FUTURE ELECTRONICS

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NPI's, DESIGN & TECHNOLOGY NEWS

24-ii
Embedded Processing & Software

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Embedded software package for STM32MP1 MPUs accelerates Linux OS deployment

STM32MP1Starter package for the STM32MP1 microprocessors from STMicroelectronics provides a comprehensive board support package that is paired with evaluation boards.

ST's ready-made Linux® distribution is backed by firmware examples and a programming tool.

FEATURES

- Boot chain based on TF-A and U-boot
- OP-TEE secure OS running on the Arm® Cortex®-A core in secure mode
- Linux kernel running on the Arm Cortex-A core in non-secure mode

APPLICATIONS

- Home gateways
- Industrial equipment:
  - Factory automation equipment
  - Industrial HMIs
  - Industrial gateways
- Robotics

STMicroelectronics has boosted support for its STM32MP1 series of low-cost embedded microprocessors with the introduction of the STM32MP1Starter package, which provides a ready-made set of operating system (OS) software and tools.

At the heart of the STM32MP1Starter board support package are binaries for the proven OpenSTLinux Distribution (STM32MP1Distrib), a Linux operating system implementation which is optimized for the STM32MP1 processors. The STM32MP1Starter also includes one or more firmware examples for the STM32CubeMP1 software package, and the STM32CubeProg tool to install this image on STM32MP15xx-EV1 evaluation boards.

Click here to download the STM32MP1Starter package software.

FREE DEV BOARD

Evaluation board for STM32MP1 embedded microprocessor.

Orderable Part Number
STM32MP157x-EV1

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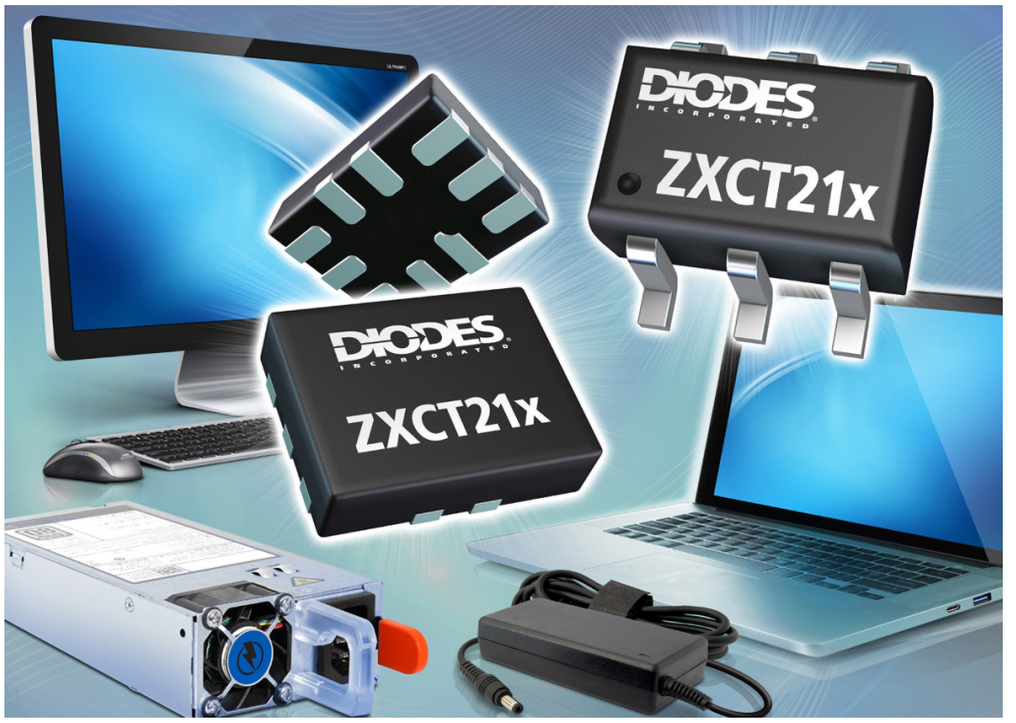
Bidirectional current monitors support accurate high- and low-side current measurement

Diodes Incorporated ZXCT21x current monitoring sensors minimize power losses and provide highly stable operation over a wide temperature range, giving accurate measurements in motors and power supplies.



DIODES INCORPORATED

FEATURES

- Gain error:
  - A and B versions: ±0.8%
  - C version: ±0.5%
- Bidirectional current flow measurement capability
- 100 µA maximum quiescent current
- Rail-to-rail output capacity
- Ambient-temperature range: -40°C to 125°C

APPLICATIONS

- Notebook computers
- Data center servers
- Telecoms equipment
- Instrumentation
- Battery management systems
- High-performance video cards
- Industrial power supplies
- Brushless dc motor-control systems
- Solar inverters

The new ZXCT21x series of current monitors from Diodes Incorporated are single-stage instrumentation amplifiers which accurately measure very low sensor voltages across a wide range of common-mode voltages up to 26 V.

The ZXCT21x's low offset voltage of 30 µV and high temperature stability, with drift of just 100 nV/°C, enable these monitors to achieve high-precision current sensing with low-resistance sense resistors, even when monitoring large currents. This results in low power losses attributable to the measurement circuit.

The ZXCT21x series is available in versions with a choice of six fixed voltage-gain options: 50 V/V, 75 V/V, 100 V/V, 200 V/V, 500 V/V, and 1,000 V/V. The current monitors measure voltage across the shunt resistor at common-mode voltages from -0.3 V to 26 V, independent of supply voltage. Operation is from a supply-voltage range of 2.7 V to 26 V; supply current is a maximum of 100 µA.

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High-voltage dc-dc converters ideal for auxiliary power supplies in solar power generation equipment

The AE series from CUI Inc provides an off-the-shelf solution to the challenge of powering auxiliary monitoring and control systems in photovoltaic power systems operating at up to 1,500 V.

CUI INC

FEATURES

- Single regulated output
- Protection functions:
  - Input reverse polarity
  - Over-current
  - Over-voltage
  - Short-circuit

APPLICATIONS

- Solar energy generation equipment
  - Off-grid
  - Distributed
  - Centralized
- Wind turbines

The AE series from CUI Inc is a range of dc-dc converters which are optimized for use in 1,000 V- and 1,500 V-rated photovoltaic energy generation systems. The AE series modules operate over wide input-voltage ranges of 100 V to 1,000 V dc, 200 V to 1,200 V dc, or 200 V to 1,500 V dc.

The converters are available with power ratings ranging from 5 W to 40 W. The isolation rating is 5,600 V dc, and they can be used at altitudes up to 5,000 m, and over an operating-temperature range of -40°C to 70°C with no derating.

The AE series helps OEMs to take advantage of the fast growth in the global market for renewable energy. Auxiliary power supplies play an important role in the monitoring and control of these systems, and they need special characteristics to withstand high operating voltages while complying with reliability and safety standards. The AE series offers system designers and integrators an off-the-shelf solution for easy implementation into renewable energy applications.

The AE series is supplied in two sets of devices. The AE-EW series is available in board-mount, chassis-mount, and DIN rail-mount configurations with power ratings of 5 W, 10 W, 15 W and 40 W. The series is safety-approved according to EN 62109-1, and complies with CISPR22/EN 55022 Class A limits for conducted and radiated emissions.

The AE-UW series is available with a 10 W, 15 W or 40 W power rating. Housed in fully encapsulated board-mount packages, the AE-UW series carries the same safety approvals as the AE-EW series, and in addition meets the requirements of the UL 1741 specification.

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Secure element family provides certified solution for asset identification and brand protection

The STMicroelectronics STSAFE-A110 implements a rich set of security functions to provide strong protection for secure keys, a unique identification and X.509 certificates. ST supports OEMs with secure provisioning of STSAFE devices.

The STSAFE-A110 from STMicroelectronics, part of its STSAFE family of secure elements, enables OEMs to prevent the counterfeiting of genuine products by strictly assuring their authenticity.

The STSAFE-A110 secure element offers state-of-the-art certified protection, and access to secure cloud credentials. This enables device manufacturers to perform mass registration of IoT devices while ensuring that only authorized devices can access online services. The personalization process can be performed at a secure ST factory, simplifying and protecting the handling of secret data in the production of IoT devices.

The STSAFE-A110 includes a secure operating system, and is based on hardware which is certified to Common Criteria Evaluation Assurance Level 5+ (EAL5+). Each unit comes with a unique identification and X.509 certificates, aiding secure connection of IoT devices to cloud computing platforms and other networked services.

Like all the STSAFE products, this secure element includes the most robust technologies for resisting attempts to eavesdrop on, steal, tamper with or corrupt private data. The STSAFE-A110 security features include:

- Secure channel establishment with remote host including transport layer security (TLS) handshake
- Signature verification service for secure boot and firmware upgrades
- Usage monitoring with secure counters
- Pairing and secure channel establishment with a host applications processor
- Wrapping and unwrapping of local host envelopes
- Symmetric data encryption or decryption with up to 16 keys
- On-chip key pair generation

The STSAFE-A110 also performs advanced asymmetric cryptography using ECC, ECDSA or ECDH protocols, and symmetric cryptography with protection against logical and physical attacks.

The STSAFE-A110 is integrated with the STM32Cube development ecosystem, so that it can be quickly incorporated in new designs based on an STM32 microcontroller.

FEATURES

- Unique serial number on each die
- Active shield against physical intrusion
- Protection against side-channel attacks
- 6 kbytes of configurable non-volatile memory
- I2C interface

APPLICATIONS

- Consumables
- IoT devices
- Smart home products
- Smart city products
- Accessories
- Power-tool batteries
- Battery chargers
- Vending machines
- Farm machinery
- Environmental sensors

FREE DEV BOARD

Expansion board based on STSAFE-A110 secure element.

