FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

FUTURE ELECTRONICS
A WT Microelectronics Company

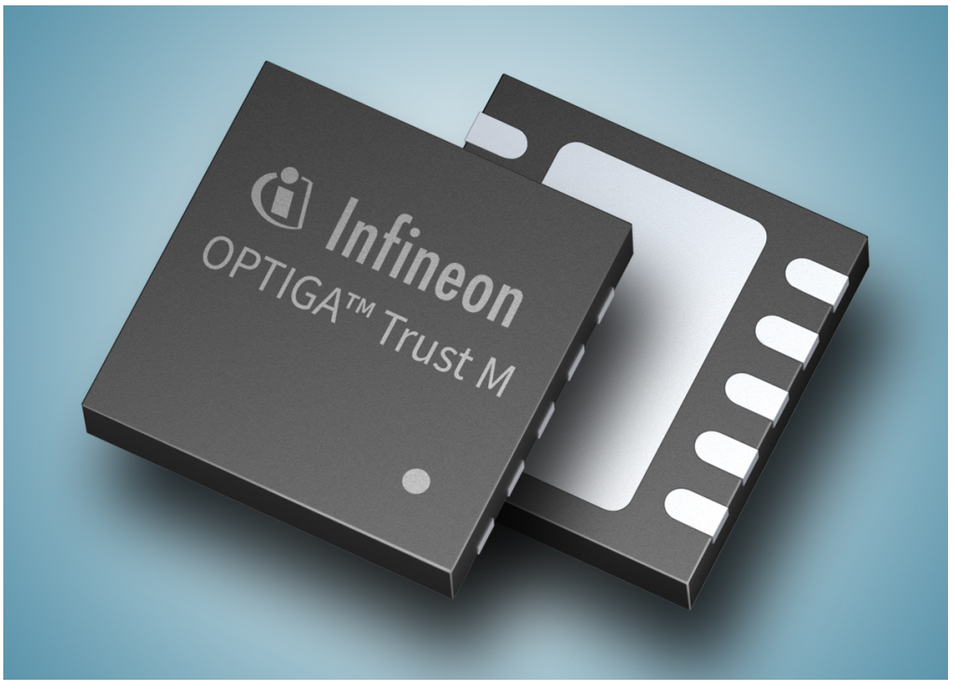
FTM

NPIs, DESIGN AND TECHNOLOGY NEWS

26-iii
AI & Edge Solutions

Secure element reduces production steps in IoT device-to-cloud onboarding

The OPTIGA™ Trust M Express secure element from Infineon Technologies is designed to reduce manufacturing and onboarding complexity in IoT devices by delivering a pre-provisioned cryptographic identity that is ready for cloud authentication at first power-up.



Typical IoT device-to-cloud onboarding relies on a per-device identity provisioning process in which each secure element must be individually accessed during manufacturing to extract its certificate and register it with the product cloud. This approach introduces additional production steps, requires secure handling of identity data, and depends on accurate correlation between devices and certificates, increasing the risk of errors that may only be detected after field deployment.

OPTIGA Trust M Express addresses these limitations by shifting identity provisioning entirely upstream into Infineon's certified and secured manufacturing facilities. Each secure element is delivered with a cryptographic identity already injected and protected throughout its lifetime. As a result, no secured ID injection, certificate readout, or per-device tracking is required during IoT device manufacturing.

Once integrated into the end product, IoT devices authenticate against certificates that are pre-registered in the cloud. The approach is complemented by Infineon's CIRRENT™ Cloud ID platform, which manages certificate ownership and registration without exposing device credentials during manufacturing or logistics.

OPTIGA Trust M Express supports asymmetric and symmetric cryptographic operations, secure key storage, and protected communication over I2C. The secure element provides a hardware root of trust that spans manufacturing, onboarding, and field operation, while reducing production overhead compared to traditional secure-element provisioning workflows.

Infineon

FEATURES

- CC EAL6+ certified hardware
- Support for ECC, RSA, AES, and TLS-related cryptographic functions
- USON-10 package
- ECC 256-bit, ECC 384-bit, ECC 521-bit asymmetric cryptography
- AES 256, HMAC, SHA512 symmetric cryptography
- 3.3V supply voltage

APPLICATIONS

- Secured cloud communication, software updates, and cloud authentication
- Industrial IoT gateways and controllers
- Smart home and building automation devices
- Connected energy and metering systems
- Consumer IoT products requiring secure cloud authentication

FREE DEV BOARD

OPTIGA Trust M IoT security evaluation board.

Orderable Part Number
TRUSTMEXPSHIELDTOBO1

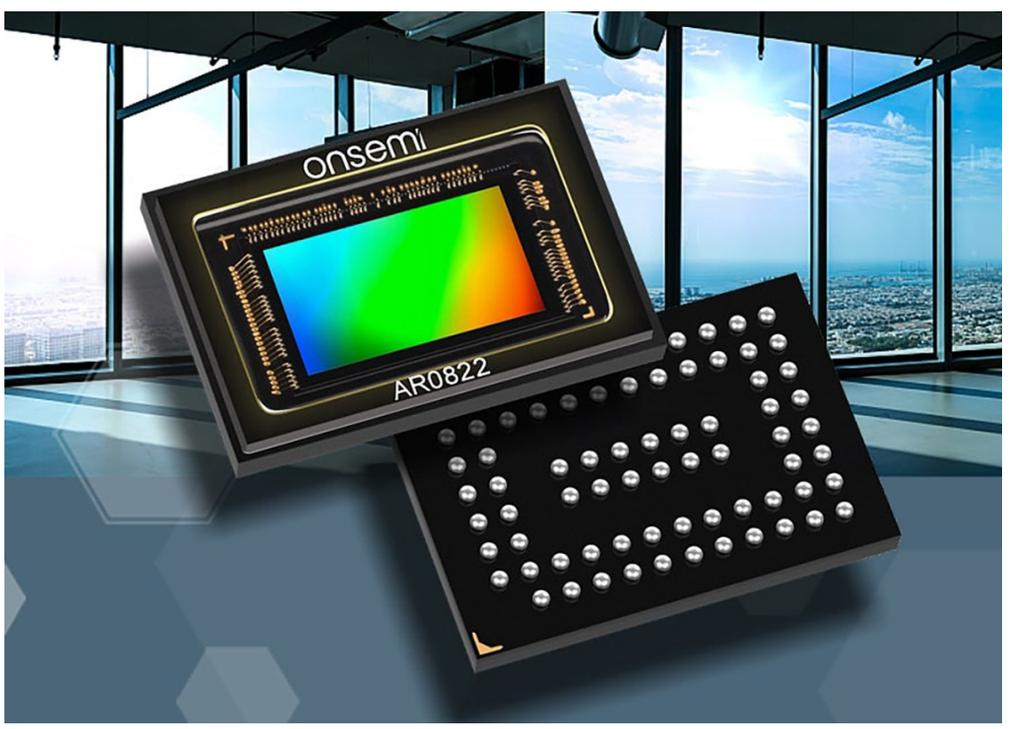
APPLY HERE NOW

BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

8Mpixel image sensor with high dynamic range optimized for harsh lighting conditions

The AR0822 from onsemi produces high image quality in mixed dark and bright lighting using embedded high dynamic range capability, while minimizing the burden on the host processor.



onsemi

FEATURES

- 12-bit ADC resolution
- Binning capability
- Windowing capability
- 6MHz to 48MHz input clock range
- 4-lane MIPI-CSI output interface

APPLICATIONS

- Security and surveillance systems
- Body-worn cameras
- Doorbell
- Vehicle dashboard cameras
- Robots

FREE DEV BOARD

Evaluation board features 8Mpixel rolling shutter CMOS image sensor.

Orderable Part Number
AR0822NPSC10SMTAH3-GEVB

APPLY HERE NOW

The onsemi AR0822 is an 8Mpixel stacked 1/1.8-inch (8.81mm diagonal) back-side illuminated (BSI) CMOS digital image sensor based on a 2.0µm pixel. Providing a rolling-shutter readout, the AR0822 features an active pixel array of 3,840px x 2,160px and produces 4K video at a rate of 60 frames/s. The sensor offers the high dynamic range (HDR) and near infrared (NIR) response required for operation in harsh or uncontrolled lighting conditions.

