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ELECTRONICS INFORMATION UPDATE

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POWER ELECTRONICS

FEATURES

Powering modern MCUs

HV GaN for 800V bus architectures in data centres

Generating negative voltages from a positive voltage supply

Powering electric motor drives

First integrated hot swap fuse for AI data centres

PLUS

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Industry News:

- Device-to-cloud IoT solution
- Quantum computing milestone
- Automatic image recognition for logistics
- Innodisk honoured for excellence

Test & Measurement

Connector Geek

Tech Ideas

Dev Kit pick

NPI

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Hopefully, all our readers and contributors will be revitalised by a seasonal end of year break and we wish everyone a healthy, happy and prosperous 2026.

Kicking off the new year, we focus on power with feature articles including: HV GaN for 800 V bus architectures in data centres; Generating negative voltages from a positive voltage supply; Powering electric motor drives; Integrated hot swap fuse for AI data centres; and Powering modern MCUs. Stuart Cording looks at ways to measure and deliver power during applications development, while David 'Connector Geek' Pike discusses the importance of colour, and in Tech Ideas we examine hydrogen fuel cells and eVTOLs. Plus Mark Patrick's Dev Kit Pick, the news round-up, and, of course, a review of the most innovative products now in stock at Mouser. Now read on! Cheers!
Nick Foot, Editor, Mouser's EIU.

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Newest products now available from u-blox, Synaptics, AMD and more

TDK SensEI's edgeRX platform now powered by AWS

TDK SensEI is collaborating with Amazon Web Services to accelerate the deployment of edge-to-cloud industrial machine intelligence. TDK SensEI's edgeRX platform will be integrated with key AWS services, such as AWS IoT Core, AWS IoT Greengrass, Amazon Bedrock AgentCore, and Amazon SageMaker, to bring scalable, intelligent machine health monitoring and predictive maintenance to industrial customers globally. Combining TDK's sensor, software, and AI expertise with AWS's cloud capabilities.

"Deploying our edgeRX platform on AWS represents a significant milestone in helping our customers advance their industrial transformations at pace," said Sandeep Pandya, CEO of TDK SensEI. "Through the integration of our edgeRX platform with AWS's cloud infrastructure, we've built a more secure AI solution that improves machine performance and product quality at scale. This is a foundational move toward a smarter industrial future."

"AI ecosystem market is a key driver for realizing our long-term Vision, TDK Transformation," said Noboru Saito, President and CEO of TDK Corporation. "TDK SensEI's edgeRX platform is at the heart of our ecosystem for industrial customers, and now with the power of AWS Cloud Solutions, we're accelerating digital transformation at greater speed, scale, and security."

Combining TDK SensEI's edge-first architecture with AWS's secure cloud infrastructure, edgeRX can deploy AI at the edge, perform real-time diagnostics, and reduce unplanned downtime, with centralized control and enterprise-grade data protection. The platform leverages AWS IoT Core for seamless device connectivity, AWS IoT Greengrass for provisioning and security, Amazon Bedrock AgentCore to accelerate AI agent development, and Amazon SageMaker to train and deploy machine learning models to optimize asset performance.