Orderable Part Number
X-NUCLEO-SAFEA1

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Near infrared imaging: new 3D sensing technology lowers cost and simplifies hardware architecture

By Abhishek Gadgi
EMEA Specialist Field Application Engineer (Imaging Solutions), Future Electronics

Read this to find out about:

- The uses for NIR imaging in industrial applications
- The range of techniques used to generate 3D images in the NIR spectrum
- The latest emitter and sensor products for NIR applications available from specialist manufacturer ams OSRAM

Near infrared (NIR) imaging has long been deployed in specialized fields such as scientific research because of the valuable optical properties of light at NIR wavelengths. For example, research laboratories perform spectrometry with NIR light sources and cameras. This advanced form of NIR imaging can detect and measure the specific physical or chemical properties of materials. In medical diagnostics, NIR imaging is used in laboratory equipment to analyze specimens or samples. The data derived from the analysis enable, for instance, the diagnosis of medical conditions.

Now industrial and commercial applications are developing new ways to deploy NIR imaging, using 3D sensing technology pioneered by the smartphone industry.

This trend is backed by manufacturers of NIR illuminators and sensors, which are introducing products that bring 3D sensing in reach of manufacturers of machine vision products and industrial equipment. And designers of machine vision equipment are finding that it can help them to improve functionality, often while reducing system cost at the same time.

Richer information, more valuable insights

Machine vision has traditionally used cameras based on image sensors operating in the visible light spectrum. In factory automation, for instance, global shutter image sensors with a high frame rate enable visual checks for defects and non-conformity in high speed, high-volume production environments.

A flat 2D visible image, however, can provide only limited information about an object: for instance, to inspect the label printed on a packaging box. A 3D imaging system, by contrast, not only inspects the label but also provides additional data about position and geometry, such as:

- The dimensions of the box
- Deformities that could indicate that the box has been damaged
- Orientation of the box, to ensure that it has not been placed upside-down or on its side

3D sensing today is often implemented as a stereovision set-up: a pair of visible light digital cameras can infer depth from the parallax effect, the fractionally different pixelated representation of the scene that each camera produces. This stereovision technology mimics the way in which the human vision system perceives depth.

3D vision solutions can also be implemented with structured light: here, a pattern projector works in combination with a single camera. The projector uses a diffractive optical element, an optical filter which splits a beam of laser light into multiple tiny beams. This diffracted beam forms a predefined pattern, typically a dot pattern, which is projected on to the observed scene. From the distortion of the projected pattern in the camera's image of the scene, the size and position of the object can be inferred.

If both 3D technologies are combined, 3D stereovision plus structured light, an even more robust 3D image can be captured. This technique is called active stereovision.

Both these 3D scanning technologies work best in the NIR spectrum, especially at 850 nm or 940 nm, rather than in the visible spectrum with the use of conventional RGB image sensors:

- Sunlight has spectral gaps at 850 nm and 940 nm that produce a better signal-to-noise ratio (SNR), enabling the use of a lower-power illuminator or projector. Such an illuminator will tend to have a lower unit cost than a higher-power light source, and will also consume less power, to provide for longer run-times in battery-powered applications such as remote surveillance
- The light source, a pattern projector or illuminator, is invisible to people
- Some NIR illuminators and most NIR image sensors have a narrow spectral bandwidth: both the output from the emitter and the sensitivity of the sensor can have narrow peaks close to their nominal wavelength. This enables an NIR system to capture clear, detailed image data free of interference from ambient visible light or other light sources

The high SNR of NIR imaging systems is particularly valuable in challenging applications for machine vision such as automatic number plate recognition (ANPR), which has to operate both fast and reliably often in dim or dark conditions, even with a low-power illuminator.

Besides these higher-resolution 3D vision systems, there are also so called time-of-flight (ToF) systems: they measure the differences between emission of short laser pulses, in direct ToF, or dToF, systems, or between continuous phase-modulated light outputs, in indirect ToF or iToF systems, and the reflection from an object in the field of view received by a sensor array. The flight time differences between the emitted and reflected photons from different parts of a non-flat object can be measured by a ToF sensor, and converted into a depth map.

Although the image resolution is not as high as with stereovision or structured light systems, ToF is a proven 3D scanning technology. The quality of the scan results depends on the laser system's ability to produce ultra-short pulses, for dToF, or stable phase modulation for iToF. In applications that do not require a high-resolution depth map, smart and energy-efficient multi-zone dToF sensors can perform histogram calculations and indicate in which zone an obstacle has been detected, and how far away it is.

New components serving the industrial market for 3D sensing

There is a broad choice of components available to implement 3D NIR imaging and sensing, including high- and low-power LEDs, both in the visible and IR spectrums, IR lasers for 3D sensing include vertical-cavity surface-emitting lasers (VCSELs), which are supplied in 850 nm and 940 nm wavelengths, and edge-emitting lasers (EELs), which normally operate at 905 nm. EELs offer a higher power output for use over a longer range, for instance in LiDAR systems traditionally deployed in autonomous guided vehicles (AGVs) and mobile robots. In fact, each 3D sensing technology is suited to a different set of application requirements and ranges.

3D sensing for face recognition and biometrics typically operates at a range of less than 1 m, and is realized with NIR imagers paired with structured light dot projectors, to provide an anti-spoofing capability.

Mobile household robots use low-cost multi-zone dToF sensors that have an operating range of up to 5 m, for obstacle detection and navigation.

Higher-end robots or production inspection systems use stereovision or active stereovision cameras to produce a detailed 3D depth map. Paired with higher resolution image data originating from the stereovision set-up, these systems capture a detailed image of the scene over a range from 0.5 m to further than 10 m.

For any of these types of NIR imaging or sensing system, ams OSRAM is a source of the advanced optical components that are required. ams OSRAM, is a company formed by the merger of ams, a specialist manufacturer of optical sensors, and OSRAM, one of the world's largest producers of emitters, including both LEDs and lasers.

Fig. 1: The BELAGO1.1 projector, showing the diffractor that produces the dot pattern. (Image credit: ams OSRAM)

The ams OSRAM product range is equally well geared towards the industrial as the consumer market. For instance, the BELAGO1.1 is a proprietary 940 nm dot-pattern illuminator with built-in eye-safety protection, shown in Figure 1. It emits a focus-free, high-contrast dot pattern that algorithms can use to produce high-accuracy depth maps. A particular benefit of the BELAGO illuminator is its characteristic random dot pattern, which can feature between 5,000 and 35,000 dots. The pattern reduces the computational load on the image processor that performs the depth map calculation.

ams OSRAM also supplies the TARA family of IR VCSEL emitters. The TARA2000-AUT is an automotive-qualified version of the emitter, for use in in-cabin sensing applications such as driver monitoring and gesture detection, shown in Figure 2. The VCSEL's narrow spectral bandwidth ensures freedom from interference caused by sunlight and reflections inside the car. The ultra-compact module, with a footprint of just 4.1 mm x 4.1 mm, is available with various field of illumination options.

Fig. 2: TARA2000-AUT, an IR VCSEL flood illuminator. (Image credit: ams OSRAM)

For the image sensor element of a 3D optical system, ams OSRAM supplies the Mira family of global-shutter NIR image sensors. The Mira family image sensors offer high quantum efficiency, which enables operation with a low-power emitter and in dim lighting conditions.

A stacked chip design uses ams OSRAM back-side illumination technology to shrink the chip's footprint, giving greater design flexibility to manufacturers of space-constrained products. The Mira220, a 2 Mpixel image sensor that can be used in structured lighting systems as well as other applications, has a small 5.3 mm x 5.3 mm footprint, and is shown in Figure 3.

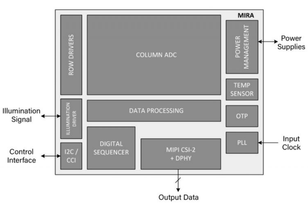

Fig. 3: Block diagram of the Mira220, a 2.2 Mpixel image sensor. (Image credit: ams OSRAM)

The global shutter provides for the distortion-free capture of fast-moving objects, such as products subject to quality assurance in a high-volume manufacturing operation. The Mira220 achieves quantum efficiency of up to 38% at 940 nm. Some applications can work with lower-resolution images, and benefit from less complex algorithms and hence lower power consumption. Here, ams OSRAM provides a 0.5 Mpixel image sensor, the Mira050. This sensor provides additional low-power features to provide wake-up triggers, which would otherwise need to be realized by additional presence detection sensing circuitry.

ams OSRAM also supplies a broad portfolio of single- and multi-zone direct time-of-flight (dToF) sensors, including the TMF8828, which detects objects in a user-configurable array of up to 8 x 8 zones.

These ams OSRAM optical products, as well as illuminators and image sensors from manufacturers including Luminus Devices, onsemi, ROHM Semiconductor and Vishay, are fully supported by the technical service, engineering and sales teams at Future Electronics.