By taking an alternative approach enabled by its on-chip embedded functionality, the AR0822 reduces system bandwidth and processor power to achieve HDR, compared to traditional methods that require an external image signal processor to combine images. The sensor supports linear, line-interleaved HDR (LI-HDR), and embedded HDR (eHDR) modes. In 3-exposure eHDR mode at 30 frames/s, the typical power consumption is 540mW.

To further reduce system power consumption in battery-powered applications, the AR0822 includes a wake-on-motion function. This feature allows the host processor to enter a low-power standby mode until the sensor detects motion and triggers the processor to resume active mode.

BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

New synchronous step-down converter simplifies IoT power conversion design plus up to 93% efficiency

The wide-input 3.3V to 36V, 3A buck converter with integrated MOSFETs and control circuitry from STMicroelectronics shrinks power-supply footprint for industrial 24V bus systems and IoT devices.

The DCP3603BCMR is a new synchronous step-down converter combining wide input capability and high integration to simplify power designs in industrial 24V bus systems and Internet of Things(IoT) devices. The converter handles input voltages from 3.3V up to 36V and delivers up to 3A output current.

The converter achieves up to 93% efficiency in typical configurations. Designers can choose between low-consumption mode (LCM) for maximum light-load efficiency and low-noise mode (LNM) for constant-frequency operation in EMI-sensitive applications. The DCP3603 operates at a fixed 500kHz or 1MHz switching frequency, allowing the use of small inductors to minimize solution size. An optional frequency dithering feature further reduces electromagnetic interference (EMI) peaks to ease compliance with emission standards.

Minimal external components are needed, only an inductor, two small capacitors, and two resistors, thanks to the DCP3603 internal compensation network and soft-start circuitry. This high level of integration, combined with a peak current mode control scheme, simplifies stability compensation and reduces design effort.

FEATURES

- Switching frequency 500 kHz to 1.0 MHz fixed switching frequency
- Protection features:
  - Output over-voltage
  - Short-circuit
  - Thermal shutdown
  - Under-voltage lockout (UVLO)
- 10-year longevity program
- Compact SOT23-6L package
- Operation range is from -40°C to 125°C

APPLICATIONS

- Smart meters
- Industrial sensing and control nodes
- IoT gateways and sensor devices
- Building automation equipment

FREE DEV BOARD

Evaluation board based on DCP3603 - 36V, 3A synchronous buck converter in SOT23-6L.

Orderable Part Number
STEVAL-3603BC1

APPLY HERE NOW

DATASHEET

SAMPLES

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

Ultra-small buck converter reduces EMI in space-constrained power designs

The AP61402 synchronous buck converter from Diodes Incorporated combines a compact DFN package with an integrated gate driver architecture to address space constraints and switching noise in low-voltage power rails.

DIODES INCORPORATED

FEATURES

- 75mΩ high-side, 33mΩ low-side integrated MOSFETs
- 20µA quiescent current in PFM mode
- Programmable modulation mode through EN:
  - PFM
  - PWM regardless of output load
- Integrated protection circuitry:
  - Under-voltage lockout
  - Over-voltage protection
  - Peak and valley current limit
  - Thermal shutdown
- V-DFN1515-6/SWP Type UX package

APPLICATIONS

- General-purpose POL supplies
- Networked video cameras
- Wireless routers
- Hard disk drivers

The AP61402 is a 2.3V to 5.5V input, 4A synchronous buck converter intended for point-of-load regulation where board area and EMI must be carefully managed. Integrating both high-side and low-side MOSFETs, the converter reduces external component count while supporting efficient step-down conversion in space-constrained designs.

To reduce ringing through controlling switching-node behavior without extending MOSFET transition times the AP61402 uses a proprietary gate driver design. This approach reduces high-frequency radiated EMI typically associated with fast switching edges, helping designers to meet strict electromagnetic noise emission requirements.

The converter uses constant on-time control to provide fast transient response and straightforward loop behavior, avoiding the need for external compensation. Operating at a nominal 2MHz switching frequency, the AP61402 supports both pulse-frequency modulation and forced PWM modes, allowing optimization for light-load efficiency or predictable switching behavior depending on system requirements.

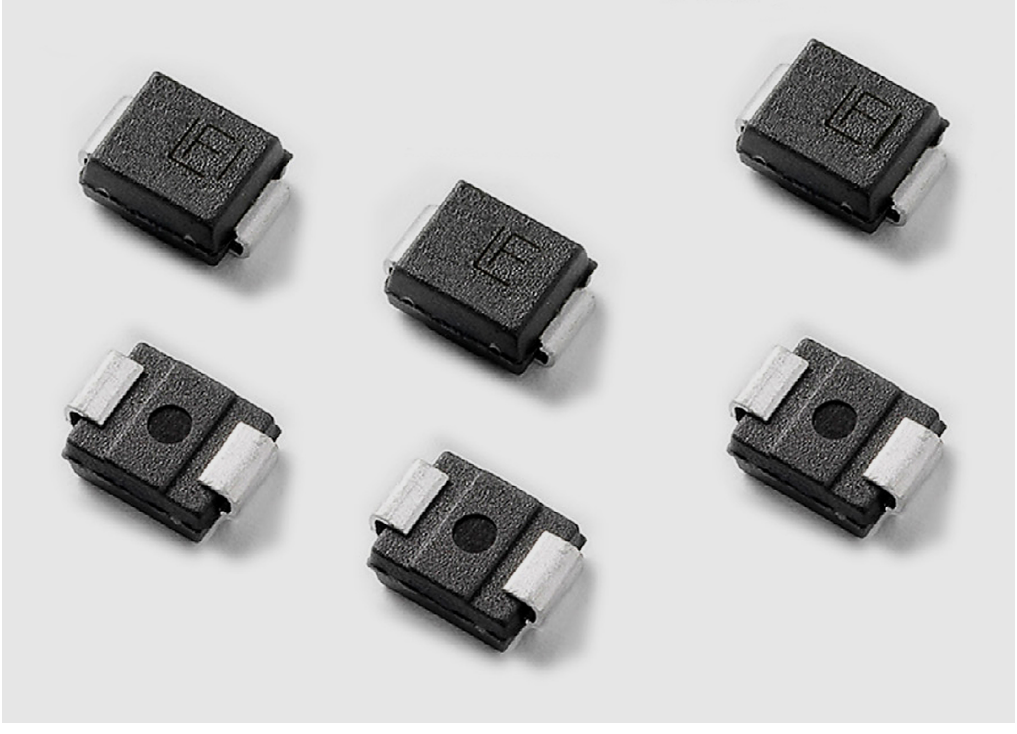
10110 DATASHEET

SAMPLES

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

TVS diode delivers robust transient protection through excellent clamping characteristics

The Littelfuse TPSMB TVS diode series provides excellent clamping capability to limit transient voltages, protecting sensitive electronics from load dump and other transient voltage events in harsh electrical environments.



Littelfuse®

FEATURES

- Low-profile, surface-mount DO-214AA package
- Shorting failure mode from over-voltage or current
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Glass passivated chip junction
- Operating temperature range: -65°C to 150°C
- 100A peak forward surge current
- 3.5V / 5V maximum instantaneous forward voltage @ 50A

APPLICATIONS

- Transient voltage suppression in automotive applications:
  - I/O interfaces
  - Vcc bus
  - Onboard charging driving circuits
  - Traction inverters
  - Battery related vulnerable circuits

The TPSMB series protects sensitive electronic equipment from voltage transients in automotive applications, including lightning strikes, load dump, and other transient voltage events. The TVS diode range is AEC-Q101 qualified and rated for 600W peak pulse power at 10/1000µs waveform on a 0.01% duty cycle.

Typically responding to transient voltage events within 1ns, the TPSMB TVS diodes maintain a stable clamping voltage in high power pulses due to low incremental surge resistance.

By limiting peak transient voltages more tightly during surge events, the diodes reduce electrical stress on downstream components such as microcontrollers, sensors, and power management ICs.

The series includes unidirectional, bidirectional, and asymmetric TVS diodes, enabling tailored protection for specific positive and negative transient requirements while optimising PCB space and component count.

AI and rich connectivity from new dual-core applications processor

With Arm Cortex -A35 and M33 cores, AI acceleration and industrial-grade multimedia, the STM32MP215DAN3 from STMicroelectronics is ideal for smart factory, edge computing, and embedded vision platforms.

