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26-iv
Advanced Mobility

Wireless IC combines Wi-Fi 6/6E and Bluetooth Low Energy connectivity

The AIROC™ CYW55513 IC from Infineon offers superior coverage thanks to a large link budget and various range-extending features, supporting smart control functions in lighting, building automation, and consumer devices.

The reliable, high-performance AIROC CYW5551x chipsets combine Wi-Fi® 6/6E and a Bluetooth® 6.0 wireless connectivity controller system.

Offering best-in-class Wi-Fi performance, the AIROC CYW55513 also allows for sensors and lights to be connected over a Bluetooth Low Energy link at very long range. This enables, for instance, intelligent sensors to provide for smart control of lights when the host system senses the presence or absence of people in a conference room, alongside conference bridge functionality.

The CYW55513 provides up to 24dBm of transmit power, and sensitivity down to -101.5dBm, while supporting Wi-Fi 6/6E range-improving features including long guard intervals, a long OFDM symbol, and dual-carrier modulation. The chipset is available for ordering by distribution customers as part of integrated Wi-Fi/Bluetooth modules from Murata, Embedded Artists, Ezurio and u-blox.

The high-performance LBEE5HY2FY-922 Type 2FY module from Murata is supplied in a very small package which facilitates integration into size- and power-sensitive applications, including industrial applications operating at temperatures up to 85°C. The Type 2FY module is also available in an M.2 form factor from Embedded Artists, in the EAR00511 or EAR00512 modules.

The Ezurio Sona™ IF513 module integrates a power amplifier and low-noise amplifier with a 1 x 1 MU-SISO antenna for reliable connectivity in harsh RF environments. The module is supplied with a Linux Backports package for excellent compatibility with the Linux® operating system.

The u-blox MAYA-W3 module is available in versions with a PCB antenna, a u.fl connector, or antenna pins. The surface-mount package has a footprint of just 10.4mm x 14.3mm.

Three members of the CYW5551x family

The CYW55513 is a member of the AIROC CYW5551x chipset, consisting of the tri-band 2.4GHz/5GHz/6GHz CYW55513, the dual-band CYW55512, and the single-band CYW55511. All three chips provide an IEEE 802.11ax-compliant Wi-Fi 6/6E media access controller, baseband and radio, alongside a Bluetooth/Bluetooth Low Energy (LE) 6.0 radio sub-system.

Bluetooth system control is performed by a 192 MHz Arm® Cortex®-M33 processor. The chips support Bluetooth Classic and Bluetooth LE functions running in hosted/controller mode, or in the embedded mode in which the chip relieves the host processor of the burden of running Bluetooth application functions.

The CYW5551x supports various Bluetooth features including LE Audio, LE2 data transfers at 2Mbits/s, LE1 at 1Mbit/s, Bluetooth Low Energy long-range (LR) mode, and periodic advertising extensions.

Infineon

FEATURES

- Network offload power saving features
- WPA2 and WPA3 security
- SDIO and GSPI Wi-Fi host interfaces
- UART and SDIO Bluetooth host interfaces
- 39 GPIOs
- Security features:
  - Secure boot
  - Encryption
  - Authentication

APPLICATIONS

- Smart home equipment
- IoT and industrial IoT devices
- IP cameras and video doorbells
- Smart door locks
- Appliances
- Smart watches
- Smart glasses
- Sensors
- Smart speakers
- Smart lighting

Safeguarding battery packs with scalable multi-cell monitor IC

The STMicroelectronics L9963E is a 14-cell battery monitoring and balancing IC offering high accuracy, functional safety, and daisy-chain scalability, ideal for electric vehicles, energy storage, and other multi-cell battery systems.

The L9963E Li-ion battery monitor IC designed for automotive and energy storage systems, provides a fully redundant voltage measurement path with an ADC swap feature and intelligent self-diagnostics to meet stringent functional safety requirements. This ensures enhanced battery protection and supports limp-home operation in fault conditions. It supervises up to 14 series-connected cells for high-voltage battery packs. Multiple L9963E can communicate over an isolated SPI bus, enabling management of battery stacks up with high-speed, low-EMI data transfer. Companion L9963T transceiver chips can bridge the 4-wire SPI to a 2-wire isolated bus for long-distance, high-reliability communications.