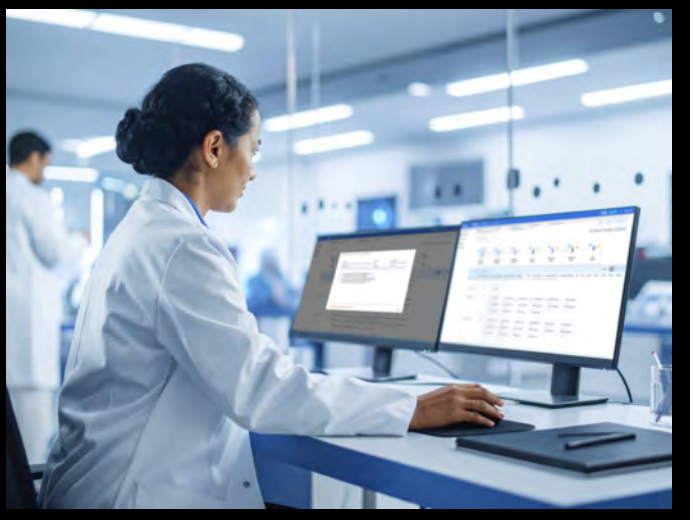
www.edgecortix.com/en

Emerson and Roche to drive innovation in Life Sciences

Simplifying technology transfer to safely and quickly bring new treatments to patients, Emerson has collaborated with Roche on a Modality Library for faster deployment and implementation of DeltaV Process Knowledge Management (PKM) software. Accelerating the time it takes to develop a process specification through its lifecycle to full commercial scale, the library provides a set of software building blocks to help organizations quickly establish a modular approach to characterizing process definitions.

The solution will reduce the months needed to establish an organization's standards and then create the associated, validateable building blocks in a PKM collaboration environment. It will aid in the development of ontology, equipment classes and capabilities, use of materials and formulations, and quality testing plans to create process specification recipes aligned with the submission and licensing process. The modality library facilitates seamless integration into execution systems to digitally transfer specification information into working recipes.

Technology transfer is a major obstacle in delivering new medical breakthroughs, and this specialized library helps overcome this hurdle by streamlining and accelerating the move from research to commercial launch. The DeltaV PKM Modality Library provides a pre-built, proven, customizable set of specification elements with an established framework for a given modality, including examples of underlying process steps, activities, key process parameters, and critical quality attributes.



Emerson.com

Generating Negative Voltages from a Positive Voltage Supply: Market Requirements and Solutions

By Erik Lamp, Senior Product Applications Engineer, and Randyco Prasetyo, Principal Product Applications Engineer, Analog Devices

Abstract

It is common for Internet of Things (IoT) devices, industrial sensors, meters, precision, and medical equipment to require both a positive and negative voltage. Often, these voltages must be symmetrical and sourced from a single power supply. This article explains the market trends, technical requirements, and a comparative analysis of solutions, aiming to equip the design engineer with the insights needed to effectively use the available products.

Definition of Terms

Converter: Power management integrated circuit with or without integrated switches inside an IC.

Regulator: A converter with integrated switches.

Controller: A converter with external switches.

The Market

Various electronic designs require one or more negative voltages in the power supply, often coming together with a symmetrical positive voltage. Some typical application examples are:

- In gate drives for the charger and traction inverter of electric vehicles (to drive gallium nitride (GaN) FETs and isolated-gate bipolar transistors (IGBTs) for example).
- In high performance ADC and DAC and rail-to-rail operational amplifiers (op amps) for industrial and medical applications.
- In LCD displays for consumer products.
- In driving (avalanche) photodiodes.
- In medical applications like X-rays.

The following details two typical block diagrams of such designs.

Gate Drives: For high power switch-mode power supplies and motor drives, a negative driving voltage is often required, that is due to:

- Systems may not have a tightly placed and coupled PCB layout, its circuit ground usually couples with noises from all around the system and may fluctuate around ground level.
- The main power devices such as IGBTs, silicon carbide (SiC), or GaN FETs are often placed up to centimetres away from the gate control circuitry unless they are all housed inside a module. Hence, the signal coming out of the gate drivers may be distorted as they reach the power devices, the additional safety margin is desired.
- Advanced power devices such as GaN FETs often have a low turn-on threshold, making them more sensitive to gate voltage ringing. Some high voltage GaN FETs may have high CGD or wide process variation, which may cause a Miller effect-induced turn-on. In this case, the end customers are suggested to apply a negative gate voltage to ensure the device maintains it's off status. For certain types of IGBTs, a negative voltage is required to completely turn off.

One example is using an isolated driver, ADuM4120. In such applications, the power devices are driven from positive voltage as in V1 and negative voltage as in V2, as seen in Figure 1.

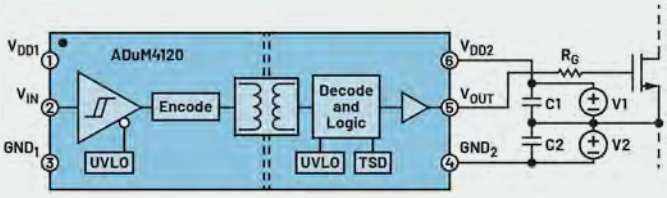


Figure 1. Example bipolar supply setup.