The new STM32MP215DAN3 is a high-performance applications processor (MPU) that couples a dual-core Arm Cortex-A35 processor up to 1.5 GHz with a 300MHz Cortex-M33 real-time co-processor. The Cortex-A35 cores include Arm NEON SIMD and TrustZone support, enabling accelerated DSP and AI inference. This architecture gives design engineers a powerful platform to run embedded vision and edge-compute workloads locally while managing control, sensing, and security functions in parallel.

The STM32MP215DAN3 is designed for industrial and IoT applications, targeting factory automation, embedded vision, edge AI, and smart energy systems. Typical use cases include robotics and factory control, machine vision cameras, EV charging stations and smart metering.

Key system features include 64-bit Armv8 computing, large on-chip cache and broad memory support. The STM32MP215DAN3 supports up to 4GB of external DRAM and integrates 456KB of SRAM. Rich multimedia features include a 24-bit parallel RGB LCD-TFT controller up to 1080p60 and a MIPI CSI-2 camera interface with integrated ISP.

FEATURES

- Arm Cortex-A35 core with NEON and TrustZone
- Arm Cortex-M33 core with FPU and TrustZone
- Supports up to 4GB external DDR: DDR3L/DDR4/LPDDR4
- 456KB on-chip SRAM
- Connectivity:
  - Two 1Gbps Ethernet TSN/IEEE 1588
  - Two CAN-FD, one TTCAN
  - USB2.0 HS Host + OTG
- 24-bit parallel LCD-TFT RGB888 up to FHD@60fps
- MIPI-CSI/DSI support and camera ISP
- UART/SPI/I2C, SD/eMMC, audio SPDIF/SAI and timers
- Operating-temperature range: -40°C to 125°C

APPLICATIONS

- Industrial automation and factory control
- Embedded vision and AI at the edge
- Smart energy and metering
- IoT gateways and smart building systems

FREE DEV BOARD

Applications icons: Energy, Industrial.

Orderable Part Number
STM32MP215F-DK

APPLY HERE NOW

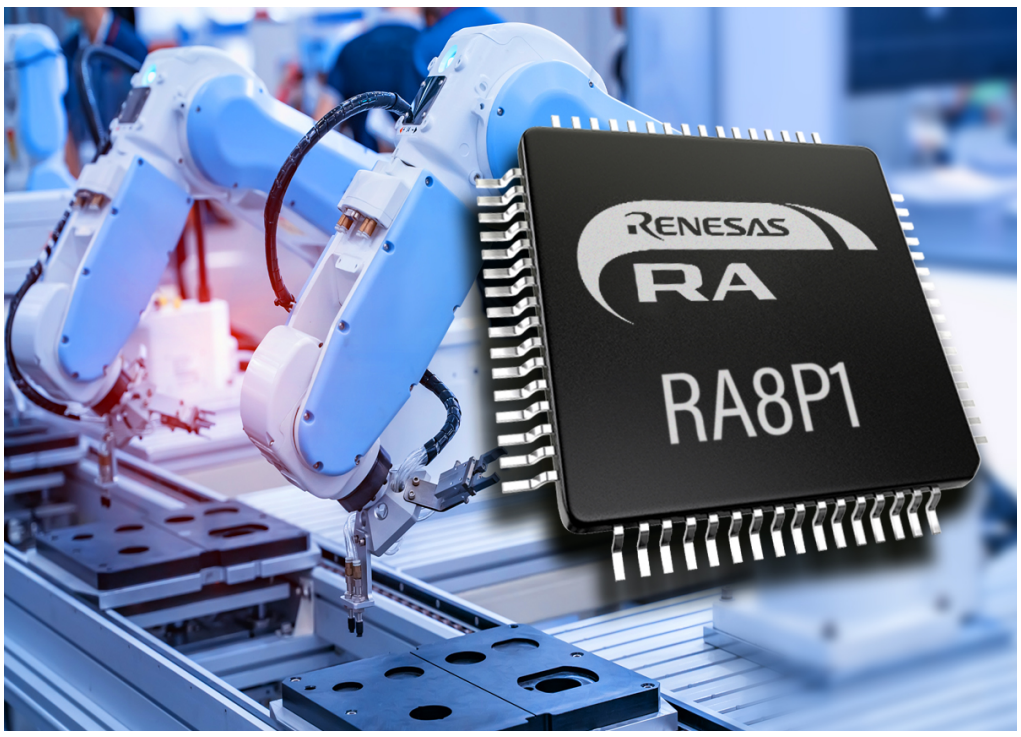
BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Microcontroller accelerates edge AI with 1GHz Cortex-M85 performance

The 1GHz Arm Cortex -M85-based Renesas RA8P1 microcontroller with built-in AI acceleration and advanced security is intended for use in smart intelligent edge devices, while also providing an interface to legacy systems.



The RA8P1 is a high-end 32-bit microcontroller that pushes MCU performance into the gigahertz range. It integrates a 1GHz Arm Cortex-M85 CPU core with extensions, delivering over 7,300 CoreMark of processing capability. This microcontroller brings energy efficiency and real-time determinism to applications that previously required a hybrid MCU+DSP architecture of a microprocessor, enabling more compact and secure edge designs.

For edge AI workloads, the RA8P1 features an Arm Ethos™-U55 neural processing unit (NPU) that offloads heavy machine learning computations. This NPU executes up to 256 multiply-accumulate (MAC) operations per cycle at 256 giga-operations per second (GOPS) when clocked at 500MHz, enabling real-time inferencing for vision and voice applications while the Cortex-M85 core handles sensor interfacing and control tasks. Arm TrustZone® technology and tightly coupled security features ensure that sensitive code and AI models run in a hardware isolated environment.

The RA8P1 also offers advanced analog and timing capabilities for mixed-signal control. It integrates dual 16-bit ADC units with up to 23 channels for high-resolution sensing, dual 12-bit DACs, four high-speed analog comparators, and an on-chip temperature sensor.

A comprehensive timer suite includes ten 32-bit general-purpose timers and four high-resolution timers with 52ps resolution at 300MHz for motor control and PWM generation. These features, combined with the Helium vector DSP engine, make the RA8P1 suited for real-time DSP tasks such as motor-drive control loops and digital filtering.

Security is built into the RA8P1 for IoT and edge computing deployments. The latest Renesas hardware cryptography engine accelerates an RSA algorithm of up to 4,096 bits, ECC with up to 521-bit curves, and Ed25519, AES-256, and SHA-512/384, and includes a true random number generator. The MCU supports secure boot with a first-stage bootloader and key storage in programmable memory.

Manufactured in a 22nm process, the RA8P1 delivers performance with efficient power usage. It operates from a single from 1.62V to 3.63V supply and is rated for operation at temperatures ranging from -40°C to 105°C.

RENESAS

FEATURES

- Helium™ MVE DSP extension and optional 250MHz Cortex-M33 co-processor
- 1Mbyte on-chip MRAM
- 2Mbytes SRAM with ECC
- Octal-SPI
- Gigabit Ethernet controllers with TSN switch
- USB 2.0 host/device interface
- Dual SDHI/SDMMC controllers
- Two CAN-FD network interfaces
- Serial interfaces:
  - I3C and I2C buses for sensor and peripheral links
  - UART/SCI ports
  - SPI and audio
- Tamper detection I/O
- Side-channel attack protection
- 5V tolerant I/O for direct interfacing to legacy 5V signals

APPLICATIONS

- Factory automation and robotics
- Smart home and appliances
- Surveillance and vision
- Transportation systems

FREE DEV BOARD

Evaluation kit for RA8P1 microcontrollers.