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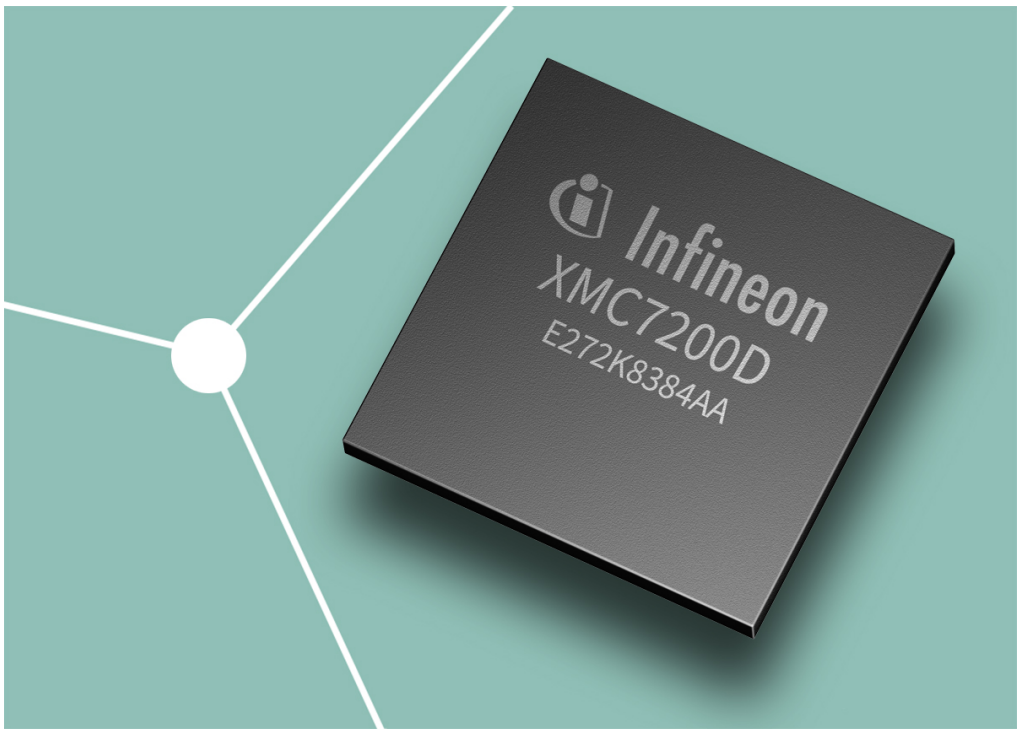
Industrial MCUs offer robust combination of security, high performance and peripherals

The XMC7000 MCUs from Infineon, which are based on a multi-core architecture, provide a rich set of communications interfaces and analog functions. System operation is supported by robust hardware security capabilities.



Infineon

FEATURES

- Supply-voltage range: 2.7 V to 5.5 V
- Read-while-write Flash memory capability
- Three SAR ADCs
- SMIF interface
- SDHC interface

APPLICATIONS

- EV chargers
- Light electric vehicles
- Robotics
- Programmable logic controllers
- Battery management systems
- Motor-control systems
- Industrial drives

Infineon provides an ideal option for developers of high-end industrial applications who require a robust, low-power and high-performance 32-bit microcontroller backed by a comprehensive set of system software and development tools.

The new XMC7000 MCU family includes versions with either a single or dual Arm Cortex-M7 core, supported by a 100 MHz Cortex-M0+ processor. The new XMC™ MCUs feature up to 8 Mbytes of Flash memory and 1 Mbyte of on-chip SRAM.

A rich set of peripherals includes a CAN FD interface and 16- and 32-bit timer/counter PWMs in both the XMC7100 and XMC7200. The XMC7200 devices also have a Gigabit Ethernet communications interface. Alongside the advanced peripheral set, the XMC7000 family also offers robust security features. These include a hardware cryptography engine.

The MCUs are able to operate in harsh environments across a temperature range of -40°C to 125°C. Power-saving modes, which bring operating current as low as 8 µA, make these MCUs ideal for power-constrained applications.

Built on Infineon's low-power 40 nm process technology, the XMC7000 MCUs are compatible with the latest Infineon ModusToolbox™ 3.0 development platform. This platform provides a common development experience across Infineon products, including PSoC™ MCUs, AIROC™ Wi-Fi and Bluetooth networking modules, and EZ-PD™ PMG1 MCUs. The ModusToolbox tools package includes:

- Desktop programs that enable the developer to create new embedded applications, manage software components, and configure device peripherals and middleware.
- Embedded development tools for compiling, programming, and debugging the application
- Extensive collection of GitHub-hosted repositories of code examples, board support packages, middleware, and application support

Series	Flash	RAM	Arm Cortex-M7 Options	Package Options
XMC7100	Up to 4 Mbytes	Up to 768 kbytes	250 MHz single or dual core	100-, 144- or 176-pin, TQFP 272-pin LFBGA
XMC7200	8 Mbytes	1 Mbyte	350 MHz single or dual core	176-pin TQFP, 272-pin LFBGA

FREE DEV BOARD

Evaluation kit for Infineon XMC7200D industrial-grade microcontroller.

Orderable Part Number
KITXMC72EVK

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Six-axis motion sensor features internal AI processing unit

The STMicroelectronics ISM330IS motion sensor combines an accelerometer and gyroscope in a single small package. The internal AI processor runs algorithms at the edge, reducing the burden on the host processor.

The ISM330IS motion sensor from STMicroelectronics, which combines a three-axis digital accelerometer and a three-axis digital gyroscope, contains a processing unit to provide real-time sensor data to the host application.

The ISM330IS system-in-package's intelligent sensor processing unit (ISPU) is an ultra low-power, high-performance programmable core which can execute signal processing and artificial intelligence (AI) algorithms at the edge. The ISPU supports C programming, and is backed by an ecosystem of libraries and third-party tools and development environments. Its circuitry is optimized for the real-time execution of algorithms, providing a streamlined implementation of AI in wireless sensor nodes.

The ISM330IS has a full-scale acceleration range of ±2 g/±4 g/±8 g/±16 g. The angular rate range is between ±125 degrees/s and ±2,000 degrees/s.

The sensor provides a programmable interrupt function, and an on-chip sensor hub for the internal accelerometer and gyroscope and up to four external sensors.

The LGA package of the ISM330IS measures 2.5 mm x 3 mm x 0.86 mm.

FEATURES

- Low power consumption in always-on mode
- Low operating current:
  - 0.59 mA in high-performance mode
  - 0.46 mA in low-power mode with ISPU inactive
- 70 µg/√Hz noise in high-performance mode
- SPI/I2C interface
- Operating-temperature range: -40°C to 85°C
- Embedded temperature sensor

APPLICATIONS

- Industrial robots
- Condition-based monitoring
- Asset tracking
- Smart home automation
- Personal health monitoring equipment

FREE DEV BOARD

iNEMO inertial module kit based on ISM330IS six-axis motion sensor.

Orderable Part Number
STEVAL-MKI230KA

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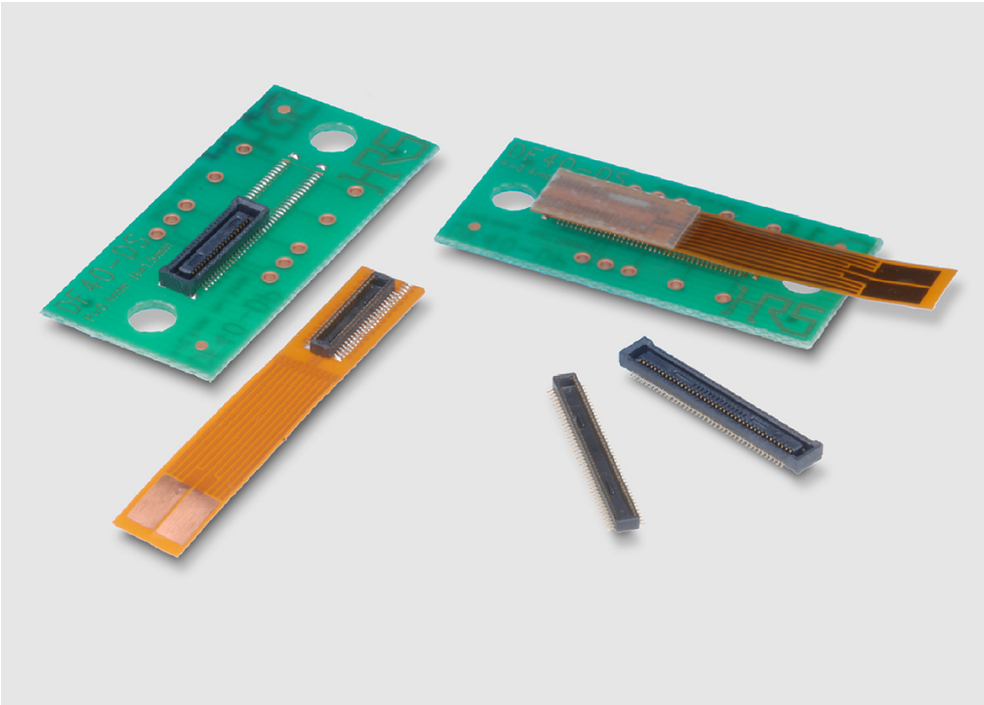
Compact connectors offer secure connection and easy unmating

The Hirose DF40 series of connectors, available in board-to-board and FPC-to-board configurations, supports high-speed applications with a 10 Gbits/s data rate and conformity to USB4® v2.0 specifications.



HIROSE ELECTRIC EUROPE B.V.

FEATURES

- 0.4 mm contact pitch
- Between 10 and 120 contacts
- 0.3 A rated current
- 30 V ac/dc rated voltage
- Operating-temperature range: -35°C to 85°C
- 30 mating cycles

APPLICATIONS

- Digital cameras
- Home appliances
- Audio devices
- Gaming devices
- Small industrial equipment
- Portable consumer devices

The DF40 series of shielded flexible printed circuit FPC-to-board and board-to-board connectors from Hirose supports high-speed signal transmission at rates up to 10 Gbits/s, making it suitable for use in products conforming to the specifications of the USB4 specification v2.0 standard. At just 3.38 mm deep, the DF40 series connectors occupy a small board mounting area.

The connectors' robust, metal-blade lock has a sliding mechanism to provide a secure connection. This is ideal for applications that must be able to withstand drop impacts. A positive tactile click can be felt when mating to confirm correct engagement. A vacuum pick-and-place area is available for automatic placement.

Guide ribs provide a wide self-alignment range of ±0.33 mm in the x and y directions to simplify mating. The user-friendly connector offers an effective mating length of 0.45 mm, providing high contact reliability.

In addition to the standard DF40 series, Hirose also offers:

- DF40T, DF40GT, DF40F series of heat-resistant and/or floating versions for automotive applications
- DF40GL, a shielded version

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Power inductors offer low resistance and high current capability

Monolithic Power Systems supplies families of power inductors with inductance values, dc and ac resistance and saturation current ratings that are ideal for power-system designs based on the company's IC products.