Each cell voltage is measured with 16-bit precision, and an on-chip coulomb counter continuously tracks pack current for state-of-charge calculations. The L9963E supports multiple NTC thermistors for temperature monitoring across the battery stack. It also features passive cell-balancing up to 200mA per cell, with both normal and low-power balance modes to minimize current draw during standby. These capabilities help to maintain uniform cell health and accurate state-of-health estimation.

Built with a redundant measurement architecture ensures that any single-point failure can be detected, supporting the highest level of functional safety in automotive battery management. High noise immunity increases reliability in various electric vehicle environments.

FEATURES

- Operating temperature is from -40°C to 125°C
- Up to 14 stacked battery cells can be monitored to meet the requirements of 48V
- Higher voltage systems monitor between 4 and 14 Li-ion cells in series with 16-bit ADC
- Supports 200mA passive balancing per cell with programmable timing
- Coulomb counter supporting pack overcurrent detection in both ignition on and off states.
- Isolated SPI 2.66Mbps interface supports daisy-chaining of up to 31 devices
- Dual integrated 5V regulators
- 9 x GPIOs, with up to 7 analog inputs for NTC sensing
- AECQ100 Grade 1 qualified
- ISO 26262 ASIL-D capable

APPLICATIONS

- Electric vehicles and hybrid vehicle battery packs
- Battery energy storage systems
- Backup power/UPS
- E-bikes and electric scooters

FREE DEV BOARD

Optimized form-factor and packaged battery management system module based on L9963E for battery pack easy mounting.

Orderable Part Number
AEK-POW-BMSCC

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Programmable buck converter enables in-field configuration and status reporting

The Diodes Incorporated AP61406Q synchronous buck converter uses an I2C interface to adjust operating mode, switching frequency, current limit, and output voltage during operation, while reporting power-good and fault status.

DIODES INCORPORATED

FEATURES

- Quiescent current: 20µA in PFM
- 0.5V ±2% reference voltage
- Configuration registers:
  - Status: temperature, input voltage, output voltage, OCP
  - Configuration: enable, active discharge, frequency, current limit, PWM
  - Output voltage
- AEC-Q100 qualified
- Manufactured in facilities certified to IATF 16949
- W-QFN1520-8 Type UX package

APPLICATIONS

- Automotive power systems
- Automotive infotainment
- Automotive instrument clusters
- Automotive telematics
- Advanced driver assistance systems

The AP61406Q is a 2.3V to 5.5V input, 4A automotive-compliant synchronous buck converter with an I2C interface intended for configurable point-of-load rails. Configuration is handled through status and setting registers, allowing parameters to be changed during system operation rather than being fixed by external component selection.

Flexibility is provided through programmable operating mode selection, pulse-frequency modulation (PFM) or forced PWM, and selectable switching frequencies of 1MHz, 1.5MHz, 2MHz, or 2.5MHz. Output current limit is programmable in discrete steps of 1A, 2A, 3A, or 4A, and output voltage is adjustable from 0.3V to 3.6V in 20mV increments. This flexibility allows a single converter to be used across multiple rails or system states, including low-load standby and peak-load operating modes.

The I2C interface supports SCL rates up to 3.4MHz, enabling integration into existing automotive and industrial control networks. A power-good output indicates when the regulated output is within limits, and fault reporting supports diagnostic visibility for protection events. Protection functions include protection circuitry, under-voltage lockout (UVLO), input over-voltage protection (OVP), peak and valley current limit, and thermal shutdown.

As automotive-compliant, the AP61406Q is manufactured in facilities certified to IATF 16949, supporting PPAP documents. With standard compliance, the AP61406 is available for industrial and commercial applications.

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Synchronous step-down converter simplifies power conversion with up to 91% efficiency

The DCP3601NMR step-down converter from STMicroelectronics combines high efficiency with ultra-low standby power consumption, and comprehensive protection for battery-powered or mains-powered designs.