Orderable Part Number
EK-RA8P1 RTK7EKA8P1S01001BE

APPLY HERE NOW

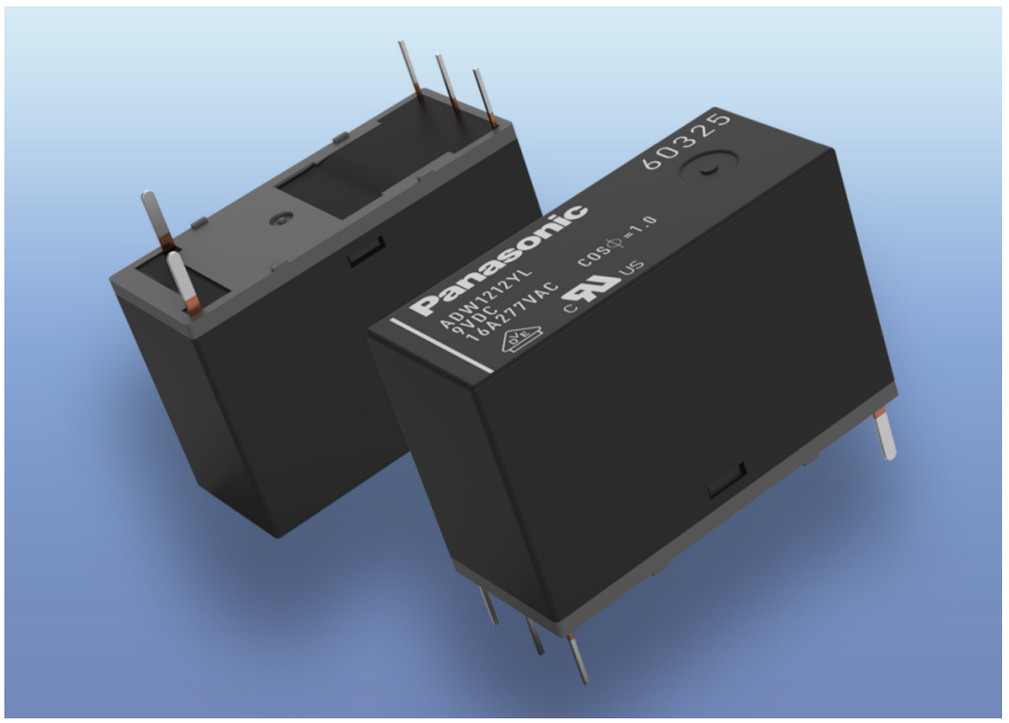
BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Low-profile relay handles 320A surges in smart lighting and IoT devices

The new DW-YL polarized power relays from Panasonic Industry offer up to 20A switching capacity with an exceptional inrush current tolerance and limited heat dissipation with a compact footprint.



Panasonic INDUSTRY

FEATURES

- Low-profile 10mm x 15.8mm package
- Sensitive coil, low power consumption
- UL/C-UL, VDE certified

APPLICATIONS

- Electrical ballasts
- Smart lighting systems
- LED drivers
- Smart plugs and smart switches
- Power distribution units
- Multiple outlet power strips

The DW-YL series significantly boosts inrush handling compared to earlier series. The DW-HL relays were rated for lower inrush at 16A load; the new DW-YL series achieves nearly three times the surge capacity while maintaining the same footprint. In practice, this enables designers to replace larger or multiple components with a single DW-YL relay, achieving a more compact and robust solution for edge connected embedded systems that must handle occasional high startup currents.

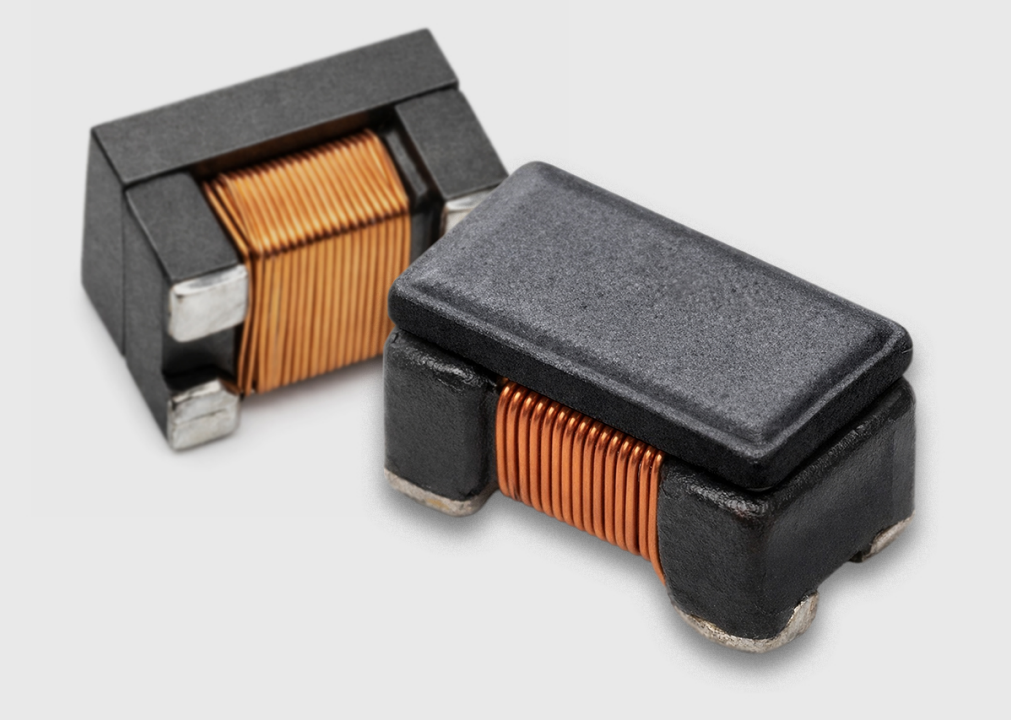
The DW-YL series latching relays are rated for 20A operation, and designed to tolerate extreme surge currents up to 320A for 1.2ms, as encountered when switching capacitive loads like LED drivers and other inrush scenarios. Despite its capability, the relay's form factor remains compact, minimizing PCB footprint in space-constrained designs, therefore targeting smart lighting, IoT switching devices, and power distribution units.

In terms of performance, the relays can reliably handle the kind of surges seen in lighting ballast circuits or when multiple devices power-on simultaneously, without contact welding. Its polarized one-coil or two-coil latching design means that after actuation, no continuous coil power is needed. This low coil energy drawing around 200mW pulse not only limits heat dissipation but also supports energy efficient, battery-powered or always-on applications.

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Common-mode choke coils suppress noise in compact industrial and consumer designs

The DLW21SN_HQ2 series of common-mode choke coils from Murata provides effective noise suppression for high-speed differential signal lines in compact consumer and industrial electronic systems.



muRata
INNOVATOR IN ELECTRONICS

FEATURES

- 10MΩ minimum insulation resistance
- Matched to 100Ω characteristic impedance systems
- Operating temperature range: -40°C to 85°C

APPLICATIONS

- Industrial robotics and measurement equipment
- Renewable energy chargers
- Medical equipment
- Home appliances
- Audio and visual systems
- Communication modules

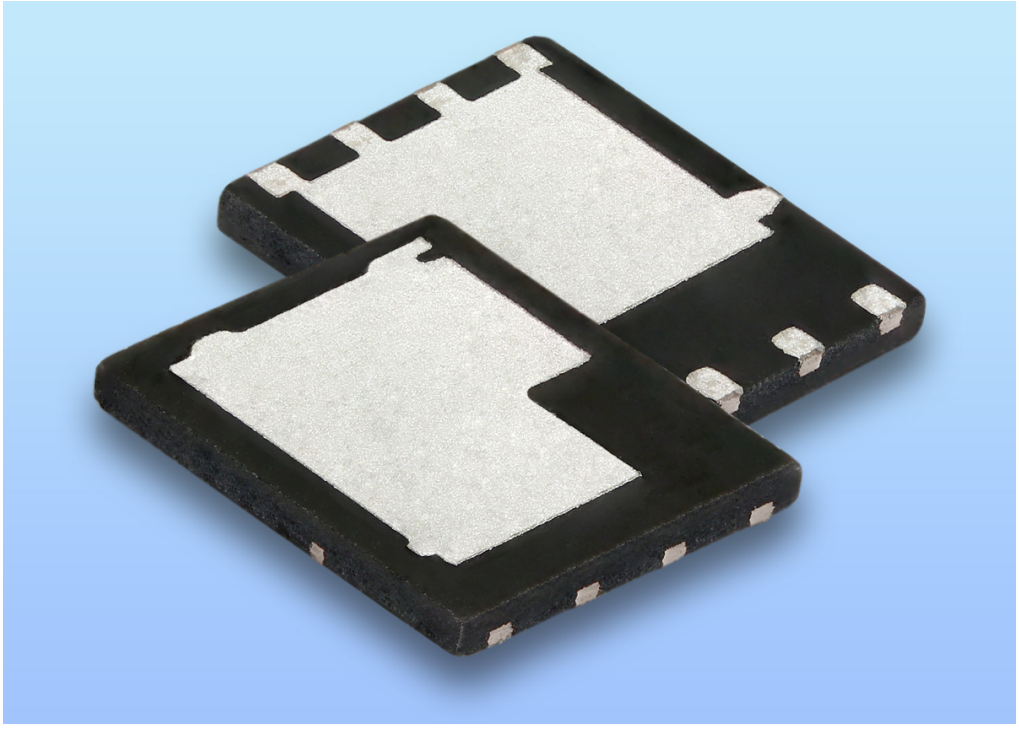
The DLW21SN_HQ2 series of chip common-mode choke coils features a compact 2.0mm x 1.2mm footprint while providing highly effective suppression of noise in high-speed interfaces using differential signal lines.