MPS

FEATURES

- Operating temperature up to 155°C
- Sample kits available

APPLICATIONS

- Power converters
- Power adaptors
- Power supplies

Monolithic Power Systems supplies surface-mount power inductors for use in power supply and power conversion applications alongside the company's range of power converter and controller ICs.

The molded and semi-shielded series inductors are available in a range of inductance values from 0.33 µH to 47 µH, and with saturation current ratings from 0.8 A to 64 A.

The **MPL-SE semi-shielded power inductors** are shielded by an external magnetic epoxy resin to give good magnetic characteristics. They feature low dc resistance and are rated for high current capacity.

The **MPL-AT/-AY/-AL series of molded power inductors** offers soft saturation due to the molded design, and provide stable behavior at high temperatures. The molded construction decreases the audible noise generated by alternating currents and pulse-wave frequencies.

The MPL-AT and MPL-AY series inductors offer low dc and ac resistance, and can handle high currents. The MPL-AT series features a very low profile.

The MPL-AL series offers low dc and ac resistance. It has a flat-wire construction, which provides higher current ratings for better performance than round-wire molded inductors.

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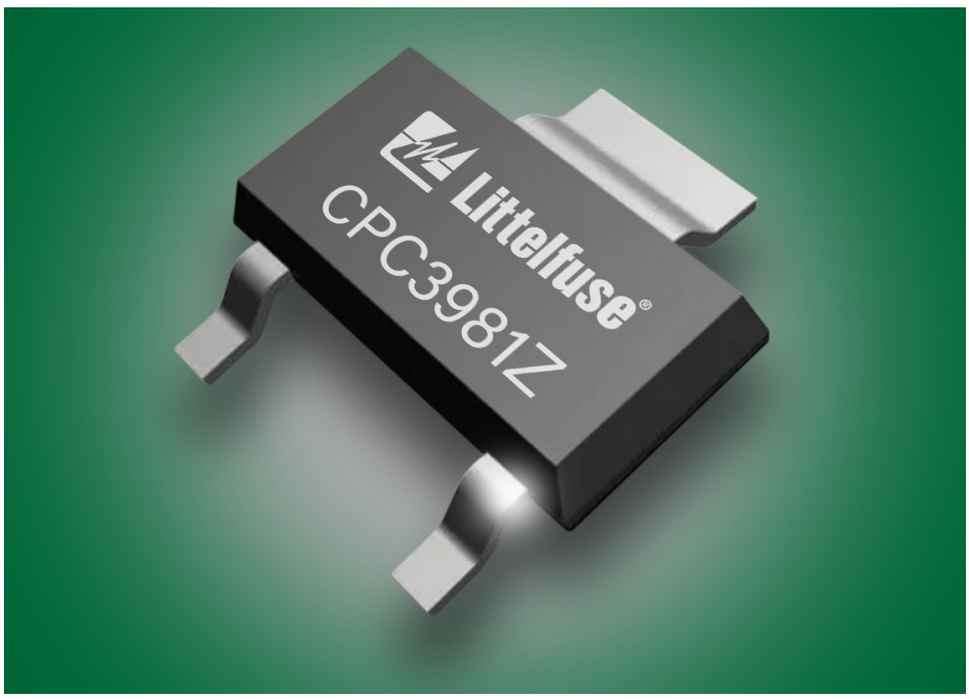
800 V depletion-mode MOSFET in modified SOT-223 package provides extra creepage distance

The new CPC3981Z from Littelfuse provides a compact solution for high-voltage power circuits that require extra drain-gate pin spacing. The longer creepage helps to save cost and simplify board layouts.



Littelfuse
Expertise Applied | Answers Delivered

FEATURES

- High input impedance
- Low gate-source switch-off voltage
- Normally closed with no power applied

APPLICATIONS

- Industrial equipment
- Energy systems
- Telecoms equipment
- LED lighting

Littelfuse has launched the CPC3981Z, an 800 V N-channel depletion-mode MOSFET with a novel pin arrangement that provides extended creepage distance in high-voltage applications.

A variation on the standard SOT-223 outline, the design of the CPC3981Z SOT 223 2L package removes a middle pin. This extends the drain-gate pin spacing from 1.386 mm to more than 4 mm. The longer creepage is beneficial in high-voltage applications such as switch-mode power supplies or power factor correction start-up circuits, because designers can avoid the need for costly conformal coating or potting while meeting their design requirement with a small, discrete device.

The increased distance between the depletion-mode MOSFET's pins also simplifies the isolation management of wide input-voltage power supplies, and enables compact PCB layouts.

The 800 V blocking voltage rating of the CPC3981Z makes it the ideal choice for use in applications such as:

- Normally on switches
- Power supplies
- Start-up circuits
- Solid-state relays
- Current regulators
- Constant current sources

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Low-cost microprocessor protected by broad set of security functions

The STM32MP131 MPU from STMicroelectronics, part of the STM32MP1 family of low-cost processors, provides a secure hardware platform for basic Linux distributions as well as RTOSs.

The STM32MP131 microprocessor from STMicroelectronics offers cost-effective and energy-efficient processing protected by certified security capabilities.

Part of the STM32MP13x line of MPUs, the STM32MP131 is based on a single Arm Cortex -A7 core running at up to 1 GHz, and interfacing to a single Ethernet port.

The STM32MP131 MPU's advanced security features include:

- A cryptographic accelerator
- Memory protection functions to deter illegal access
- Code isolation mechanisms for runtime protection
- Platform authentication functions protecting systems throughout the product lifecycle

The STM32MP131 supports entry-level Linux operating system (OS) distributions, as well as bare metal implementations and real-time OSs (RTOSs). The Microsoft Azure RTOS is pre-integrated in the STM32MP131.

The code available from ST for security mechanisms includes the Open Portable Trusted Execution Environment (OP-TEE) and the Trusted Firmware-A (TF-A) projects. This helps developers using the STM32MP13x processors to address the key elements of information security in their applications: confidentiality, integrity, availability, and authentication.

ST has also introduced software expansion packages tailored for the STM32MP13x which help designers to deploy artificial intelligence (AI) in computer vision projects and to accelerate the development of predictive maintenance applications. These include X-LINUX-AI, an expansion package which contains AI frameworks and application examples for the Linux OS to help designers to quickly begin implementing computer vision use cases.

FEATURES

- Dual quad SPI memory interface
- Flexible external memory controller
- Four DMA controllers
  - 56 physical channels in total
- Security functions:
  - Secure boot
  - TrustZone peripherals
  - Temperature, voltage, frequency and 32 kHz monitoring
- Three package options
  - 289-lead 9 mm x 9 mm TFBGA
  - 320-lead 11 mm x 11 mm TFBGA
  - 289-lead 14 mm x 14 mm LFBGA

APPLICATIONS

- Industrial equipment
- Factory automation
- Metering
- Smart home
- Point-of-sale equipment
- Electric vehicle charging
- Medical equipment
- Health and wellness devices

FREE DEV BOARD

Discovery kit supports evaluation of STM32MP13x line of MPUs.

Orderable Part Number
STM32MP135F-DK

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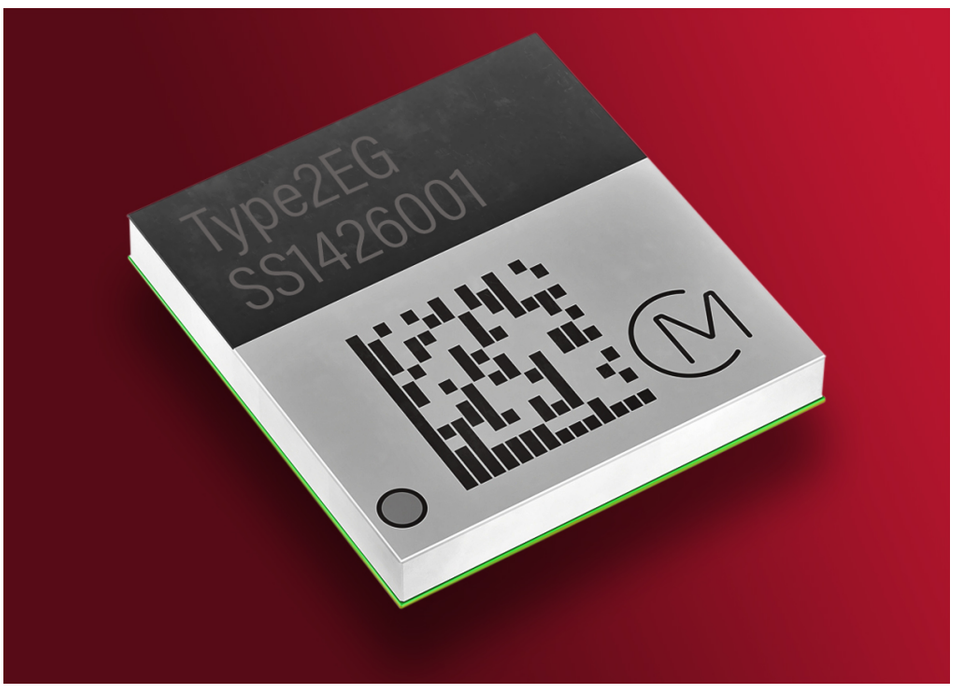
FUTURE ELECTRONICS
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

New Bluetooth LE module consumes low power in IoT applications

The Type 2EG module from Murata includes all the functions required for secure wireless communication, including an on-board antenna, matching network, power supply, and timing devices, simplifying IoT system development.



Murata has launched a Bluetooth Low Energy (LE) communications module, the Type 2EG, which provides a ready-made wireless system implementation, shortening OEMs' time-to-market.

The compact module, which measures just 7 mm x 7.4 mm x 1 mm, integrates an onsemi RSL15 Bluetooth LE system-on-chip (SoC), an RF front end, a fast and a slow clock for operating and sleep modes, a large inductor which supports low-power mode, and an on-board antenna.