Rail-to-Rail Op Amps: For various signal conditioning applications, rail-to-rail op amps are often used where the output needs to have a wide span close to supply, the input swings around the reference, or when the highest precision is required. A typical example of a phono preamplifier system is shown in Figure 2. This design requires one positive 15V and one negative 15V.

Powering modern AI data centers with industry's first integrated 48V integrated hot swap (eFuse)

By Kshitiz Khatri, Texas Instruments

Introduction

As high-performance computing and artificial intelligence continue to grow, data centers demand power-dense, efficient solutions to support the latest central processing units, graphics processing units (GPUs) and hardware accelerators.

The need for increased power density and a shift to 48V power architectures to accommodate processing demands introduces new challenges, however, particularly in managing power levels >6kW while maintaining reliability, efficiency and scalability.

Increasing power requirements often lead to larger solution sizes, complex designs, and inefficiencies in fault detection and protection. Additionally, managing high currents while ensuring safe operation and minimal power losses becomes an important concern. Traditional hot-swap controllers combined with discrete field-effect transistors (FETs) face significant limitations in high-power applications.

To address these challenges, TI's 48V hot-swap eFuse device with power-path protection is designed to be a reliable and compact solution for data center applications.

Unlike approaches that require external sense resistors and current-sense amplifiers for current monitoring, the TPS1689 and TPS1685 simplifies designs by integrating these functionalities, reducing solution size upto 50% while enabling seamless scalability to support high power levels.

One of the differentiating features of the TPS1689 is the blanking timer, which prevents false tripping by enabling the system to distinguish between peak load currents and actual fault conditions. This feature enhances system reliability and avoids unnecessary shutdowns. The device also supports stacking capabilities for increased current handling, allowing multiple devices to work together in high-power applications.

An integrated black box for fault logging, a guaranteed FET safe operating area, active current sharing and health monitoring further enhance system resiliency. Available in an industry-standard common footprint, the TPS1689 provides a power management solution that ensures reliable operation.

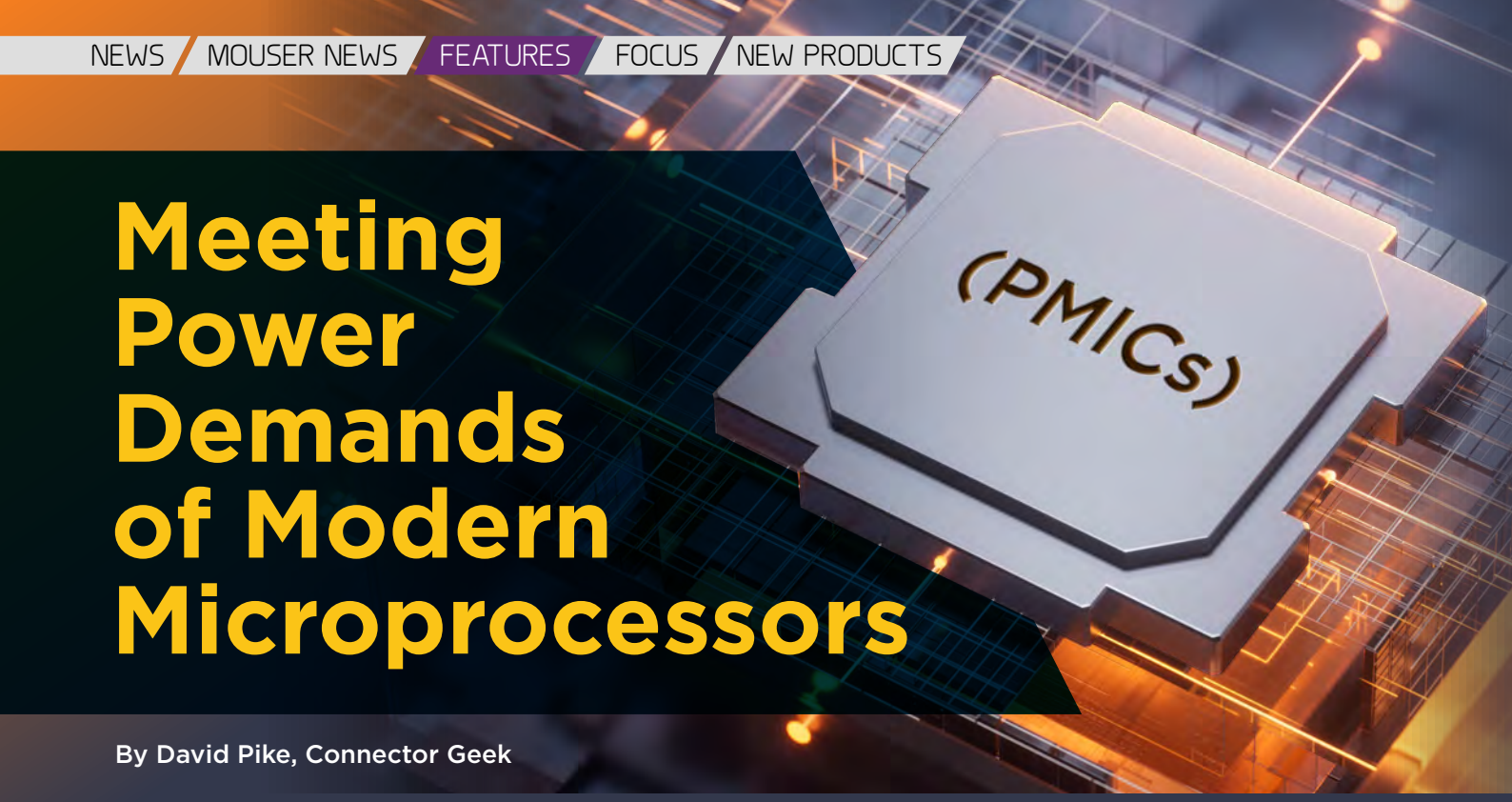
Enhancing server protection and performance

