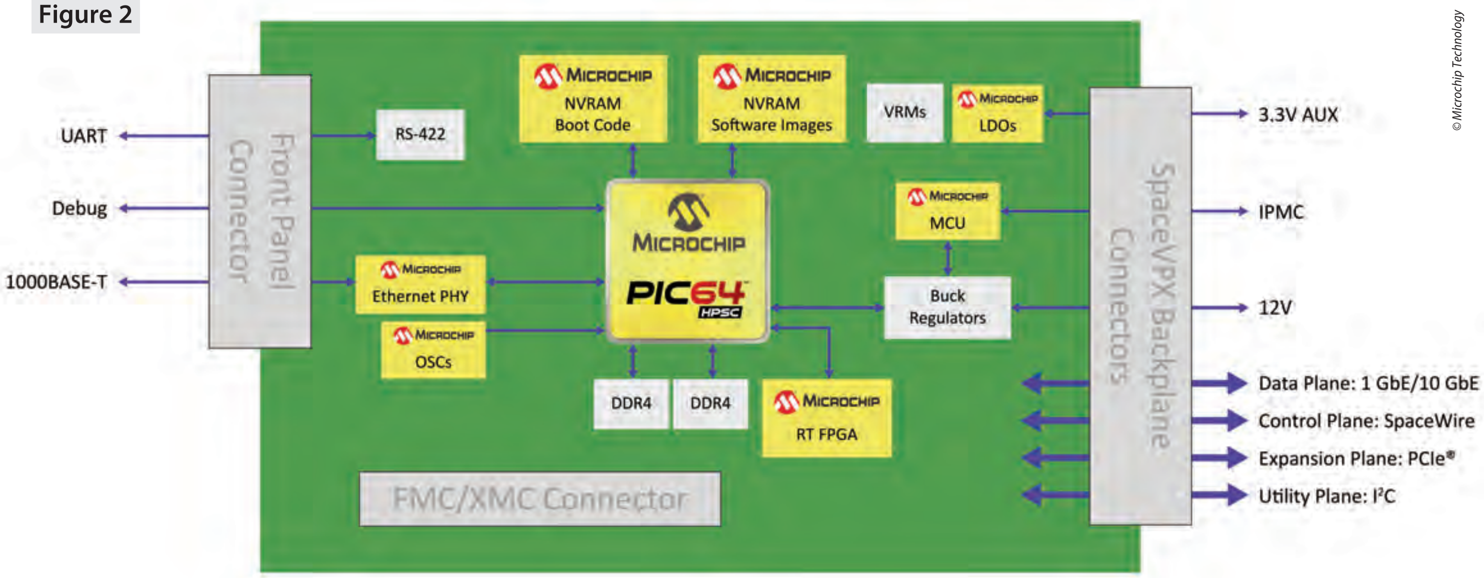
Figure 1 *Microchip's triad of space computing solutions.*

Figure 2 shows how these components will be used in a popular SpaceVPX form factor single board computer to help accelerate development of system-level integrated spaceflight avionics and payload solutions.

Medium-Earth Orbit (MEO), Geosynchronous-Earth Orbit (GEO), deep space, and planetary missions. They must operate in environments where electronics are exposed to intense radiation levels.

embedded processing applications here on Earth. They are joining 8-, 16- and 32-bit microcontrollers and processors, as well as FPGAs and SoCs, that are all supported by a common development tool ecosystem.

Figure 2



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Modern space systems need a variety of space-grade peripherals including clock and timing solutions, memory, discretes, and more. Multiple ecosystem partners will be providing off-the-shelf Single Board Computers (SBCs) like the one above that adhere to the standards set forth by organizations like VITA, SOSA or PICMG. This will enable an HPSC SBC from one vendor to seamlessly interoperate with plug-in cards from various other vendors within a unified chassis..

Diverging Space Computing Needs

Accelerating system development through a comprehensive ecosystem is critical for fueling a "New Space" era. In contrast to "Traditional Space" where space programs and technological development were primarily driven by government agencies and public funding, this new space era is characterized by significant private sector participation and an entrepreneurial approach to space endeavors.

New Space advocates for more economical and accessible approaches of spaceflight development, particularly for Low-Earth Orbit (LEO) constellations.

These constellations exhibit unique characteristics, such as reduced radiation intensity, shorter mission durations, different fault tolerance requirements, and a higher frequency of satellite replacement.

The processor needs of traditional and "New" space reflect these differences:

- **Traditional space**: Radiation-hardened processors must be engineered to survive the extreme conditions found in
- **New Space**: Radiation-tolerant processors must be tailored to meet the requirements of Low Earth Orbit (LEO) constellations. The optimal solution supports missions where lower radiation levels allow for a more cost-effective approach.

These differences can be bridged from a development perspective if there is processor pin- and software-compatibility so users can create customized solutions for both Low Earth Orbit (LEO) and deep space missions with a single development effort.

Such compatibility between the radiation-hardened PIC64-HPSC-RH MPUs and the radiation-tolerant PIC64-HPSC-RT MPUs facilitates a streamlined design process, reduces development costs, and accelerates the deployment of space technologies across various orbital regimes.

A Growing Role for 64-Bit Embedded MPUs

In addition to modernizing space computers, 64-bit embedded MPUs are also coming to a new generation of AI-enabled edge computing and other high-performance

This will give developers the flexibility and reusability they need to solve difficult computing challenges across a diverse array of markets and applications and transform how embedded systems are designed and operate whether at the edge of Earth-bound networks or in space.