The Type 2EG supports the Bluetooth v5.2 specifications, which include long range, proximity mode, a high data transmission rate, and up to 10 simultaneous connections.

The module provides the two key features required in battery-powered wireless IoT devices, which are widely deployed in use cases such as remote monitoring and control: long battery life and secure data communication.

The Type 2EG module offers low power consumption thanks to the efficiency of both its radio and the SoC CPU. The RSL15 Arm Cortex -M33 core can remain in a deep sleep mode while still monitoring sensor interfaces. Security is assured by the provision of Arm TrustZone hardware partitioning and Arm CryptoCell™-312 technology, which provide a root-of-trust and high data security.

The Type 2EG module can be ordered with the part number LBCA1HN2EG.

muRata
INNOVATOR IN ELECTRONICS

FEATURES

- Interfaces:
  - UART
  - Quad SPI
  - SPI
  - GPIO
  - PWM
  - I2C
- Certification:
  - FCC/IC
  - ETSI
  - MIC
- On-board and external antenna options

APPLICATIONS

- IoT edge devices
- Medical equipment

FREE DEV BOARD

Evaluation board for Murata Bluetooth Low Energy communications module.

Orderable Part Number
LBCA1HN2EG-EVK

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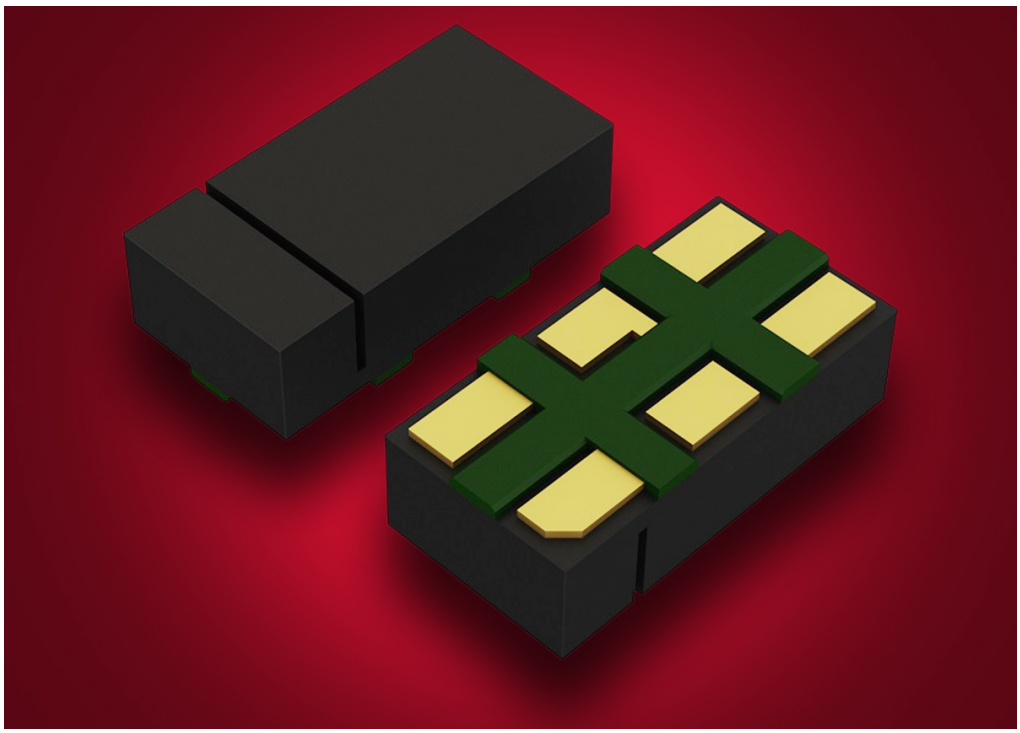
Compact sensor module provides reliable proximity detection in consumer devices

The ROHM Semiconductor RPR-0720 infrared module can detect the presence of objects at a range of up to 15 mm. An on-chip I2C interface makes the sensor controllable by any microcontroller.



ROHM SEMICONDUCTOR

FEATURES

- Compatible with 1.8 V or 3.3 V logic interfaces
- Built-in VCSEL driver
- Ambient light cancellation
- Low light leakage inside the package

APPLICATIONS

- Earbuds
- Hearing aids
- Mobile phones
- Games machines
- AR/VR equipment
- Digital still cameras

The ROHM Semiconductor RPR-0720 is an integrated infrared (IR) proximity sensor module which combines an emitter and receiver in a single small package.

The RPR-0720's emitter is an IR vertical-cavity surface-emitting laser. The chip's built-in IR receiver detects the approach of a person or other object by measuring the rate of reflection of IR light emitted by the VCSEL, over a range between 1 mm and 15 mm. The proximity sensing range is controllable by the system designer via its I2C interface.

The RPR-0720 measures 2.0 mm x 1.0 mm x 0.55 mm.

FREE DEV BOARD

Evaluation kit for ROHM Semiconductor proximity sensor module.

Orderable Part Number
RPR-0720-EVK

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Signal relay offers space and power savings

The fifth generation of the HFD signal relays from Hongfa has a small board footprint, and features low coil holding power, providing advantages in industrial, medical and telecoms applications.

Hongfa has introduced the fifth generation of its HFD signal relays, providing space savings in applications that require isolated control of signal transmission.

At 9.0 mm x 4.8 mm x 4.9 mm, the HFD5 relays are 40% smaller by volume than the fourth-generation HFD relays, and occupy a board area which is 34% smaller.

The new HFD5 product also offers improved energy efficiency: coil holding power is just 50 mW, more than 64% lower than the fourth-generation relay. The improved efficiency saves power and helps to limit the temperature rise inside the relay, resulting in higher reliability and longer lifetime. The HFD5 is also notable for its quiet operation: audible noise when switching is a maximum of 30 dB.

Hongfa supplies relays in the HFD5 range that are compliant with the IEC 60079 or IEC 60335-1 standards. The range is available in single-side stable and latching type options, and with coil voltage options ranging from 1.5 V to 12 V.

HONGFA

FEATURES

- Directly driven by microprocessor or microcontroller
- 10 mA maximum operating current for 5 V coil
- 2 A maximum switching current
- 250 V ac/220 V dc maximum switching voltage
- 100 mΩ maximum contact resistance
- 2 ms maximum switching time
- 750 V ac dielectric strength between open contacts
- Bifurcated contacts
- DIP and surface-mount package options

APPLICATIONS

- 5G mobile networking
- Test equipment
- Medical equipment
- Video surveillance systems
- Smart home devices
- Automotive systems

DATASHEET

SAMPLES

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Compact 60 V, 100 V and 150 V rectifiers feature high current ratings

New TMBS rectifiers from Vishay, including the VxNL63 series, have a low profile, save space and improve thermal performance and efficiency in many types of power circuit.

Vishay has introduced five new series of 60 V, 100 V, and 150 V Trench MOS Barrier Schottky (TMBS) rectifiers housed in a low-profile DFN3820A package that has wettable flanks.

Offering space and power savings, the VxNL63, VxNM63, VxN103, VxNM103 and VxNM153 rectifiers feature best-in-class current ratings of up to 7 A. Current density is as much as 50% higher than that of rectifiers housed in a conventional SMA (DO-214AC) package, and 12% higher than SMF (DO-219AB) devices.

The DFN3820A package footprint is 3.8 mm x 2.0 mm, and the profile is 0.88 mm. The design optimizes the copper mass, while advanced die placement technology allows for superior thermal performance, which enables operation at higher currents.

These rectifiers are intended for use in various types of power circuits:

- Low-voltage, high-frequency inverters
- Dc-dc converters
- Freewheeling diodes
- Snubbers
- Polarity protection
- Reverse current blocking
- LED backlighting

VISHAY

FEATURES

- AEC-Q101-qualified versions available
- Up to 175°C maximum operating temperature
- Forward voltage drop as low as 0.45 V
- Supports automated optical inspection

APPLICATIONS

- Energy generation, distribution, and storage equipment
- Industrial automation
- Consumer electronics
- Appliances
- Notebook and desktop computers
- Telecoms equipment
- Automotive systems:
  - Airbags
  - Motors
  - Fuel pumps
  - Driver assistance systems
  - Power distribution systems
  - EV chargers
  - Battery management systems

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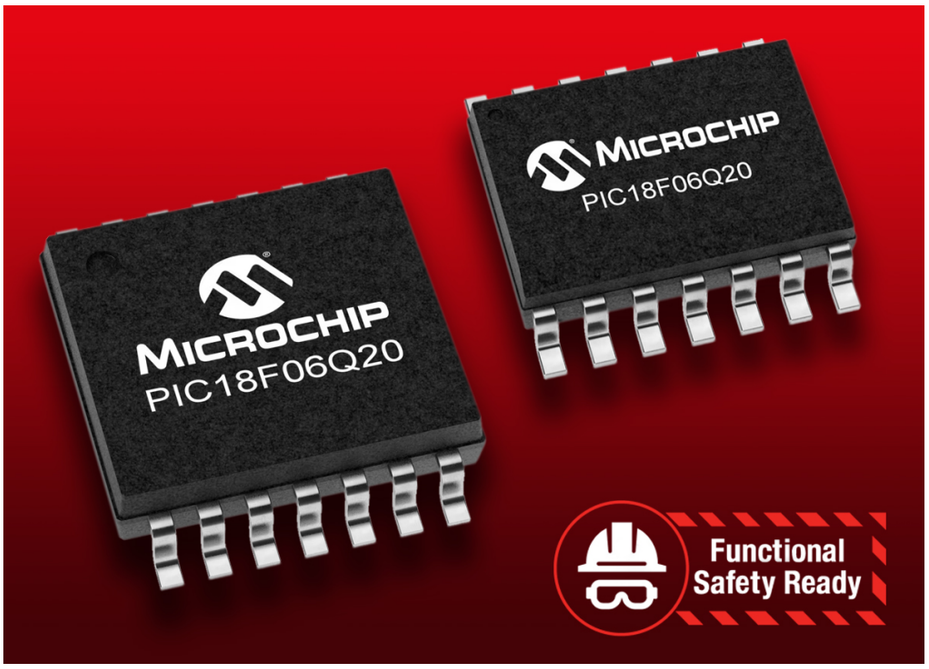
Launch of industry's first low pin-count MCUs include I3C support

The PIC18-Q20 8-bit microcontrollers from Microchip occupy little board space, and easily interface with devices operating in multiple voltage domains. The built-in I3C® interface supports higher-speed and lower-power data transfers than I2C.