The blanking timer offers advantages in enterprise server systems by striking a balance between system protection and performance optimization.

As shown in Figure 1, this feature enables short transient overloads to pass through without triggering a circuit breaker, ensuring that temporary, high-amplitude load pulses common in AI, GPU and processor-intensive applications do not disrupt the system. However, the eFuse promptly shuts down the circuit during sustained overcurrent events.

Other advantages include:

- Cost optimization. The blanking timer minimizes the need for oversized power-supply units (PSUs) and reduces the number of eFuses required in parallel configurations. This significantly lowers bill-of-materials costs while maintaining reliable operation.
- Improved power density. By reducing the number and size of high-current-carrying components, the system can achieve a more compact design, freeing up valuable printed circuit board (PCB) space and improving thermal management.
- Flexibility and customization. Programmable fault intervals enable designers to fine-tune the system response to match specific transient profiles, optimizing performance for unique workloads



Meeting Power Demands of Modern Microprocessors

By David Pike, Connector Geek

Introduction

There are many demands for increased computing power in the modern world. The explosion in the volume of data created, processed, and stored has been driven by the rapid expansion of artificial intelligence (AI). AI has impacted every aspect of modern life, from the cars we drive to how we shop. In the industrial world, edge computing has revolutionized manufacturing, creating a more flexible factory space that can respond quickly to changing needs. All these applications require greater computing power, which leads to a need for more capable, high-performance processors.

The modern processor has evolved enormously to cope with this increased demand. Modern processors now boast process technology nodes as small as 3nm, and while design voltage requirements have dropped from 5V to as low as 0.8V, the smaller node size demands greater voltage precision to ensure optimum performance. The smaller node size has also enabled a significant increase in transistor density, which, in turn, raises heat density. This makes power efficiency even more critical to reduce power dissipation and ensure reliable operation.

The faster speeds of modern processors allow for quicker responses. While this speed allows them to work on new tasks rapidly, their performance demands a similar response speed from their power supply. If the power supply cannot react at the same speed, voltage drops at critical moments can cause system crashes or even damage to hardware.