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Darveen Launches Intel 14th Gen High-Performance Industrial Computers – MIC-9000 Series

Darveen, a global leader in industrial computing, announced the launch of the MIC-9000 Series industrial computers. Powered by Intel® 14th/13th/12th Gen Core™ i7/i5/i3 processors and supporting up to four PCIe/PCI expansion slots, the series combines high-performance computing, cableless architecture, and flexible expandability to deliver outstanding reliability and scalability in demanding industrial environments.

The MIC-9000 Series is an ideal platform for advanced applications such as industrial automation and edge AI computing.

High-Performance Processing

The MIC-9000 Series is equipped with Intel® Core™ desktop processors (14th/13th/12th Gen), delivering next-generation performance for complex workloads. Leveraging Intel's hybrid architecture, which combines Performance-cores (P-cores) and Efficient-cores (E-cores), the system achieves optimized performance and power efficiency. With support for up to 64GB of DDR5 memory, it ensures smooth multitasking in data-intensive environments.

Multiple PCIe/PCI Expansion Options

The MIC-9000 Series offers a range of expansion options to meet various requirements. The MIC-9X00 models feature a compact design without PCIe/PCI expansion. For applications requiring additional capabilities, the MIC-9X11 models provide two PCIe/PCI expansion slots, allowing integration of essential add-on cards. For more complex applications, the MIC-9X22 models support up to four PCIe/PCI slots, enabling integration of multiple expansion cards such as motion control or data acquisition cards. These options allow system integrators and developers to select the most suitable setup and support future upgrade for their industrial applications.

High-Performance GPU Support for Edge AI

To address the growing demand for edge AI computing, selected models support high-performance GPU integration. The MIC-9X22G and MIC-9X02GLF models support a GPU card up to 300W, accelerating compute-intensive workloads. Particularly, the MIC-9X02GLF accommodates a full-length GPU card up to 330 mm, delivering powerful computing performance for Edge AI applications

■ **Darveen** | www.darveen.com

Enabling Future Innovations:

INTERMEDIATE BUS CONVERTER PART 1: BENEFITS

This article will explore how an Analog Devices’ reference design stands out by addressing key concerns such as efficiency, power loss, thermal dissipation, and common footprint design. It will also discuss how the benefits and advantages can impact system applications.

Authors:
Karl Audison Cabas, Applications Engineer
Christian Cruz, Staff Applications Engineer
Analog Devices

Converting 54 V to a suitable 12 V is a challenging task that requires a new converter topology to develop an improved, high performance power supply. Additionally, it must have small dimensions to fit into the latest data center and hyperscale architecture, making a quarter brick small form factor highly desirable.

Introduction

In today’s world of digital information and constant social connection, having a well-designed and efficient data center is essential. These data centers provide the networking, storage, and global connectivity we rely on. Keeping them running smoothly is crucial to avoid data interruptions and corruption.

However, older data centers are struggling as they are operating near their limits with the market’s increasing demand of computing power, and their usage is continuously increasing rapidly every year. For example, the use of artificial intelligence as a large language model in terms of weekly active users has doubled in less than a year.


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This has led to a growing need for higher power density, which in turn will need more robust and high performance power converters.

As data centers scale up to support more powerful servers, networking equipment, and storage systems, they require higher power, which involves several stages of power conversion from the power transmission line down to the usable DC voltage level inside the rack. The legacy architecture in data centers is converting a rectified AC voltage down to 12 V DC, which will be the main power source inside the motherboards. However, 12 V DC architecture is becoming inefficient for main power delivery within the board. Increasing the input voltage to a 48 V supply allows for up to a 16× reduction in I2R losses across the PCB with considerably lower conversion losses and within the safety extra low voltage (SELV) level.

Therefore, an intermediate bus converter is a critical component in modern data center power architectures, which converts a 48 V voltage bus line from the primary power source, such as an uninterruptible power supply (UPS), to the existing intermediate bus voltage (5 V, 12 V architecture) and point-of-load (POL) regulators. This power supply is called an intermediate bus converter (IBC). IBCs come in various power capacities and sizes, with one common type being the quarter brick (QB) power supply.

A quarter brick power supply (QB PS) is a compact, efficient type of DC-to-DC converter module that plays a crucial role in modern power systems. It takes a high voltage DC input and converts it to a lower voltage that is ideal for powering a variety of peripherals and core processors inside the motherboard.

The term quarter brick refers to its small, rectangular shape. These power supplies usually measure around 58.4 mm × 36.8 mm (2.3 inches × 1.45 inches) in a PCB area, with a height typically about 14.5 mm (0.57 inches). Despite the small size, a QB PS is highly efficient and can be easily integrated into existing power systems.

These power supplies are widely used in data centers, where their compact footprint and high efficiency make them ideal for use in server racks, network switches, ventilation systems, rectifiers, and battery backups.

Their versatility and reliability make them a go-to solution for meeting the power needs of a modern electronic infrastructure.

These power supplies usually operate with input voltage ranges of 40 V to 60 V, although there are variations available for different input voltages. They utilize a switching technique to efficiently regulate and convert the input voltage to a lower, regulated output voltage, typically from 9 V to 16 V. The output voltage can vary depending on the specific requirements.

Key Features of Quarter Brick Power Supplies Often Include:

HIGH EFFICIENCY

These power supplies are designed to maximize conversion efficiency. The reduction of conversion losses should be lower than the I^2R losses a legacy 12 V DC architecture will incur.

WIDE INPUT VOLTAGE RANGE

They can accept a broad range of input voltages, making them compatible with various power sources. A typical nominal input voltage range falls within 48 VDC to 54 VDC with an extended range of 40 V DC to 60 V DC.