As a step-down converter, the DCP3601NMR provides up to 1A of output current from input sources between 3.3V and 36V. Part of the new DC+ converter family, from STMicroelectronics, the regulator emphasizes compact size for power designs.

The DCP3601NMR switching frequency is fixed at 1MHz, allowing the use of small inductors and capacitors to minimize solution footprint. The converter's wide VIN tolerance suits systems from battery packs to industrial 24V rails. Also included are output over-voltage limiting and a thermal shutdown (TSD) mechanism, so the converter can safely shut itself down if an abnormal event or excessive temperature is detected.

STMicroelectronics offers the DCP3601 in multiple variants and package options. In addition to the base DCP3601NMR, which is the low-noise PWM version, there are variants like DCP3601CMR for low consumption mode, as well as DCP3601CDMR and DCP3601NDMR which both include the EMI dithering feature. This allows you to choose between low-noise and low-consumption operating modes to optimize performance. The low noise mode (LNM) variant runs in fixed-frequency PWM for minimal ripple. Alternatively, the low consumption mode (LCM) uses pulse-skipping at light loads to boost efficiency.

FEATURES

- Input operating voltage range: 3.3V to 36V
- Input quiescent current:
  - 110µA for LCM variants CMR/CDMR
  - 1.4mA for LNM variants NMR/NDMR
- Switching frequency up to 1MHz
- Protection features:
  - Under-voltage lockout (UVLO)
  - Over-current
  - Short-circuit
  - Thermal shutdown
  - Output over-voltage safeguards
- Operating junction temperature from -40 to 150°C
- 10-year longevity program
- Compact SOT23-6L package

APPLICATIONS

- Smart metering
- Industrial 24V bus conversion
- Building automation equipment

FREE DEV BOARD

36V, 1A synchronous buck converter evaluation board based on DCP3601.

Orderable Part Number
STEVAL-3601CV1

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Waterproof audio components ensure safety in electric two-wheelers and three-wheelers

Audio components from Same Sky provide reliable acoustic feedback for electric two-wheelers and three-wheelers, ensuring pedestrian safety and clear operator communication in open-air environments.

Electric two-wheelers and three-wheelers require acoustic vehicle alerting systems (AVAS) to warn pedestrians of their presence, due to the near-silent operation of electric motors. Same Sky offers a range of speakers and buzzers capable of generating the warning sounds in compliance with regulations such as UNECE R138.

These audio components produce high sound pressure levels to ensure audibility in noisy urban environments, while maintaining a compact footprint suitable for the limited installation space available on handlebars or dashboards.

To address exposure to rain, dust, and mud typical of open-air vehicles, the portfolio includes models with ingress protection up to IP68. Robust construction enables these audio components to withstand mechanical vibration and shock transmitted through the chassis when traversing rough terrain.

The components also support user interface feedback for navigation, battery status, and anti-theft alarms. The range includes MEMS and electret condenser microphones to facilitate voice commands and active noise cancellation, helping to filter wind and road noise for clearer audio capture.

Same Sky provides these components in surface-mount, through-hole, and wire-lead termination packages for flexibility in integration into various electronic control units (ECUs) and instruments.

same sky

FEATURES

- Microphones:
  - Analog and digital PDM interfaces
  - Omnidirectional, unidirectional, and noise cancelling variants
  - Sensitivity ratings range: -54dB to -24dB
- Buzzers:
  - Piezo, solid state, and magnetic transducers
  - Sound pressure range: 65dB to 115dB
  - Variants with integrated driving circuit
- Speakers:
  - Standard and custom frame sizes
  - SPL range: 77dB to 135dB
  - Impedance options: 4Ω to 50Ω

APPLICATIONS

- Two- and three-wheeler vehicles:
  - Electric scooters and motorcycles
  - Delivery vehicles
  - Acoustic alerting systems
  - Digital dashboards
  - GPS navigation systems
  - Security systems

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Enables high-precision navigation with automotive-grade 6-axis IMU

A high-accuracy 6-axis inertial measurement unit, the STMicroelectronics ASM330LHHXG1TR integrates a 3-axis accelerometer and 3-axis gyroscope. Ultra-low-noise, high-stability sensing delivers precise motion data for robust vehicle navigation and dead-reckoning systems.