In addition to these requirements comes the need for efficiency. While energy prices have risen worldwide, the energy demands of data centers have been driven further by power-hungry AI processors. Inefficiencies in power supplies result in increased thermal loads that must be managed. This combination of factors has changed the way in which energy is delivered.

In this blog, we'll review some of the challenges engineers face when dealing with modern power delivery and examine how NXP's Power Management Integrated Circuits (PMICs) provide scalable, efficient, and reliable solutions for next-generation processors.

The Persistent Problems of Power

The traditional power delivery method to the printed circuit board (PCB) is unsuitable for modern computing devices. Early microprocessors required far less complicated power supplies, as single-core processors required one voltage level, known as single-rail power supplies. This power was converted from mains power to direct current at relatively high voltages, originally 5V, but it decreased as processors became more sophisticated and nodes became smaller.

However, the multiple cores in modern processors operate at unique voltages and clock speeds. These multi-core processors, therefore, require systems that can provide the correct voltage for each function—a process known as multi-rail power management.

Each rail provides power to different blocks within the processor, including memory, core, and I/O functions. Multi-rail power systems are designed to deliver specific voltage and current to each core as required.

Changes in how we power processors reflect our new relationship with energy. We are encouraged to create more energy from renewable sources to help combat climate change. Operators are investing heavily in the opportunity to use technologies such as solar cells to reduce the cost of the energy they consume. In this method, the electricity is stored in an energy storage system (ESS) consisting of a large bank of batteries. In contrast to traditional grid-supplied power, the output of the ESS is direct current. There is, therefore, a need for power management systems that can deliver the correct voltage from a DC power supply.

At the same time, there is considerable interest in using new techniques to increase the efficiency of power supplies. Driven in part by the move within the automotive industry to use 48V power supplies, this new approach to power created the opportunity to increase efficiency.

One major contributor to power loss in power delivery networks is resistive conduction loss, which decreases efficiency in proportion to the square of the current ($P = I^2R \sim 1/Efficiency$). Increasing voltage and reducing the current delivers the same amount of power but significantly improves the overall efficiency of the system.

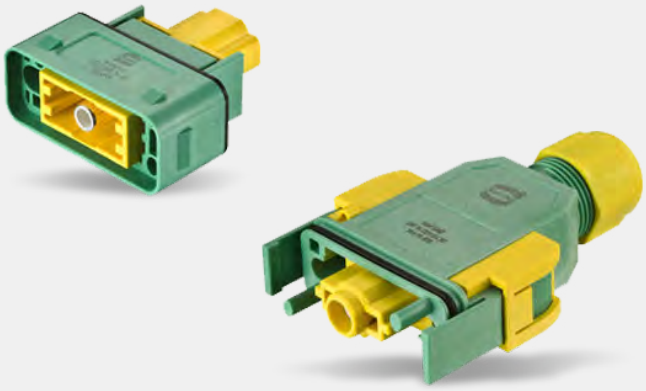
From the Connector Geek

Don't diss connectors! David Pike is proud to call himself the 'Connector Geek'. He has spent nearly 30 years in the interconnection marketplace, working with manufacturers and distributors, building a reputation throughout the industry for his passion and knowledge. So we gave him his own series...

THE IMPORTANCE OF COLOUR TO CONNECTORS

In my November 2025 column, I looked at the idea of connectors as art. Electronic components are designed to be functional. They are almost all excellent examples of form following function. Any beauty that results is usually the by-product of engineering decisions rather than their primary goal. But I did not look carefully at the subject of colour.

In the natural world, colour is rarely accidental. It is used as an invitation, as a warning or as concealment. Flowers use bright colours to attract pollinating insects, and venomous animals use bright colours to warn of danger. In contrast, many animals are coloured to conceal themselves, either to protect themselves from predators or to sneak up on prey. Colour is often essential for survival.



HARTING Han GND Connectors – Colours for Safety (Source: HARTING)

Connectors, of course, do not need to attract mates or scare predators, but they do exist in environments where fast and reliable interpretation matters. In this context, colour becomes a language, not of beauty or survival, but of information.

Concealment and Belonging

In nature, concealment allows organisms to blend into their surroundings. The goal is not invisibility, but belonging. In connector design, that might mean reducing visibility for operational reasons, or simply ensuring the hardware visually fits the environment it serves.