MICROCHIP

FEATURES

- 1 µA sleep current at 3 V
- Four DMA controllers
- Two 16-bit dual PWMs
- Vectored interrupt capability
- ADC with computation capability
- Two UART interfaces

APPLICATIONS

- Automotive systems
- Industrial control
- Computing
- Consumer products
- IoT devices
- Medical equipment

Microchip has released the PIC18-Q20 family of 8-bit microcontrollers, the industry's first low pin-count MCUs with one or two I3C peripherals and Multi-Voltage I/O (MVIO) capability. Available in 14- and 20-pin packages as small as 3 mm x 3 mm, the PIC18-Q20 MCUs are a compact solution for real-time control, touch sensing and connectivity applications.

The MCUs offer configurable peripherals and advanced communication interfaces. The MVIO feature means that they can make easy connections across multiple voltage domains without the need for external components.

The launch of the PIC18-Q20 family comes in response to growth in the number of cloud-connected edge nodes, in which the Improved Inter Integrated Circuit® (I3C) interface technology provides a sustainable way for sensors to transmit data at a fast rate.

With I3C functionality, flexible peripherals and the ability to operate on three independent voltage domains, PIC18-Q20 MCUs are suitable for use alongside a primary MCU, performing tasks such as processing sensor data, handling low-latency interrupts, and system status reporting. While the CPU runs in a different voltage domain, the I3C peripheral operates between 1.0 V and 3.6 V.

Compared to I2C, an I3C interface offers higher data-transfer rates and lower power consumption, while maintaining backwards compatibility with legacy systems. The I3C and MVIO functionality, combined with Microchip's configurable Core Independent Peripherals, allow for lower system costs, design simplification and a reduction in board space by replacing external level shifters with on-chip multiple voltage domains.

The PIC18-Q20 MCU family is supported by Microchip's full ecosystem of hardware and software development tools, including its MPLAB® X and MPLAB Xpress integrated development environments and MPLAB Code Configurator.

FREE DEV BOARD

Evaluation kit for PIC18F-Q20 family of 8-bit I3C MCUs.

Orderable Part Number
EV73T25A

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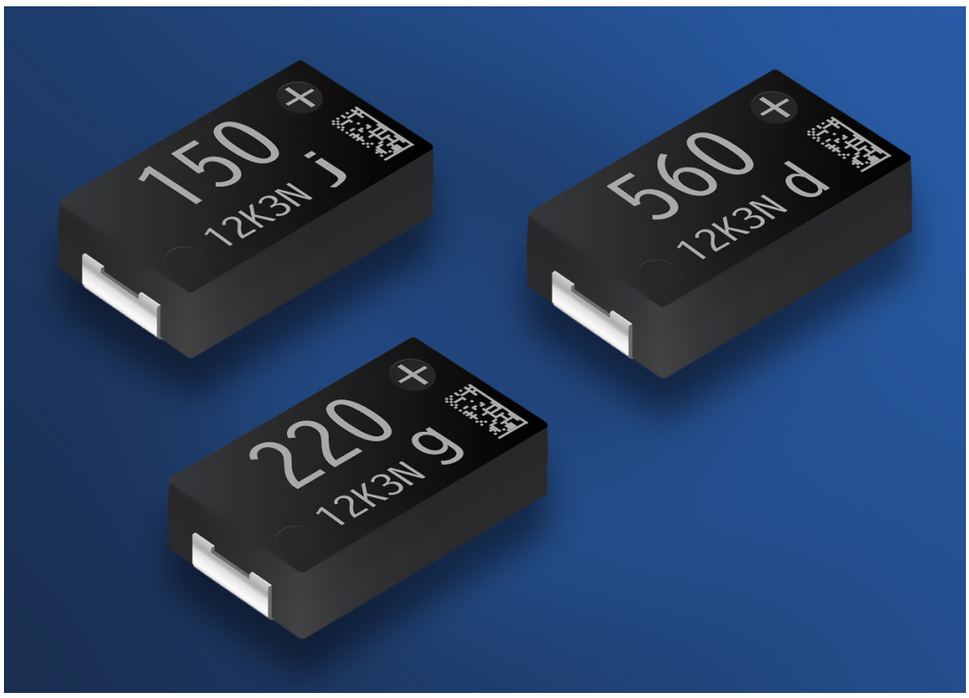
New polymer capacitors provide long lifetime and low ESR

Panasonic has added to the SP-Cap family of conductive polymer aluminum electrolytic capacitors, extending the designer's choice of reliable devices that can withstand high temperature and high humidity.



Panasonic
INDUSTRY

FEATURES

- Voltage range: 2 V to 6.3 V
- Capacitance range: 120 µF to 560 µF
- ESR range: 3 mΩ to 15 mΩ
- Case footprint: 7.3 mm x 4.3 mm
- Height range: 1.9 mm to 2.2 mm
- Operating-temperature range: -55°C to 125°C or 135°C
- Lifetime range: 3,000 hours to 5,500 hours

APPLICATIONS

- 5G network base stations
- Data center servers
- Industrial equipment

Panasonic has introduced the TX, TZ, JZ and KZ series to its SP-Cap family of surface-mount, chip-style conductive polymer aluminum electrolytic capacitors, which feature a long operating lifetime in harsh conditions and very low ESR. The new capacitors join the existing JX and KX series in the SP-Cap family.

The very low ESR values of SP-Cap capacitors means that they are mainly used as input and output capacitors in dc-dc converters.

The new TX and TZ series are for use in applications exposed to very high temperatures: they can operate for up to 5,500 hours at a temperature of 135°C. The low profile of 1.9 mm means that the capacitors can be mounted close to a heat-sink.

The maximum capacitance of the KX and TX series is 470 µF, while that of the JZ, KZ and TZ capacitors is 560 µF. All the reliable SP-Cap capacitors provide ultra-low ESR values as low as 3 mΩ.

The JZ and KZ capacitors are also robust, but are for use in less harsh environments: the JZ series is rated for 3,000 hours at 125°C, and the KZ series for 5,500 hours at 125°C.

The SP-Cap capacitors also withstand operation in humid environments: rated lifetime is 1,000 hours at 85°C and 85% relative humidity.

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Serial page EEPROM offers low power consumption in data-logging applications

The M95P08-I and M95P08-E EEPROM from STMicroelectronics provide flexible options for writing and storing data in applications that require very fast write times and non-volatile storage capability.

The M95P08-I and M95P08-E serial page EEPROM are storage devices that can be used to save data such as manufacturing traceability logs, calibration and settings, error flags, data logs, and monitoring data.

These EEPROMs, manufactured with ST's proprietary non-volatile memory technology, offer byte flexibility, page alterability, high page cycling performance, and very low power consumption.

The M95P08 EEPROM provides capacity of 8 Mbits. The EEPROM is organized as 2,048 programmable pages of 512 bytes each, accessible through a serial peripheral interface (SPI) with high-performance dual- and quad-SPI outputs. The pages are organized into 64 kbyte blocks and 4 kbyte sectors.

The EEPROM offers two additional identification pages of 512 bytes. The first contains identification data and, on request, a unique ID. The second can be used to store sensitive application parameters, which can later be permanently locked in read-only mode.

The M95P08-I and M95P08-E offer byte and page write instructions of up to 512 bytes. Write instructions consist of self-timed auto-erase and program operations, giving flexible data byte management.

These EEPROMs are supplied in two versions:

- The M95P08-I operates from a supply voltage ranging from 1.6 V to 3.6 V over an ambient temperature range of -40°C to 85°C
- The M95P08-E offers an extended temperature range from -40°C to 105°C. The EEPROM supports a clock frequency of up to 80 MHz.

FEATURES

- Up to 160 Mbits/s dual-output data-transfer rate
- Up to 320 Mbits/s quad-output data-transfer rate
- 500,000 cycles endurance across entire temperature range
- 100 years' data retention
- Low-current operation:
  - 0.6 µA in deep power-down mode
  - 16 µA in standby mode
  - 800 µA for single read at 10 MHz
  - 1.5 mA for page write

APPLICATIONS

- Industrial equipment
- Consumer devices

FREE DEV BOARD

EEPROM memory expansion board for STM32 Nucleo.

Orderable Part Number
X-NUCLEO-PGEEZ1

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European wall-plug adapter provides ready-made power solution for USB PD 3.0 devices

The 20 W SWI20C-E from CUI Inc complies with international safety standards, and provides built-in protection against electrical faults, making it ideal for use in consumer products such as tablets and smartphones.

CUI INC®

FEATURES

- Complies with IEC 62368-1:2023 safety standard
- Input-voltage range: 90 V to 264 V ac
- Dimensions: 37.5 mm x 22 mm x 59.2 mm

APPLICATIONS

- Smartphones
- Tablet computers
- Laptop computers
- Displays and monitors
- Earbuds
- Wearable devices

The SWI20C-E from CUI Inc is a 20 W European wall-plug ac-dc adapter for use with USB Power Delivery (PD) 3.0-compatible powered devices. The EN 55032 standard-compliant SWI20C-E adapter features twin blade terminals for use in European wall sockets, and provides a USB Type-C® output connection to the powered device.