PROTECTION MECHANISMS

They incorporate protective features such as overvoltage protection, overcurrent protection, short-circuit protection, and thermal shutdown to safeguard the power supply and the connected devices.

THERMAL MANAGEMENT

Efficient heat dissipation is crucial for reliable operation. QB power supplies often include thermal management features such as heat sinks or integrated fans to regulate temperature.

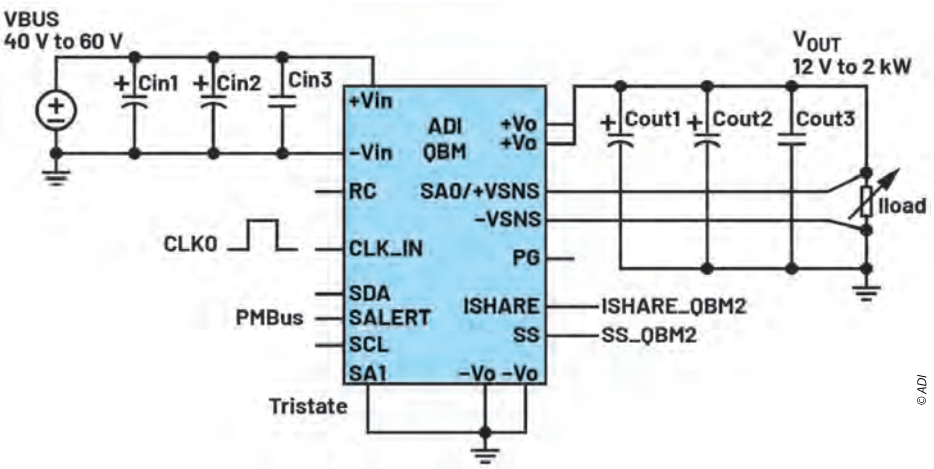

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Figure 1 *ADI's quarter brick PSU block diagram.*

REMOTE SENSING
Some models support remote sensing, which compensates for voltage drops along the output cables, ensuring accurate voltage regulation at the load.

PMBus® AND ADVANCED CONTROL FEATURES
Many QB power supplies offer advanced control capabilities, such as voltage trimming, remote on/off control, and synchronization with other power modules.

SCALABILITY
The QB power supply should be easily scalable with minimum circuit adjustment, can be configured in parallel operation for different power demands, and can handle pre-biasing startup for hot swap capability.
When selecting a QB power supply, it is essential to consider factors such as input/output voltage requirements, load current, efficiency, operating temperature range, and specific industry certifications or standards applicable to your application. These features are available in a QB reference design, which is suitable for demanding applications that require stable and efficient power delivery.
The key components of a QB power supply include an input filter, an output filter, some feedback control circuitry, and protection mechanisms that may be included in controller or power management ICs (PMICs). See Figure 1.

Advantages of a QB Power Supply

COMPACT SIZE
One of the primary advantages of a QB power supply is its compact form factor, which allows for efficient space utilization in applications where size is a constraint.

HIGH POWER DENSITY
Despite their small size, QB power supplies offer high power density, enabling them to deliver significant power outputs.

EFFICIENCY
With advancements in power conversion technologies, QB power supplies achieve high efficiency levels, reducing energy wastage and minimizing heat dissipation.

THERMAL MANAGEMENT
QB power supplies often incorporate thermal management consideration, such as a flat baseplate that can be extended with a heat sink to ensure optimal operation and reliability in challenging thermal environments.

RELIABILITY AND DURABILITY
These power supplies are designed to meet stringent industry standards, ensuring long-term reliability and durability even in harsh operating conditions.

SUPPLY RESILIENCY
QB power supply pins are compatible between different manufacturers due to their common footprint package (CFP) to ensure resilient supply chain in production or ease of after-sale support in case of field failures.

Key Features of the QB Power Supply

WIDE INPUT VOLTAGE RANGE
QBM power supplies typically support a wide input voltage range, allowing for compatibility with various power sources.

OUTPUT VOLTAGE REGULATION
They provide precise and stable output voltage regulation, ensuring consistent performance across different load conditions.

HIGH POWER DENSITY
This quarter brick design is capable of delivering 2 kW on regulated 12.2 V for the same off-the-shelf quarter brick power supply.

SCALABLE
The topology is a current-mode power supply that can easily be paralleled by tying its soft start pin and compensation pin together. This reduces the complexity for parallel operation.
Figure 2 shows an example of how each QB can be paralleled.