These Murata common-mode choke coils address the rising demand for more compact components for electronic systems in industrial robotics, audio-visual systems and communication modules which often make use of differential interfaces that require higher current. The DLW21SN_HQ2 series can handle rated currents up to 320mA supporting both power and signal lines in various circuit configurations.

The coils offer common-mode impedance values of 67Ω, 90Ω, and 120Ω at 100MHz featuring a rated voltage of 20V dc and a withstanding voltage of 50V dc. The maximum dc resistance ranges from 0.31Ω to 0.41Ω.

Double-cooled MOSFETs increase power density in high-current designs

The SiDR626LDP and SiDR680ADP from Vishay are 60V and 80V N-channel MOSFETs based on fourth-generation TrenchFET technology featuring low on-resistance and gate charge in a PowerPAK® package.



VISHAY
The DNA of tech.™

FEATURES

- 150°C maximum operating temperature
- 100% tested for UIS and gate resistance
- ±100nA maximum gate-source leakage

APPLICATIONS

- Motor drives
- Battery management systems
- Dc-dc converters

The Vishay SiDR626LDP and SiDR680ADP MOSFETs enable the design of systems with tighter power budgets and thermal margins.

Both MOSFETs offer a low maximum on-resistance and high continuous drain current, making them particularly suitable for synchronous rectification and high-current motor drive applications. The MOSFETs are tuned for the lowest on-resistance x output capacitance figure of merit (FOM) to improve efficiency in high-frequency switching topologies.

Housed in a PowerPAK® SO-8DC package, the SiDR626LDP and SiDR680ADP allow for the attachment of a heatsink directly to the top of the leadless package. This feature significantly lowers the thermal resistance and allows for more effective thermal management in space-constrained designs.

BUY NOW | DATASHEET | DATASHEET #2

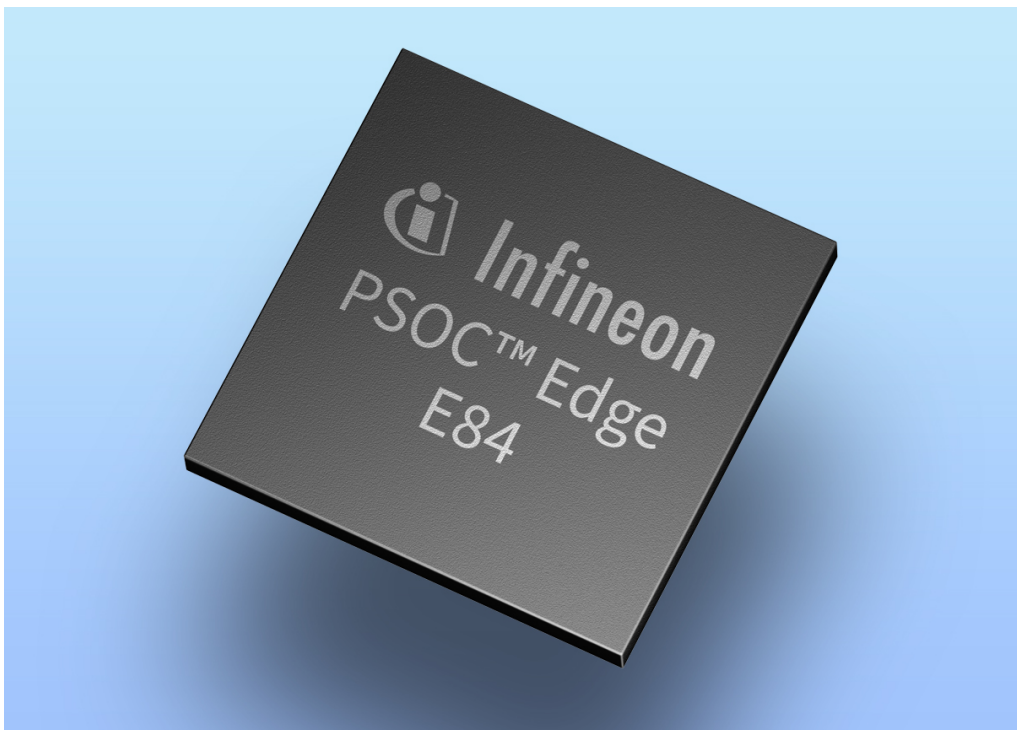
SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Multi-core MCU includes neural networking accelerators for high AI performance

The Infineon PSOC™ Edge E84 features a sophisticated compute architecture with both high-performance and low-power blocks, both backed by dedicated artificial intelligence (AI) acceleration hardware and fast memory.



The PSOC Edge E84 MCU further extends the broad PSOC portfolio of microcontrollers, which features hardware-assisted machine learning (ML) acceleration for use in next-generation responsive compute and control applications.

The PSOC Edge MCUs use the capability of AI to improve end-user experiences by enabling end products to be more intelligent and intuitively usable, lowering the barriers to human-machine interaction and adding contextual awareness. They do so while providing robust privacy and safety protection through embedded Infineon Edge Protect technologies.

The PSOC Edge E84 is based on a power-optimized multi-core architecture. A high-performance block features an Arm® Cortex®-M55 CPU core, including Helium DSP support, paired with an Arm Ethos™-U55 neural processing unit (NPU). A low-power block combines a Cortex-M33 CPU paired with the ultra-low-power Infineon NNLite hardware accelerator for neural networks in always-on ML and AI applications. PSOC Edge family MCUs feature advanced memory resources, with up to 6 Mbytes of system SRAM and 512 kbytes of non-volatile RRAM memory shared across the high-performance and low-power blocks.

The MCU provides an always-on acoustic activity detection capability which enables the operation of a human-machine interface (HMI) with low active and standby power consumption. It also includes support for advanced graphics, voice, and audio, as well as standard communication and timing peripherals suitable for a variety of consumer and industrial applications.

Software enablement is based on the ModusToolbox™ development software suite, including integration with the DEEPCRAFT™ AI Suite solution with off-the shelf DEEPCRAFT™ Ready Models. ModusToolbox is a comprehensive collection of multi-platform tools and software libraries which includes board support packages, a peripheral driver library, and middleware libraries.

Infineon

FEATURES

- HMI functions:
  - Low-power 2.5D graphics processor unit
  - Up to 1024px x 768px display controller with MIPI-DSI/DBI interface
  - Audio multi-microphone interface
- Security functions:
  - Secure enclave in low-power always-on domain
  - Infineon Edge Protect Category 4/PSA Level 4
  - Trusted Firmware-M enablement
  - Mbed-TLS for crypto operations

APPLICATIONS

- Wearable devices:
  - Fitness watches
  - Augmented/virtual reality glasses
  - Audio accessories
- Smart home equipment:
  - Smart thermostats
  - Smart locks
  - Smart home appliances
  - Security cameras
- HMIs:
  - Appliances
  - Industrial equipment
  - Factory automation equipment
- Robotics:
  - Vacuum cleaners
  - Service robots
  - Industrial robots

FREE DEV BOARD

AI-focused evaluation kit for PSOC™ Edge E84 microcontroller.

Orderable Part Number
KIT_PSE84_AI

APPLY HERE NOW

FREE DEV BOARD

Evaluation board for PSOC™ Edge E84 AI-enabled microcontroller.