CUI has ensured that the adapter is protected from the risk of damage from electrical faults. It features built-in over-current, over-voltage, and short-circuit protection functions.

Backwards-compatible with earlier USB PD specifications, the SWI20C-E supports the following USB PD 3.0 power specifications:

- 15 W at 5 V
- 20 W at 9 V
- 20 W at 12 V

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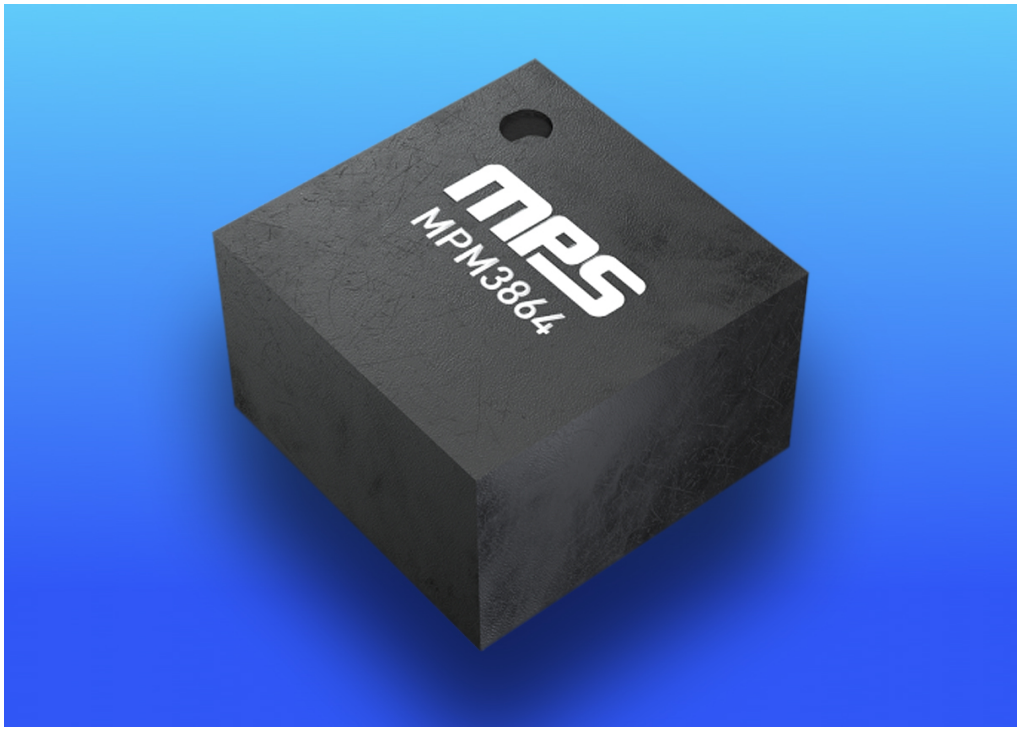
Integrated regulator modules simplify design of point-of-load power supplies

The Monolithic Power Systems MPM38x4 family of step-down switching converter modules only requires a small number of standard external components. Variants are available with maximum output current values from 0.6 A to 6 A.



Monolithic Power Systems supplies a family of integrated power modules for use at the point of load. The MPM38x4 family are synchronous step-down regulators with integrated power MOSFETs and inductor, and provide an output discharge function. Only input capacitors, output capacitors, and feedback resistors are required to complete the converter circuit, simplifying the power-system design.

The constant-on-time control scheme of the converter modules provides a fast transient response, high light-load efficiency, and easy loop stabilization.

The members of the MPM38x4 family support application requirements for various current outputs and input-voltage ranges.

FEATURES

MPM3804

- Up to 91% peak efficiency
- 11 µA quiescent current
- 2.4 MHz switching frequency
- 0.5 ms internal soft-start time
- Protection functions:
  - Cycle-by-cycle over-current protection
  - Short-circuit protection with hiccup mode
  - Thermal shutdown
- 10-lead QFN package with 2 mm x 2 mm footprint

APPLICATIONS

- Point-of-load power supplies
- Portable and mobile devices
- Battery-powered systems

FREE DEV BOARD

Evaluation board for MPM3804 power converter module.

Orderable Part Number
EVM3804-G-00A

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New Arm Cortex-M85-based devices bridge gap between MCUs and MPUs

The Renesas RA8 series microcontrollers feature Arm Helium™ technology which boosts the performance of DSP functions and of AI and machine learning algorithms. A rich set of security features includes cryptographic acceleration and secure boot.

Renesas has introduced what it bills as the world's most powerful microcontrollers. The new RA8 series MCUs, the industry's first to implement the Arm Cortex®-M85 processor, produce industry-leading performance measured at 3,000 CoreMark points, or 6.39 CoreMark points/MHz.

The deterministic, low-latency, real-time operation enabled by this high performance allows system designers to use an RA MCU in applications that would previously have required a microprocessor. The new RA8 series is part of the Renesas RA family of MCUs based on Cortex-M processors. Existing designs built for other RA devices can easily be ported to the new RA8 devices.

The new RA8 MCUs deploy Arm Helium technology, which provides up to a four times improvement in DSP and machine learning performance compared to MCUs based on the Cortex-M7 processor. This performance boost can enable designers to eliminate an additional DSP in the system in some applications.

The combination of high CPU performance and Helium technology also provides a dramatic improvement in the MCUs' ability to perform AI and machine learning tasks. For instance, the RA8 series MCUs enable edge and endpoint devices to implement natural language processing in voice AI and predictive maintenance applications, using Helium to accelerate neural network processing. The design of AI applications is assisted by Renesas' provision of embedded AI and TinyML solutions for automotive, industrial and commercial products, based on its Reality AI tools.

The security of AI and connected devices benefits from the advanced features of the RA8 series MCUs. The Cortex-M85 core includes Arm TrustZone® technology, which enables isolation and secure/non-secure partitioning of memory, peripherals and code. The MCUs also feature the most advanced Renesas security IP, RSIP-E51A, which provides leading-edge cryptographic accelerators and supports a true secure boot.

The RA8 series consists of the RA8M1 and RA8D1 groups. The RA8M1 are general-purpose MCUs that address diverse compute-intensive applications in industrial automation, home appliances, smart home, consumer, building/home automation, medical and AI applications.

The RA8D1 MCUs are specialized with a feature set optimized for human-machine interface, graphics, and vision AI systems in the industrial automation, home appliances, smart home, consumer, home and building automation, and medical/healthcare market segments.

All RA8 MCUs are supported by the Renesas Flexible Software Package (FSP). The FSP enables faster application development by providing all the infrastructure software needed, including multiple real-time operating systems, a board support package, peripheral drivers, middleware, and connectivity, networking, and security stacks. It also includes reference software for building complex AI, motor control and cloud designs.

RENESAS

FEATURES

RA8M1

- Memory resources:
  - Up to 2 Mbytes of Flash memory
  - 1 Mbyte of SRAM, of which 512 kbytes are ECC protected
  - Octal SPI Flash interface
- Interfaces:
  - CAN-FD
  - Ethernet
  - Full-speed/Hi-Speed USB
  - 16-bit camera interface
  - I3C
- Security features:
  - Cryptographic algorithms
  - Immutable storage
  - Tamper resistance with protection against side-channel attack
  - Secure debug
  - Secure factory programming
  - Lifecycle management support

APPLICATIONS

- Fingerprint scanners
- Thermostats
- Programmable logic controllers
- Smart meters
- Home hubs
- Industrial HMI
- Video doorbells
- Patient monitors
- Graphics calculators
- Security panels with displays
- Printer display panels
- Appliances

FREE DEV BOARD

Evaluation kit for Arm Cortex-M85-based RA8 MCUs.

Orderable Part Number
RTK7EKA8M1S00001BE

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New wireless MCU eases development of smaller, more efficient smart Bluetooth devices

The STM32WB09 Bluetooth® wireless microcontroller supports the latest Bluetooth Low Energy 5.3 specification, enabling designers to implement advanced features such as real-time location finding and indoor positioning.

STMicroelectronics has released the STM32WB09, a Bluetooth wireless microcontroller which enables the next generation of better, smaller short-range wireless connectivity devices to extend battery run-time.

Complying with the latest Bluetooth v5.3 specification, the STM32WB09 opens up the opportunity for designers to make smarter products such as wireless beacons and devices that can calculate their location indoors with centimeter accuracy. The chip supports advanced Bluetooth capabilities including direction finding for accurate position detection, thereby enabling applications such as real-time location, indoor positioning, item finding, and asset tracking.

This new MCU puts all the processing power and Bluetooth radio-frequency technology needed in a single chip. The STM32WB09 is supplied with a Bluetooth v5.3 protocol stack, as well as PC-based design tools, essential software and sample code to accelerate application development. The chip is based on an Arm® Cortex®-M0+ CPU core which hosts the application, while ST's state-of-the-art radio manages the Bluetooth wireless connection.

While providing generous on-chip memory, ST has prioritized features that make the biggest difference in the target applications. These include support for power-control options in the Bluetooth radio, and the ability for users to fine-tune the RF output power in 1 dBm steps. This tuning optimizes battery life and system reliability, and ensures coexistence with other nearby wireless devices.