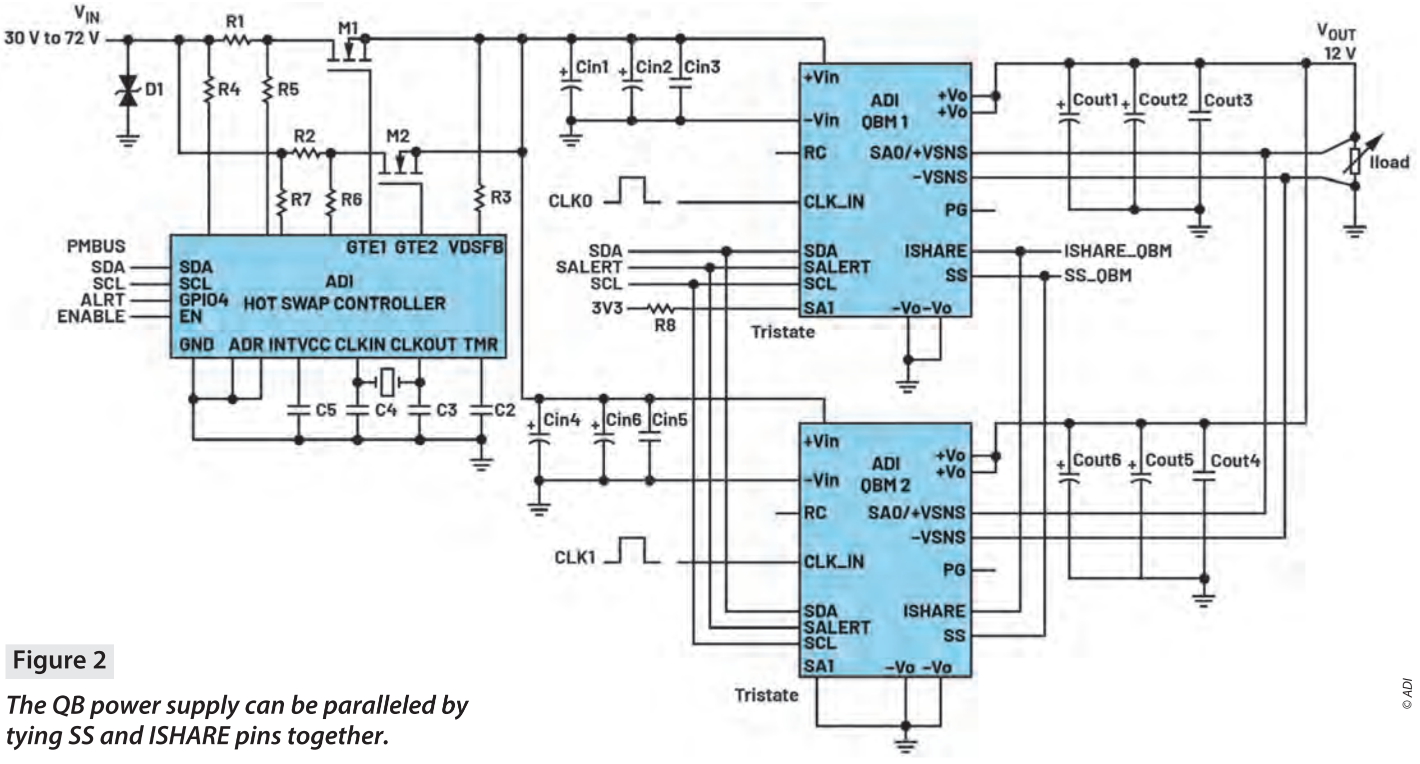

Figure 2

The QB power supply can be paralleled by tying SS and ISHARE pins together.

PROTECTION MECHANISMS

QB power supplies incorporate protection features such as overvoltage protection (OVP), overcurrent protection (OCP), short-circuit protection (SCP), and thermal shutdown to safeguard against electrical faults and prevent damage to connected devices.

Coupled Inductors in Intermediate Bus Converters

A coupled inductor is another excellent technology to incorporate a quarter brick power supply for intermediate bus applications due to the integer ratio conversion. A 48 V to 12 V conversion will have 50% duty cycle, which makes the buck section operate at a notch for a 2-phase coupled inductor design.

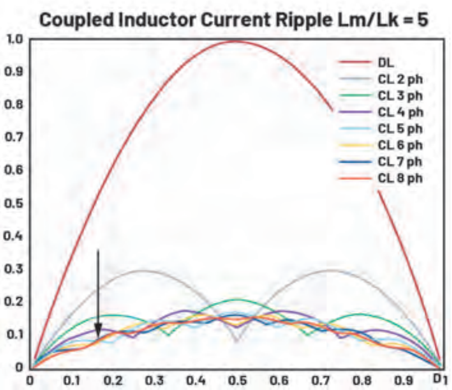

Figure 3

Normalized current ripple as a function of duty cycle for a given coupling coefficient, Lm/Lk.

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Even for a wider 40 V to 60 V (typical) input voltage range, it can still benefit from using a coupled inductor instead of a discrete inductor (DL). Figure 3 shows the normalized current ripple comparison between a discrete inductor and coupled inductor with different phases.

As seen in Figure 3, the current ripple is minimized at 50% duty cycle for a 2-phase coupled inductor design. Notice that the benefit of coupled inductors is not the same across different duty cycles. Different phases have different notch locations where the reduction of current ripple is maximized. So, it is important to consider the input voltage range and target output voltage of the quarter brick design. For example: a buck converter with a 4:1 step-down ratio should use a 4-phase design to maximize the coupled inductor's current ripple reduction. See Figure 4 for an example of a single 4-phase coupled inductor.

The most important impact of using a coupled inductor in a quarter brick design is its significant reduction in the size of magnetic components, which is required for quarter brick PCB dimensions. The use of a coupled inductor allows for delivering high output power at competitive efficiency.

Applications of Quarter Brick Power Supply

QB power supplies find applications in various industries and sectors, including the following:

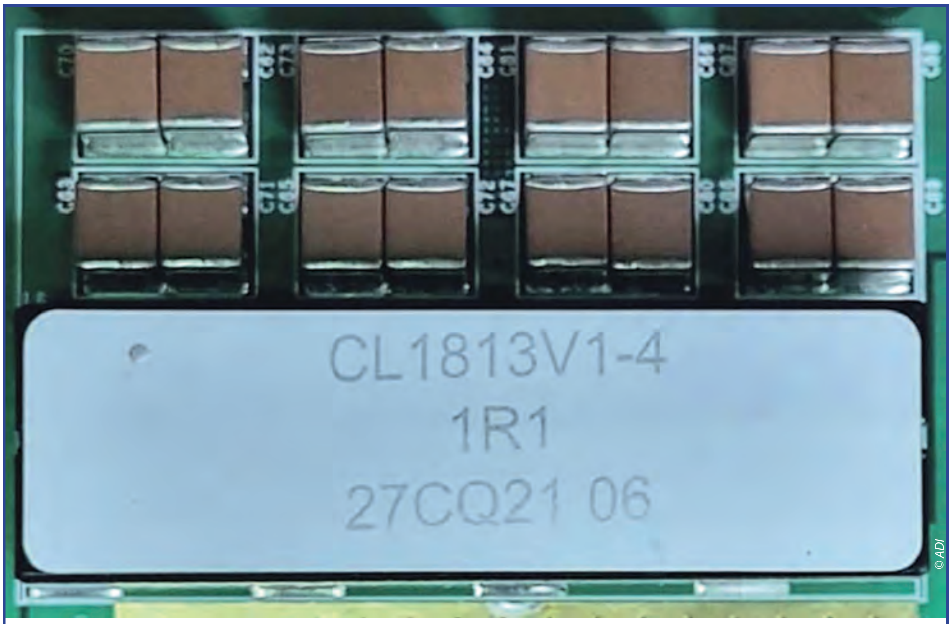

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Figure 4 *A single 4-phase coupled inductor that can be used for 48 V to 12 V conversion with a 4-phase DC-to-DC converter.*

- Telecommunications are commonly used in telecom infrastructure, data centers, and networking equipment to power communication systems and network switches.
- QB power supplies are suitable for industrial automation applications such as motor drives, robotics, and control systems.
- Using a quarter brick power supply is suitable for different output voltage step-down ratios.

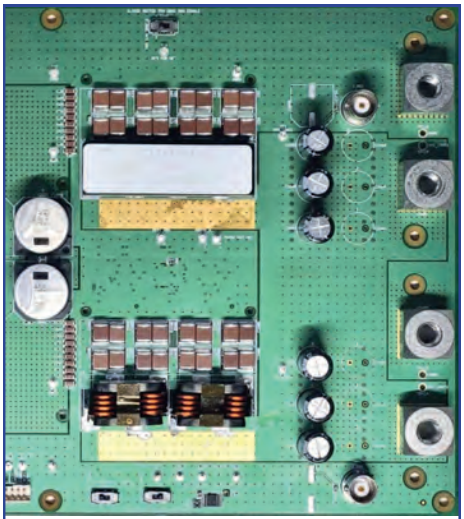

Figure 5

ADI discrete quarter brick reference design.

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ADI's discrete quarter brick reference design makes it easier to include multiple coupled inductor footprints available to evaluate up to two different output voltage levels, or parallel them together to test at higher output current requirements. See Figure 5 for the quarter brick section.

Conclusion

Older data centers are struggling to meet the increasing demand for computing power, especially with the rapid growth of artificial intelligence. To address these challenges, modern data centers are adopting new designs with higher power density, such as the 48 V architecture, which significantly reduces power losses compared to the traditional 12 V architecture. A key component in this transition is the intermediate bus converter, specifically the quarter brick power supply. These compact, efficient DC-to-DC converters are essential for converting high voltage DC input to lower voltages required by various peripherals and core processors.

The QB power supplies provide a streamlined, high performance power solution suitable for diverse applications. Renowned for their compact design, energy efficiency, and robust reliability, these power supplies boast superior power density, accurate voltage regulation, and advanced protective features, making them an essential component across various industries. They are designed to maximize space utilization, ensure reliable operation, and meet the power needs of modern electronic infrastructure.

Analog Devices' quarter brick power supply delivers key advantages for powering data centers while offering high efficiency, robust performance, and advanced control features. Enhanced reliability and reduced operational costs make it an ideal solution for efficient and dependable data center power management.

The next part of this series will discuss the comprehensive evaluation for the quarter brick power supply and the data gathered to provide the electrical and thermal performance, as well as the proper component selection for high power application.

■ **Analog Devices**
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About the Authors:

Karl Audison Cabas is an applications engineer focusing on power applications at Analog Devices since September 2020. He holds a bachelor's degree in electronics engineering from Polytechnic University of the Philippines and a postgraduate diploma in power electronics from Mapua University. He has more than 4 years of experience in DC-to-DC power converters. His previous function involved catering to customer inquiries and design issues related to DC-to-DC converters. He now works as power system applications engineer for cloud and data center applications.

Christian Cruz is a staff applications development engineer at Analog Devices, Inc., Philippines. He holds a bachelor's degree in electronics engineering from the University of the East in Manila, Philippines. He has more than 12 years of engineering experience in the field of analog and digital design, firmware design, and power electronics, which includes power management IC development as well as AC-to-DC and DC-to-DC power conversion. He joined ADI in 2020 and is currently supporting power management requirements for cloud-based computing and system communications applications.