Orderable Part Number
KIT_PSE84_EVAL

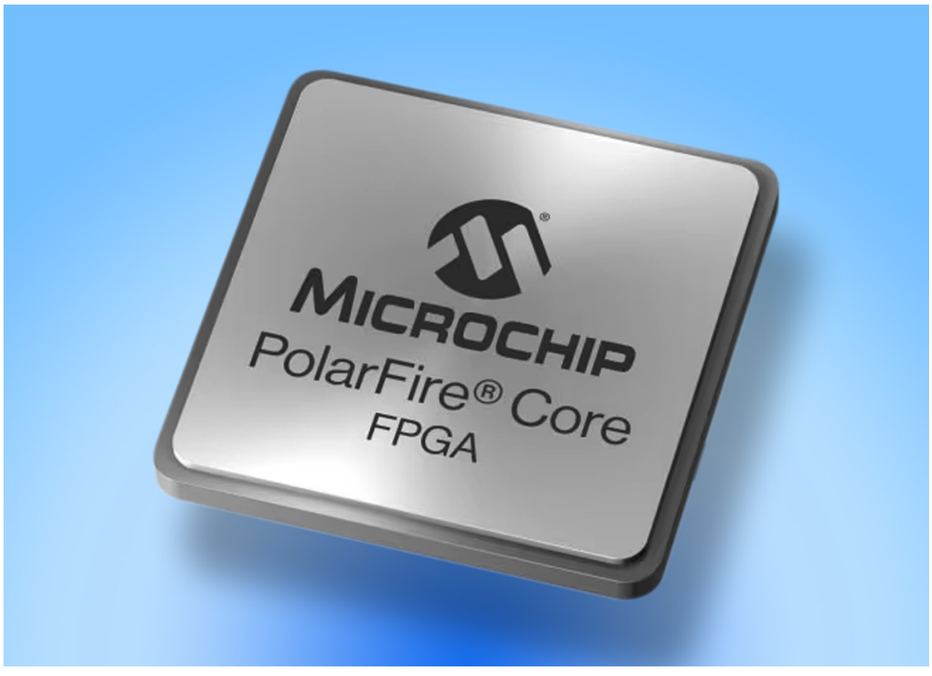
APPLY HERE NOW

BUY NOW | INFORMATION | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

Low-power FPGAs reduce thermal design constraints in edge AI

The new PolarFire® FPGA Core series from Microchip enables cost-effective, power-efficient edge AI inference, to reduce cost and complexity for industrial, medical, and automotive applications.



The PolarFire FPGA family from Microchip addresses the requirement for devices that deliver high reliability and security without the high power consumption typical of SRAM-based alternatives. The architecture is optimized to bridge the gap between low-density programmable logic and high-performance FPGAs, enabling the deployment of complex logic in thermally constrained designs.

Microchip's new PolarFire FPGA Core series is a streamlined platform that omits Serializer/Deserializer (SerDes) and PCIe® interfaces from the PolarFire FPGA family, reducing the cost and complexity of developing Artificial Intelligence (AI) and Machine Learning (ML) applications.

The PolarFire FPGA Core series uses non-volatile Flash technology to reduce power consumption by up to 50%. This efficiency allows designers to implement fanless enclosures for thermal management in harsh industrial environments.

To facilitate AI deployment, the PolarFire FPGA Core series supports the VectorBlox® Accelerator Software Development Kit (SDK), which compiles neural networks from standard frameworks such as TensorFlow and ONNX into a binary format that loads into the FPGA memory. This workflow enables the FPGA to perform complex inference tasks, such as object detection and sensor fusion, without requiring the developer to have FPGA logic design expertise.

Microchip has also introduced the PolarFire FPGA Ethernet Sensor Bridge to support real-time decision-making further. This solution allows the development of AI-driven sensor processing systems compatible with the NVIDIA Holoscan platform.

The series offers densities up to 481,000 Programmable Logic Elements (PLEs) and SoC variants that integrate a 64-bit, quad-core RISC-V® processor, enabling real-time control and Linux®-capable processing on a single chip.

MICROCHIP

FEATURES

- Single Event Upset (SEU) immunity
- Support for secure key provisioning
- DPA-resistant bitstream programming
- Instant-on capability
- Native DDR4 support

APPLICATIONS

- Industrial control and robotics
- Predictive maintenance sensors
- Medical imaging and diagnostics
- Automotive electronics

FREE DEV BOARD

Discovery kit provides a low-cost entry to edge AI.

Orderable Part Number
MPFS-DISCO-KIT

APPLY HERE NOW

DATASHEET

SAMPLES

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

6-axis IMU integrates AI for always-on industrial sensing

The ISM330IS accelerometer/gyroscope inertial measurement unit (IMU) from STMicroelectronics features an embedded 32-bit sensor processor to execute AI algorithms on-device combining ultra-low-power and always-on operation for applications.

As a 6-axis inertial module the ISM330IS embeds a 32-bit intelligent sensor processing unit (ISPU) on-chip to enable AI at the edge. The always-on IMU combines a 3-axis accelerometer and 3-axis gyroscope with built-in signal processing, delivering high-accuracy motion sensing without continuous MCU intervention. By performing tasks like pattern recognition and anomaly detection within the sensor, the ISM330IS reduces system latency and saves power at the system level. This makes it suited for industrial robots, condition-monitoring sensors, and other smart IoT-edge devices that require immediate insight from motion data.

The module's ISPU allows developers to deploy custom machine-learning algorithms or classical C code directly inside the sensor. Running data processing on-sensor enables real-time analysis of vibration, orientation, and events without waking the main processor. The ISPU core is optimized for efficient signal processing and can be programmed in C, with support from the ST NanoEdge AI Studio and toolchain for automatic code generation.

Power efficiency is a key feature of the ISM330IS. In full operation, consumption is 0.59mA, and draws only 0.46mA in low-power mode. Even with the AI core active, total current remains around 0.8mA. Standby mode consumes on the order of 10µA, allowing the sensor to remain always-on for wake-up events.

The ISM330IS also maximizes integration for design simplicity. An on-chip sensor hub can stream data from up to four external sensors, enabling multi-sensor fusion without additional MCU overhead.

FEATURES

- ±2/±4/±8/±16g accelerometer
- ±125/±250/±500/±1000/±2000dps gyroscope full-scale
- 0.46mA in low-power mode
- 0.59mA in high-performance mode
- Up to 4 external sensors
- 1.71V to 3.6V analog supply
- Independent 1.62V I/O supply
- Operating temperature range: -40°C to 85°C.
- 2.5mm x 3.0mm x 0.83mm LGA-14 module package
- 10-year product availability commitment

APPLICATIONS

- Industrial condition monitoring
- Industrial robots and automation equipment
- Asset tracking devices, logistics and supply chain
- Smart IoT-edge sensors for factories and infrastructure

FREE DEV BOARD

Evaluation kit for 6-axis ISM330IS inertial measurement unit (IMU) with intelligent sensor processing unit (ISPU).

Orderable Part Number
STEVAL-MKI230KA

APPLY HERE NOW

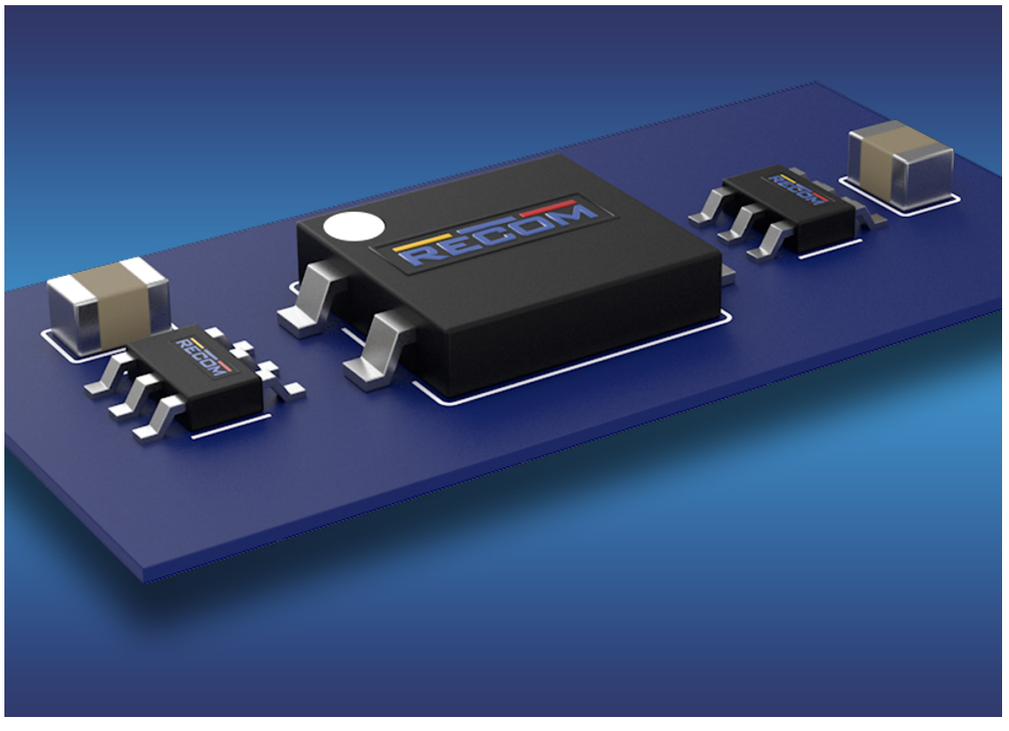
BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Isolated dc-dc controller ICs simplify transformer design

The RVP and RVS series from RECOM Power provide unregulated driver and rectification solutions for isolated power supplies up to 10W, enabling high integration and reinforced isolation with minimal external components.