Military connectors are perhaps the most obvious example, and MIL-Spec circular connectors are rarely shiny. Instead, they are finished in olive drab or matte black to prevent reflections and to reduce their visual signature. Their finish also communicates purpose. While military connectors have found uses in other arenas, they are not designed for domestic or laboratory use. These connectors belong in the field.

Not all concealment is purely functional. If you have ever marvelled at the lights on the Eiffel Tower, spare a thought for the engineering behind this spectacle. Each of the 20,000 sparkling lights must be connected to a power supply. At one time, that connection was supplied by an Ecomate product from Amphenol Tuchel. To blend in with the surrounding structure, the normally blue-and-black connectors were moulded in the iconic brown colour. The choice in this case was not about camouflage in the military sense, but about visual harmony. The connectors needed to disappear into the structure rather than stand out against it. Colour became a tool for respect, ensuring that modern infrastructure does not visually dominate historic architecture.

Matching the iconic colour of the Eiffel Tower was important for connector choice

In both cases, colour draws attention away from the hardware itself. The connector is present, but it does not need to be obvious. Good design is sometimes about knowing when not to be noticed.

Embedded IoT processor suits consumer and industrial applications

The new SL1680 embedded IoT processor from Synaptics is the latest in a series of highly integrated, AI-native Android™ and Linux® embedded SoC processors optimized for multimodal enterprise, consumer, and industrial IoT applications.

Available from Mouser, the SL1680 incorporates high-performance compute engines including a quad-core Arm® Cortex®-A73 64-bit CPU subsystem, a multi-TOPS neural processing unit (NPU), a high-efficiency, feature-rich graphics processing unit (GPU) for advanced graphics and AI acceleration, and multimedia accelerators for 4K video encode/decode image signal processing (ISP) and audio.

The Synaptics SL1680 is part of the family of Synaptics Astra™ SoCs, including the Synaptics SL1640 and SL1620, also available to order from Mouser, which deliver a unified, standards-based, open software framework, full-featured AI toolkits, and Synaptics' best-in-class wireless connectivity.

Mouser also stocks the Synaptics SL1680-EVK evaluation kit, part of the Astra Machina™ Foundation Series of evaluation-ready kits. The kit enables easy and rapid prototyping for the SL1680 multimodal embedded processors with a modular design that incorporates swappable core compute modules, a common I/O board, and daughter cards for connectivity, debugging, and flexible I/O options.

Learn more about Synaptics' SL1680 processor

Tri-radio modules for low-power, IoT and mesh networking

MAYA-W4 tri-radio modules from u-blox are cost-efficient wireless connectivity modules supporting dual-band Wi-Fi® 6, Bluetooth® Low Energy 5.4, and 802.15.4, offering reliable and secure connectivity for low-power IoT and mesh networking, medical, consumer, smart homes, and industrial applications.

The MAYA-W4 modules, available from Mouser, solve network congestion issues, boost power efficiency, and deliver the latest wireless technologies for the IoT ecosystem and the next generation of smart, low-energy, mesh network devices. The MAYA-W4 combines Wi-Fi 6, Bluetooth LE 5.4, and 802.15.4 (for Thread supporting Matter), with an entry-level feature set and optimized data throughput offering secure connectivity and cost-efficiency without compromising performance. By maintaining the same compact dimensions as its predecessors (10 × 14 × 1.9 mm3), and an industrial temperature range of -40°C to +85°C, the MAYA-W4 modules simplify migration across previous generations while enhancing device connectivity and interoperability across diverse industries.

Mouser also stocks the u-blox EVK-MAYA-W476 evaluation kit. The EVK-MAYA-W476 allows an external host processor to access several practical features for testing and evaluating the connectivity options supported in the MAYA-W476 module.

This evaluation kit features external connectors and pin headers for GPIO and all host interfaces. The EVK-MAYA-W476 evaluation kit includes a dual-band SMA dipole antenna, SD, Micro-SD, and M.2 adapters and cables.

Learn more about u-blox' MAYA-W4 tri-radio modules