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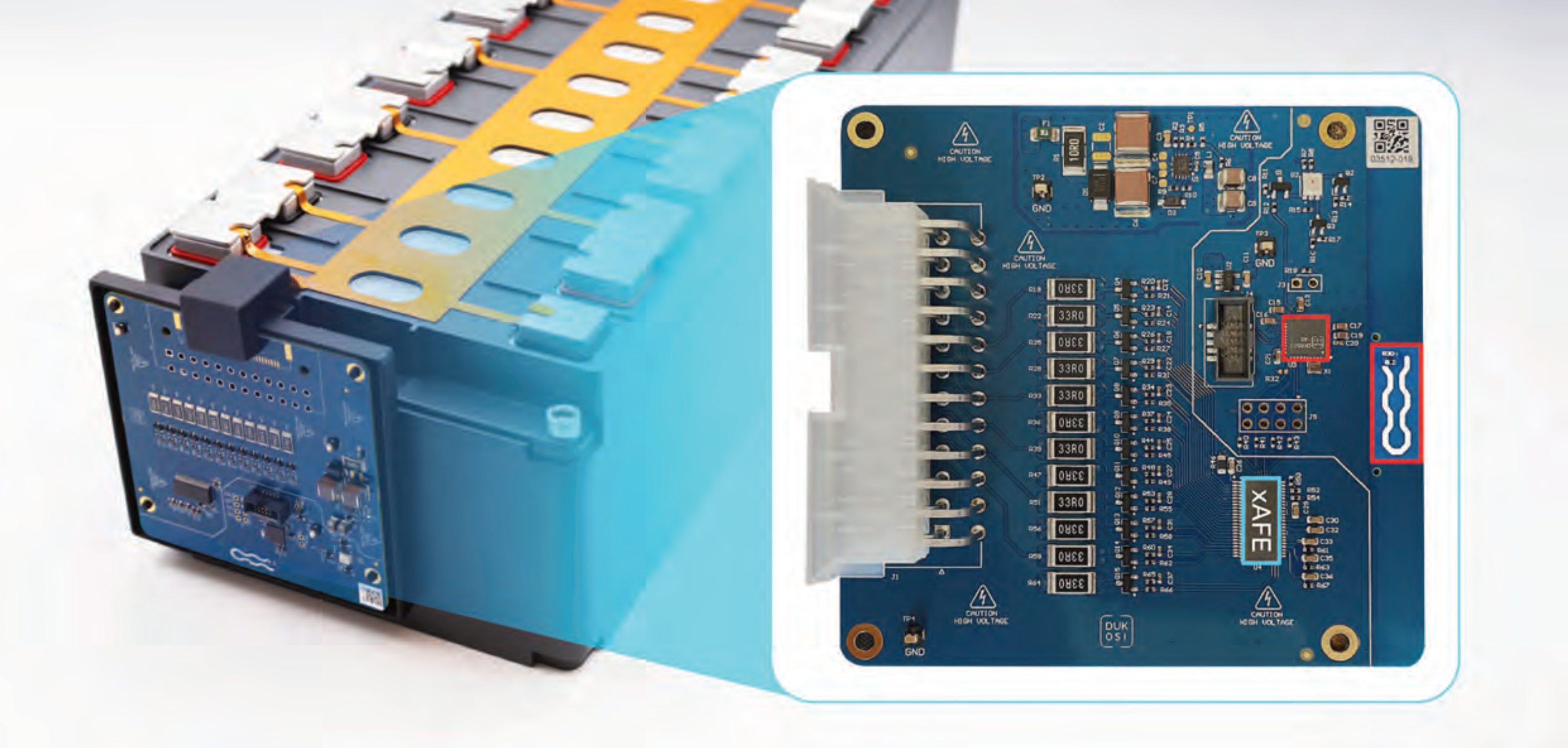


Dukosi to Showcase Live Demonstrations of DK-NFLNK™ and DKCMS® Battery Passport-Ready PoC at The Battery Show Europe 2026

Dukosi Ltd, the technology company revolutionizing the performance, safety and sustainability of high-power battery systems, is pleased to announce its presence at The Battery Show Europe 2026 in Stuttgart, Germany. At the event, Dukosi will feature a live demonstration of its new DK-NFLNK communications solution for modular battery systems and will also showcase collaborations with industry partners.

Taking place from 9th – 11th June at Messe Stuttgart, Dukosi will be in its new location in Hall 3, Booth #3-B20, showcasing how its award-winning cell monitoring and unique battery communications technologies are addressing key industry challenges and future proofing battery systems for automotive (xEV), industrial transportation, marine applications, and battery energy storage systems.

Dukosi's unique battery cell monitoring solutions create safer and more scalable battery designs, support regulatory compliance, and provide cell-level intelligence and advanced measurement capabilities for improved analytics, SoX estimations, battery performance and longevity.

Visitors to the booth will see demonstrators developed in collaboration with industry leaders and partners, including a turnkey Battery Passport-ready Secure Cell-to-Cloud Battery Management solution demonstrator developed in collaboration with STMicroelectronics.

Dukosi DK-NFLNK™ Demonstrator

The DK-NFLNK solution for modular battery designs provides a simple, highly effective upgrade path from traditional wired and far field wireless BMS architectures based on multi-channel AFEs, to a more reliable battery solution that offers synchronous, module-level data communication to the BMS host using Dukosi's proprietary contactless communication protocol based on C-SynQ®.

DK-NFLNK helps simplify battery pack design while improving data integrity, reliability, scalability, and flexibility.

The DK-NFLNK live demonstrator consists of a 12-cell module configuration typical of 400-800V battery packs used in xEV and BESS applications, and allows attendees to explore how Dukosi's solution can support more secure and reliable battery systems based on modular battery architectures.

DKCMS® Battery Passport-ready PoC Demonstrator Module

Developed in collaboration with STMicroelectronics, Dukosi will be showcasing a Battery Passport-ready proof-of-concept (PoC) representing an end-to-end cell-to-cloud battery data management solution using the Dukosi Cell Monitoring System (DKCMS®) and STSAFE-A120.