RECOM

FEATURES

- Short-circuit protection
- Operating temperature range: -40°C to 125°C
- Integrated soft-start function
- Up to 30V input voltage

APPLICATIONS

- Isolated power supplies for gate drivers
- Process control
- Medical instruments
- Test and measurement equipment
- Isolated communication interfaces

The RVP series of unregulated dc-dc converter drivers supports input and output voltages up to 30V with a power rating of up to 10W. The family is divided into push-pull and full-bridge drivers to address different system requirements. The push-pull controllers include the RVP009 and RVP010, and RVP6501, the latter offering pin and function compatibility with the industry-standard SN6501 driver.

For designs prioritizing transformer simplicity, the RVP001, RVP003, RVP005 utilize a full-bridge topology, eliminating the need for a center-tapped primary winding on the transformer.

These drivers can be paired with the RVS002 or RVS004 secondary-side rectification ICs. The RVS series replaces rectifier diodes and dummy resistors, simplifying design and minimizing component count.

RECOM supports these ICs with a range of pre-tested RMR-series transformers to create discrete solutions that meet specific isolation requirements, ranging from 1,500V dc functional isolation to 8,000V dc reinforced isolation. This validated pairing of IC and transformer accelerates the prototyping process for isolated power stages. Custom voltage combinations up to 24V are also supported for high-volume applications.

DATASHEET | DATASHEET #2 | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

Solid and hybrid capacitors improve stability in generative AI server power supplies.

The NIC Components NSP series, including solid polymer and hybrid capacitors, offer the features required to enable manufacturers to improve stability in generative AI power supply designs.

NIC COMPONENTS CORP.

FEATURES

- Surge voltage capability up to 100V
- Compatible with lead-free reflow soldering
- Stable operation at high frequencies

APPLICATIONS

- AI servers
  - Power supplies
  - Voltage regulation circuits

The NSP family of capacitors, with the NSPG, NSPx and NSPE-UT series, addresses the growing performance requirements of generative AI power supply units (PSUs), specifically the need to maintain stable voltage delivery during high-current surges required by modern processors. These capacitors exhibit low ESR, high resistance to heat, and high ripple current capability characteristics.

The NSPG series of solid polymer aluminum electrolytic capacitors provide an extended operating temperature range and are engineered to handle high ripple currents, making them suitable for the input and output stages of voltage regulator modules (VRMs). With capacitance ranges of 6.8µF to 1,000µF and voltage ratings from 2.5V to 80V, the NSPG series supports the current demands of generative AI workloads.

To support high-density board layouts, NIC Components offers the NSP, NSPT, and NSPY featuring a flat chip surface-mount package. These solid polymer capacitors offer a low-profile solution for low-voltage power rails, enabling efficient use of space in server racks and compact power modules.

The NSPE-UT series utilizes a hybrid construction consisting of a conductive polymer liquid electrolyte optimized for performance in higher voltage systems ranging from 16V to 80V. The hybrid design enables the capacitors to handle high ripple currents while withstanding operating temperatures of up to 150°C for 4,000 hours, ensuring longevity in thermally constrained power supply units.

DATASHEET | DATASHEET #2 | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

Boost to AI at the edge with launch of NPU-accelerated 32-bit microcontrollers

The STM32N6 microcontroller series from STMicroelectronics with new machine-learning capabilities makes it possible to perform computer vision, audio processing, sound analysis and more in consumer and industrial applications at the edge.

STMicroelectronics has launched a series of 32-bit STM32 microcontrollers which integrate accelerated machine-learning (ML) capabilities alongside a high-performance 800MHz Arm Cortex -M55 CPU core.

The new STM32N6 MCUs are the first to embed the Neural-ART Accelerator, a neural processing unit (NPU). With the onboard NPU, the STM32N6 provides 600 times more machine-learning performance than a current high-end STM32 MCU. This enables cost-sensitive and power-conscious consumer and industrial products to implement AI video and audio functions in small embedded systems.

The high-speed, low-power ML inferencing performed by the STM32N6 is due to the Neural-ART Accelerator NPU, which features 288 configurable multiply-accumulate (MAC) units which can implement up to 600 giga-operations per second (GOPS) specifically included in the STM32N6x7 MCUs. The NPU includes dedicated streaming engines which optimize data flow and minimize internal buffer usage and power. The accelerator supports on-the-fly weight decompression and real-time data encryption and decryption.

The high STM32N6 ML performance is complemented by the system control side of the MCU. The Cortex-M55 core achieves a high CoreMark score of 3,616. The MCU also includes 4.2 Mbytes of RAM, providing sufficient memory to support data-intensive AI and multimedia workloads. Two 64-bit Advances eXtensible Interfaces (AXIs) provide the high intra-chip bandwidth required to unlock the full power of the Neural-ART Accelerator.

To support AI vision applications, the STM32N6 incorporates an image signal processor (ISP) which provides direct signal processing, enabling the use of simple and affordable image sensors. This ISP can be configured using the free ST ISP IQTune software, a cutting-edge tool which enables the developer to customize image signal processing parameters such as exposure time, contrast and color balance.

ST also provides development software to support the implementation of AI functions. The Edge AI Suite is a comprehensive set of software tools for the development of edge machine-learning applications. The software tools enable developers to implement AI models in various formats such as TensorFlow Lite, Keras, and ONNX.

FEATURES

- Security features:
  - TrustZone -aware support
  - Memory protection unit
  - Secure boot ROM
- Neo-Chrom graphic accelerator
- Optional hardware H264 codec
- Hardware JPEG accelerator
- Operating-temperature range: -40°C to 125°C

APPLICATIONS

- Industrial equipment
- Smart home equipment
- Smart cities
- Automotive systems
- Personal electronics devices
- Medical and healthcare equipment

FREE DEV BOARD

Evaluation board for 32-bit MCUs with onboard AI acceleration.

Orderable Part Number
NUCLEO-N657X0-Q

APPLY HERE NOW

BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Low-resistance MOSFET reduces conduction loss in compact USB PD systems

The ROHM Semiconductor AW2K21 dual N-channel power MOSFET combines very low on-resistance with a wafer-level chip-scale package to support efficient, bidirectional switching in space-constrained USB Power Delivery (USB PD) circuits.

ROHM SEMICONDUCTOR

FEATURES

- 1.6W maximum power dissipation
- ±40A pulsed drain current
- 2V maximum gate-source threshold
- 100nA gate-source leakage current

APPLICATIONS

- USB voltage bus protection
- Battery protection
- Load switch

The AW2K21 from ROHM Semiconductor is a 30V, 20A dual common-source N-channel power MOSFET intended for low-loss switching in USB-PD, battery protection, and load-switch applications. Its low maximum drain-to-drain on-state resistance of 4mΩ reduces conduction losses in high-current paths, helping to limit temperature rise during fast-charge operation and supporting compact power-path layouts without additional parallel devices.

Used as either a unidirectional or bidirectional switch,the AW2K21 is suitable for USB PD systems that must handle power flow in both source and sink modes. An internal 100Ω source resistor supports stable current sensing and protection circuit integration in USB voltage bus (VBUS) and battery-protection designs.

Common-source MOSFETs are integrated in a WLCSP2020 package measuring approximately 2.0mm x 2.0mm. This package format supports high current density while enabling placement close to USB-C® connectors or power controllers. A total gate charge of 29nC and low gate-source-on voltage enables the MOSFET to be driven directly by common USB-PD gate-driver ICs, simplifying power-path control whilst maintaining low component count and reduced board footprint.