FEATURES

- 512 kbytes of Flash memory
- 4 kbytes of RAM
- RF performance:
  - Up to -104 dBm sensitivity
  - +8 dBm output power
  - 3.9 mA peak Transmit current
  - 3.2 mA peak Receive current
- Integrated balun and crystal
- Works with 2-layer PCB

APPLICATIONS

- Industrial equipment
- Smart home
- IoT devices
- Remote controls
- Wearable devices
- Wireless sensors
- Warehouse inventory management systems
- Smart meters
- Disposable medical sensors
- Access controls equipment

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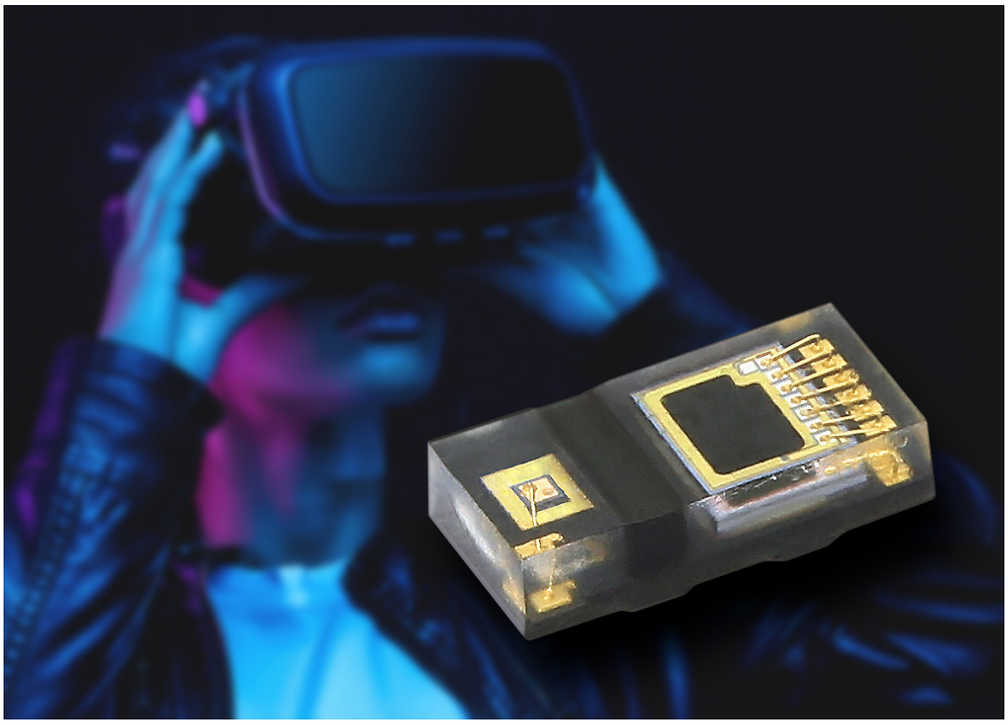
Low power consumption makes new proximity sensor ideal for battery-powered consumer devices

The VCNL36828P sensor module from Vishay implements a complete proximity sensing system which detects objects at a range of up to 200 mm. The module saves both space and power in products such as earbuds.



VISHAY

FEATURES

- 200 mm detection range
- Programmable VCSEL sink current
- I2C interface
- 1.8 V supply voltage

APPLICATIONS

- True wireless stereo earphones
- Multi-button displays
- Smart home products
- IoT devices
- Touchless dispensers
- VR/AR headsets
- Smart watches

Vishay has introduced a fully integrated proximity sensor which offers exceptionally low power consumption. In low-power mode, the VCNL36828P sensor draws just 5 µA between measurements. The VCNL36828P combines a 940 nm infrared vertical-cavity surface-emitting laser (VCSEL) emitter, photodiode, and ASIC in a single package.

This compact sensor, with a package measuring just 2.0 mm x 1.0 mm x 0.5 mm, is suitable for object detection in a wide range of consumer use cases. For instance in true wireless stereo earbuds, support for multiple slave addresses means that two VCNL36828P sensors may be placed on the same I2C bus in each earphone: this enables it to tell whether the sensor has been placed in-ear or on a table or other surface.

The sensor's VCSEL emitter has a narrow beam, the angle of emission is just ±4.5°. This enables the application to work with a small window, increasing design flexibility.

The sensor offers reliable operation even when outdoors. The VCNL36828P's sunlight cancellation feature compensates for bright ambient light of up to 140 klux.

DATASHEET

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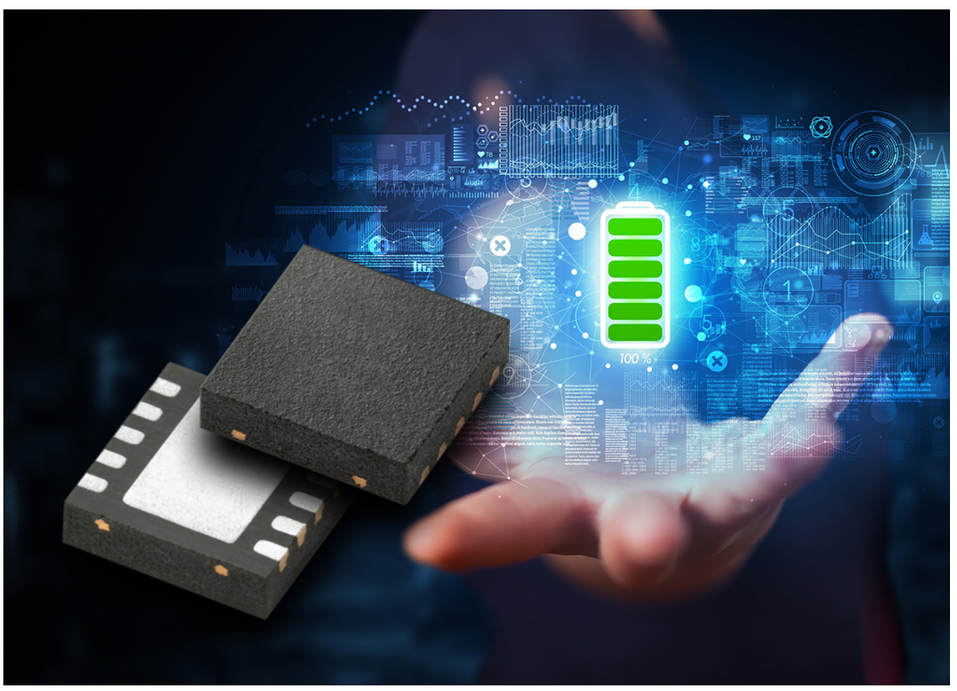
Innovative eFuse charger IC protects supercapacitor back-up power storage devices

The LS0502SCD33 from Littelfuse provides an integrated, high-voltage solution for charging and protecting supercapacitors used to back-up battery power supplies in handheld and portable devices.



Littelfuse
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FEATURES

- Supply-voltage range: 2.5 V to 5.5 V
- Programmable supercapacitor voltage
- Programmable supercapacitor charge current
- Programmable voltage and current thresholds
- ±2% threshold accuracy

APPLICATIONS

- Dashboard cameras
- Smart meters
- IoT devices
- Handheld industrial tools
- Portable gadgets with detachable batteries

Littelfuse has released an eFuse protection IC, the LS0502SCD33, which integrates an advanced charging circuit for a supercapacitor with protection against electrical faults, all in a single chip.

In many applications in which back-up power is required, the narrow temperature range of lithium-ion batteries limits their use. A supercapacitor-based solution offers a wider operating-temperature range, high power output and high energy density.

The LS0502SCD33 performs the functions of both charging and protecting any such supercapacitor-based back-up power system. It can operate at high voltages of more than 3 V without the need for complex power management systems. The LS0502SCD33 safeguards the system from potential damage by integrating input over-voltage and over-current protection, providing designers with a flexible, integrated, and compact storage capacitor or capacitor-bank back-up solution.

When the main supply is present, and above the minimum system supply voltage, the host system will draw power from it. At the same time, an integrated linear charger in the LS0502SCD33 charges the storage element at a current of up to 300 mA. Once the storage element is charged, the circuit draws only 2.5 µA while it maintains the supercapacitor in its ready state.

When the main supply is removed, the integrated reverse blocking switch will block current flow from the system rail to the input. The linear charger will be turned on to supply the system rail from the supercapacitor with up to 2 A. An integrated cell-balancing circuit monitors the cell voltages when charging a dual-cell supercapacitor, and keeps the two cells' voltage the same.

Introduction to eFuse supercap protection ICs

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Antenna band-switching evaluation board speeds time to market for IoT and handheld devices

The 1004795-EC646-01 antenna band switching evaluation board from Kyocera AVX provides an easy way to evaluate an antenna for cellular and low-power wide-area networks at frequencies up to 2.17 GHz.

The new antenna band switching evaluation board from KYOCERA AVX makes it quick and easy to test antenna performance in designs for handheld consumer electronics, IoT devices, and industrial machine-to-machine applications.

The 1004795-EC646-01 board enables engineers to reduce the number of design iterations, improve accuracy, and speed time-to-market for smaller applications operating at low frequencies in the range 698 MHz to 960 MHz, or at higher frequencies of 1.71 GHz to 2.17 GHz. Using the board, it is simple to optimize antenna size, performance, and emissions and to meet design and regulatory requirements.

The evaluation board measures 45.5 mm x 60 mm, which means that it fits easily in designs for many IoT or handheld devices. The board can be trimmed down or extended with copper tape to better match the physical size of test devices if required.

The board includes the 1004795 universal broadband FR4 embedded antenna, an Ether Switch & Tune™ chipset for band switching, a battery holder to power the switch, and a female SMA connector.

The device supports cellular network services including broadband LTE, 4G/5G, LTE CAT M, NB IoT, and cellular low-power wide-area networks.

Frequency Range (MHz)	RF1 (890-960)	RF2 (700-800)	RF3 (700-750/1710-2170)	RF4 (790-890)
Peak Gain (dBi)	-1.60	-1.69	-1.45/2.99	-0.28
Average Efficiency (%)	18	22	20/60	30

KYOCERA AVX

FEATURES

- Less than -2.5 dB return loss
- 50 Ω unbalanced feed-point impedance
- Linear polarization
- 2.0 W continuous wave power handling
- Operating-temperature range: -40°C to 85°C

APPLICATIONS

- Asset tracking
- Smart meters
- Agriculture
- Healthcare
- Smart home
- Smart city
- Retail
- Industrial

FREE DEV BOARD

Antenna band switching evaluation board for IoT and handheld devices.

Orderable Part Number
1004795-EC646-01

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