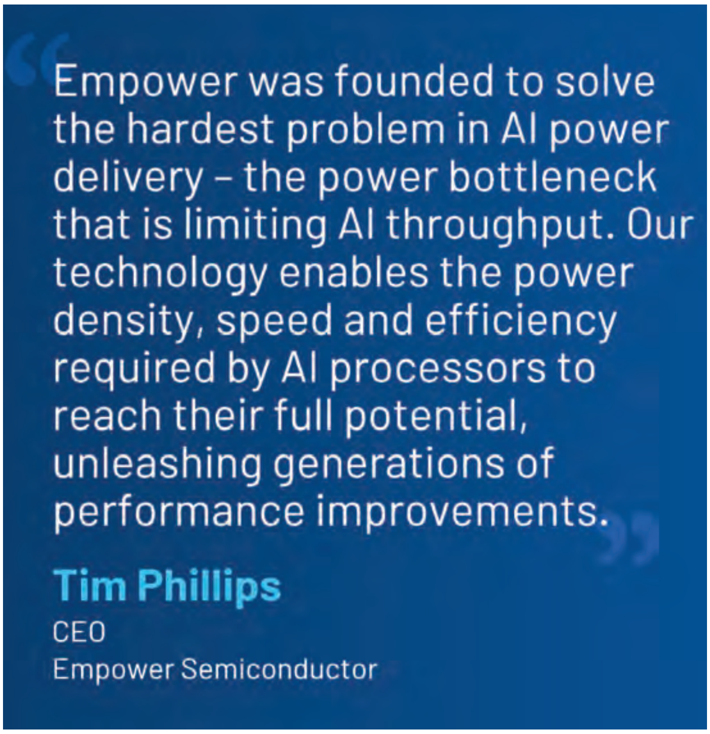
Designed to deliver complete cell data security, regulatory compliance, and support the circular economy, the reference platform incorporates 16 cells, a standard battery module configuration appropriate for xEV, industrial equipment, and battery energy storage applications.

It utilizes Dukosi chip-on-cell technology with C-SynQ® proprietary communications, ST's BMS host processor and Secure Element device, demonstrating the potential of authenticated lifetime cell-to-cloud data and tamper-proof Battery Passport ID to build supply chain trust, improve repairability and extend battery lifecycle through safer reuse and recycling.

■ **Dukosi** | www.dukosi.com

“ADI already delivers some of the highest-performance power management solutions in the industry, and with Empower we are further expanding our portfolio to help customers rearchitect their power systems and achieve the compute densities next-generation AI demands.”

Vincent Roche
CEO and Chair
Analog Devices



“Empower was founded to solve the hardest problem in AI power delivery – the power bottleneck that is limiting AI throughput. Our technology enables the power density, speed and efficiency required by AI processors to reach their full potential, unleashing generations of performance improvements.”

Tim Phillips
CEO
Empower Semiconductor

Analog Devices to Acquire Empower Semiconductor, Expanding its Next-Generation High-Density Power Portfolio for the AI Era

Analog Devices, Inc. and Empower Semiconductor announced that they have entered into a definitive agreement under which ADI will acquire Empower in an all-cash transaction for $1.5 billion.

As AI compute scales, power density – not just total watts – has become the limiting factor. Delivering high-density, high-efficiency power at the point of compute, while responding to fast-changing demands, is now one of the most critical challenges in system design.

Together, ADI and Empower will help shape the power delivery architecture for AI and other compute-intensive applications. By enabling power conversion closer to the processor, the combined solution shortens the power delivery path and improves efficiency to support higher-performance, higher-density systems.

Building on its leadership in high-performance power management, ADI is investing in its system-level platform to deliver a step-change in performance, density, and efficiency from grid to core.

Commentary

“AI infrastructure is fundamentally reshaping how power must be delivered, with energy now the most persistent constraint to scaling next-generation systems. ADI already delivers some of the highest-performance power management solutions in the industry, and with Empower we are further expanding our portfolio to help customers rearchitect their power systems and achieve the compute densities next-generation AI demands. The impact of this technology extends well beyond AI data centers to any domain where energy constrains what is possible,” ***said Vincent Roche, CEO and Chair at ADI.***

“Empower was founded to solve the hardest problem in AI power delivery – the power bottleneck that is limiting AI throughput. Our technology enables the power density, speed and efficiency required by AI processors to reach their full potential, unleashing generations of performance improvements. The combination of ADI’s power management platform, scale and operational excellence, along with the system level benefits our merger enables, will accelerate our adoption with customers,” ***said Tim Phillips, CEO of Empower Semiconductor.***

Empower’s silicon capacitors are already in production, and IVR programs are advancing in close collaboration with leading hyperscalers and AI silicon providers – capabilities ADI will accelerate through its scale, manufacturing, and customer reach.