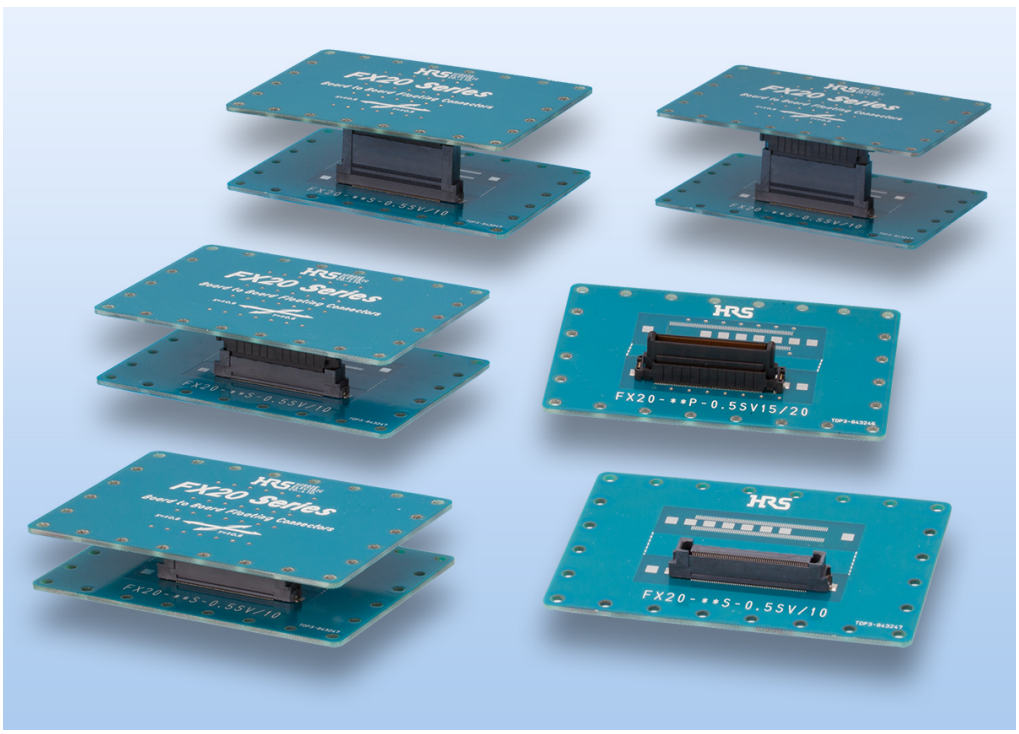
10110 DATASHEET

SAMPLES

ENERGY INDUSTRIAL LIGHTING MEDICAL TRANSPORT SECURITY CONSUMER TELECOMS

Self-cleaning connector absorbs misalignment in automotive ECUs

The FX20 series from Hirose are board-to-board connectors which feature a floating structure with double-beam contacts which ensure reliable connections in high-vibration environments.



HIROSE ELECTRIC EUROPE B.V.

FEATURES

- 1.5mm effective mating length
- 0.5A rated current
- 150V ac/dc withstanding voltage for 1 minute
- 50 mating cycles
- Number of contacts: 20, 30, 40, 50, 60, 80, 100, 120, 140

APPLICATIONS

- Automotive systems:
  - Battery, motor, and EPS control units
  - ADAS cameras and sensors
  - Powertrain inverters and converters
  - Infotainment systems
  - Heads-up displays
  - Navigation modules

These floating board-to-board connectors provide high reliability when used in automotive systems that experience significant mechanical stress.

The connectors feature double-beam contacts with a self-cleaning function that reduces dust build-up in the contact path, increasing contact reliability. The connectors allow for up to ±0.8mm float in X and Y directions, providing tolerance for the assembly process on the production line. The design also prevents misalignment during mounting, simplifying installation, even when visibility is limited.

A range of mated heights and pin counts allows one connector family to serve multiple designs.

FUTURE ELECTRONICS
A WT Microelectronics Company
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Polymer capacitors boost power stability in compact electronics

With ultra-low ESR, the SP-Cap JX polymer capacitors from Panasonic Industry deliver long life and high ripple tolerance, and are engineered for stability as well as reliability.

Panasonic
INDUSTRY

FEATURES

- Minimal voltage drop and heat generation
- High capacitance from 150µF to 470µF
- 7.3mm × 4.3mm × 1.9mm case
- 3,000 hours at 125°C endurance
- Operating-temperature range: -55°C to 125°C

APPLICATIONS

- AI servers, switches and routers
- Virtual reality and augmented reality headsets
- High performance wearable devices
- Accelerator and base stations
- Wearable medical and health monitoring devices

The SP-Cap JX series of surface-mount conductive polymer aluminum electrolytic capacitors are designed for stable power delivery in space-constrained applications. The JX series supports rated voltages of 2V, 2.5V, 4V, and 6.3V, making it suitable for bulk decoupling and energy storage in modern compact consumer electronics.

Thanks to the low ESR, SP-Cap JX capacitors minimize voltage drop and waste heat, ensuring high power integrity for fast-switching processors and regulators. The capacitors also tolerate high ripple currents up to 10.2Arms without performance loss, supporting stable dc power rails for demanding loads. The high single-unit capacitance can potentially reduce the number of parallel capacitors required, saving board space while maintaining tight voltage regulation.

The JX series has long life, combined with a wide operating-temperature range, to ensure durable performance over years of operation.

BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS

IMU drives motion sensing accuracy with embedded AI for industrial and home appliances

Dual low-g and high-g accelerometers plus a low-drift gyroscope in the ISM6HG256X from STMicroelectronics deliver precise motion tracking, with an on-chip machine learning core and finite state machine for edge AI processing.

The ISM6HG256X is a high-end 6-axis inertial measurement unit (IMU) that integrates dual 3-axis accelerometers and a precision gyroscope. This combination captures both subtle vibrations and extreme shocks with exceptional accuracy for demanding uses. The IMU features embedded intelligence through a finite state machine (FSM) and machine learning core (MLC), enabling smart motion analysis at the sensor level and reducing the processing burden on the host microcontroller.

Engineers can program the on-chip FSM to recognize custom motion patterns up to 960Hz using data from the low-g or high-g accelerometers, gyroscope, or even an external sensor. In parallel, the MLC runs advanced decision-tree algorithms up to eight simultaneously, to classify events and detect contexts in real time. This edge AI capability allows the IMU to perform context awareness. For example, identifying equipment states or detecting anomalies without continuous host intervention. An adaptive self-configuration (ASC) feature further enhances autonomy by automatically reconfiguring the sensor based on detected motion patterns or MLC outputs, with no host involvement needed.

The ISM6HG256X dual-channel architecture allows the IMU to concurrently monitor fine movements and high-g impacts. The dedicated high-g accelerometer channel accurately captures sudden shocks up to 256g, which is essential for machine health monitoring and impact logging, while the low-g channel provides low-noise measurements for subtle vibration analysis. The integrated gyroscope offers an extended full-scale range up to ±4000dps with very low noise, enabling precise tracking of fast rotational motion.

A built-in 4.5KB FIFO buffer and multiple interrupt signals for events such as free-fall, shock, orientation change or taps, allow event-driven operation and efficient data batching. Smart digital features such as advanced pedometer, step detector, step counter, significant motion detection and tilt detection are integrated. An on-chip temperature sensor is included for calibration and thermal stability.

FEATURES

- 6-axis dual accelerometer IMU:
  - Low-g accelerometer ranges: ±2/±4/±8/±16g
  - High-g accelerometer ranges: ±32/±64/±128/±256 g
  - 3-axis gyroscope from ±125dps to ±4000dps
- Interfaces and integration:
  - I2C
  - SPI
  - MIPI I3C® v1.1 interfaces for host communication
  - Auxiliary SPI/I3C
- Embedded sensor fusion low-power (SFLP) algorithm.
- Supply voltage ranges from 1.71V to 3.6V
- Operating temperature range: -40°C to 105°C
- Compact 2.5mm x 3.0mm x 0.83mm LGA-14 package

APPLICATIONS

- Industrial robots and robotic arms
- Factory automation equipment
- Condition monitoring sensor nodes
- Asset tracking devices

FREE DEV BOARD

The STEVAL-MKI248KA adapter kit offers a convenient way to evaluate the ISM6HG256X IMU.

Orderable Part Number
STEVAL-MKI248KA

APPLY HERE NOW

BUY NOW | DATASHEET | SAMPLES

ENERGY | INDUSTRIAL | LIGHTING | MEDICAL | TRANSPORT | SECURITY | CONSUMER | TELECOMS