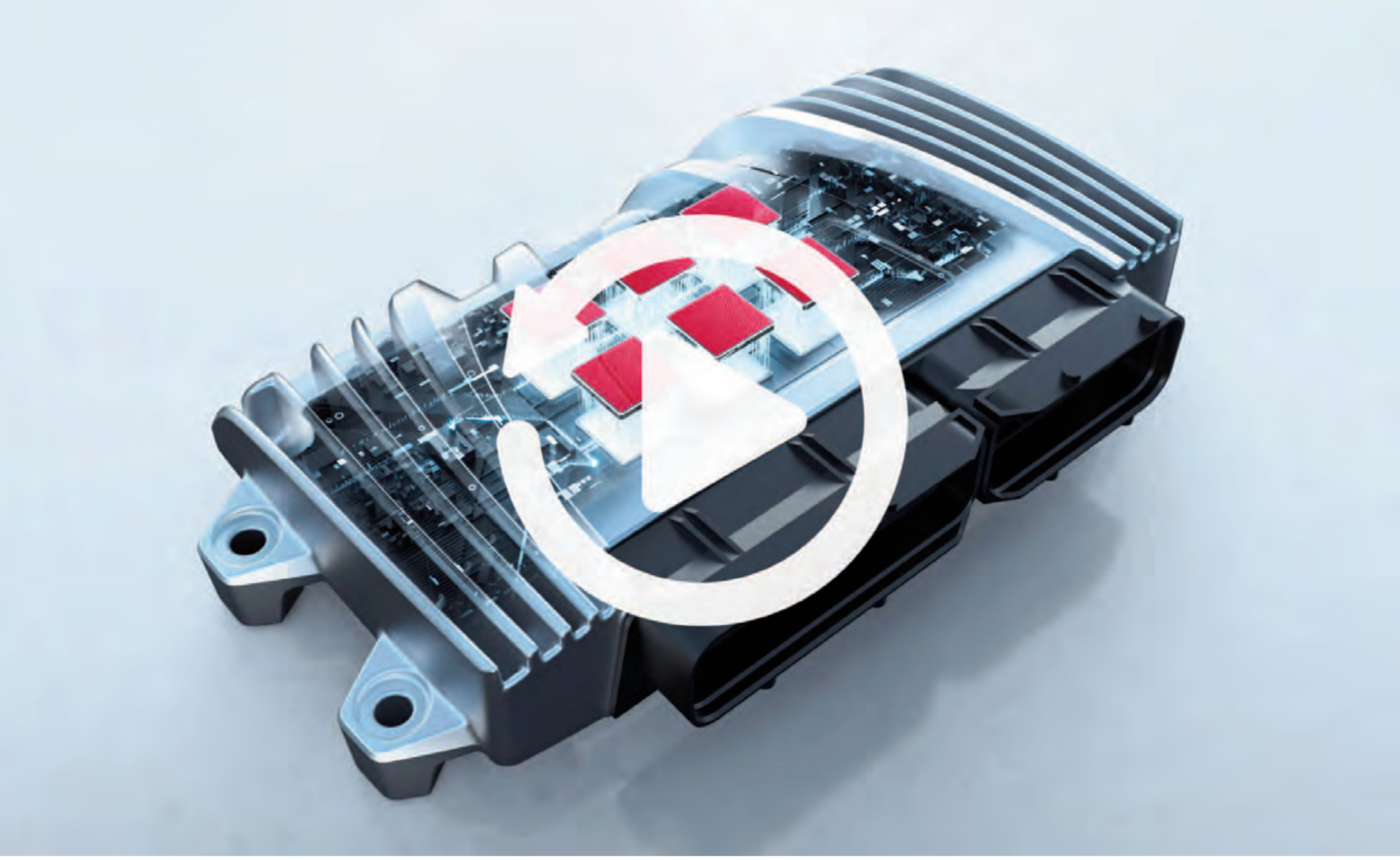
Transaction Details

Under the terms of the agreement, which has been approved by the Boards of Directors of both companies, ADI will pay Empower’s stockholders $1.5 billion in an all-cash purchase price.

The transaction is expected to close in the second half of calendar year 2026, subject to customary closing conditions and the expiration of the applicable waiting period (and any extension thereof) under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended.

Following the closing of the Transaction, Mr. Phillips will continue leading IVR technology efforts as part of ADI.

- **Analog Devices (ADI)**
  www.analog.com



Premiere at the Automotive Testing Expo in Stuttgart: Joint Data Replay Solution for ADAS/AD Testing from Vector Informatik and Solectrix

Realistic and reproducible testing of camera-based driver assistance and automated driving functions is becoming increasingly important. Against this backdrop, Vector Informatik and Solectrix are jointly introducing a powerful data replay solution that enables development and test teams to efficiently and transparently validate state-of-the-art ADAS and AD functions.

To achieve this goal, the two companies combine their core competencies: Vector contributes its proven simulation and test tools CANoe and DYNA4 for vehicle communication, remaining bus simulation, and virtual driving scenarios, while Solectrix adds its long-standing expertise in embedded vision along with its high-performance video capture and replay system proFRAME. Together, the partners offer a broad range of capabilities for testing and video replay.

Through the full integration of CANoe, DYNA4, and proFRAME, users gain access to an end-to-end development and test solution that enables precise, synchronized, and reproducible playback of camera data from real and virtual scenarios. Development teams can therefore run identical test scenarios across different software versions, detect regressions at an early stage, and deliberately analyze complex or rare traffic situations. This significantly reduces test effort, improves the comparability of results, and shortens development cycles.

Real-time camera replay for ADAS/AD validation

For the first time, virtual driving scenarios can be output in real time as camera streams, while simultaneous camera I^2C emulation is performed. This makes it possible to precisely validate the environment model generated by data fusion and the ADAS/AD driving functions based on it on the ECU – entirely without the use of a physical vehicle. Additional test scenarios, such as targeted fault simulation through manipulation of video or I^2C data, allow boundary and failure scenarios to be investigated in a controlled manner and enable focused validation of safety-critical ADAS and AD functions.

A modular toolset for reproducible ADAS/AD validation

Overall, users benefit from a modular, extensible toolset that combines reproducible testing, flexible data sources, and comprehensive simulation capabilities within a consistent, end-to-end approach. This integration creates transparency and efficiency in the development process and forms the foundation for continuous validation of advanced ADAS and AD systems. As a premiere, Vector Informatik and Solectrix will present the joint video replay test setup for the first time at the Automotive Testing Expo, taking place June 23–26, 2026, in Stuttgart. Visitors can experience the new test environment at the Vector booth (Hall 1, Booth 1602) with real and virtual camera data, and discover additional embedded vision and proFRAME showcases at the Solectrix booth (Hall 1, Booth 1321).

■ **Vector** | www.vector.com

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