The ASM330LHHXG1TR offers wide measurement ranges selectable up to ±16g for acceleration and ±4000°/s for angular rate, capturing both subtle motions and fast rotations. Combined with exceptionally low noise densities as low as 60µg/√Hz for the accelerometer and 5mdps/√Hz for the gyroscope, the inertial measurement unit (IMU) provides the high precision and time-synchronized six-axis outputs needed for accurate inertial navigation algorithms and vehicle dead-reckoning.

Embedded sensor-processing features further simplify integration. The IMU includes 16 programmable finite state machines for the fully configurable tasks for on-device motion detection. It also embeds a machine learning core to classify motion patterns in real time. A dedicated sensor hub interface and 3KB FIFO buffer allow the ASM330LHHXG1TR to gather timestamped data from external sensors and batch inertial data, offloading the host processor and improving sensor-fusion efficiency. For design flexibility, the IMU supports dual high-performance and low-power operating modes, enabling trade-offs between maximum precision and energy consumption.

FEATURES

- Dual operating modes: high-performance and low-power
- Full-scale acceleration range: ±2/±4/±8/±16g
- Angular rate range: ±125/±250/±500/±1000/±2000/±4000dps
- 0.013mA in low-power mode
- 1.7mA in high-performance mode
- Event-detection interrupts, fully configurable
  - Free-fall
  - Wake-up
  - 6D orientation
  - Activity/inactivity recognition
  - Stationary/motion detection
- Serial interfaces:
  - I2C
  - MIPI I3C®
  - SPI
- Operating temperature: -40°C to 125°C
- 2.5mm x 3.0mm x 0.83mm LGA-14 module package
- 15-year product availability commitment
- AEC-Q100 qualified

APPLICATIONS

- Automotive navigation and telematics systems
- Inertial navigation and dead-reckoning units
- Robotics and industrial motion control systems

FREE DEV BOARD

6-axis IMU ASM330LHHXG1 adapter board for a standard DIL24 socket.

Orderable Part Number
STEVAL-MKI243A

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Ultra-wide input dc-dc converters simplify railway and e-mobility power design

The RMD and RMOD series of dc-dc converters from RECOM offer plug-and-play dc-dc conversion for railway and off-highway electric vehicles, featuring ultra-wide input ranges and robust chassis-mount packaging.

RECOM Power has introduced the RMD and RMOD series of dc-dc converters to address the complexity of supply chain management in the heavy transportation sector. Railway and e-mobility battery systems traditionally require specific power supplies for different nominal voltages depending on the region and vehicle type.

The RMD series solves this by offering an ultra-wide input range of up to 12:1, accepting any voltage between 16.8V to 137.5V dc. This allows a single converter to operate across all standard global railway networks. The converters are designed with a plug-and-play architecture that integrates active inrush current limitation and reverse polarity protection, removing the need for external protection circuits.

A critical requirement in railways standards such as EN 50155 is the ability to bridge supply interruptions. The RMD converters incorporate a built-in 10ms hold-up time which eliminates bulky and expensive external capacitor banks usually required to maintain operation during power drops.

For off-highway e-mobility applications, such as construction vehicles or electric forklifts, the RMOD series provides a plug-and-play solution for generating low-voltage networks from high-voltage traction batteries. The converters accommodate wide input ranges suitable for common battery architectures such as 48V, 80V, and 96V systems.

RMOD converters are housed in IP69K-rated enclosures with waterproof connectors, allowing the modules to be mounted directly on the chassis and still be protected from water ingress, dust, and pressure washing.

Both series utilize baseplate cooling allowing the units to deliver full power at ambient temperatures up to 85°C without needing fans or forced air cooling, ensuring reliability in thermally constrained environments.

RECOM

FEATURES

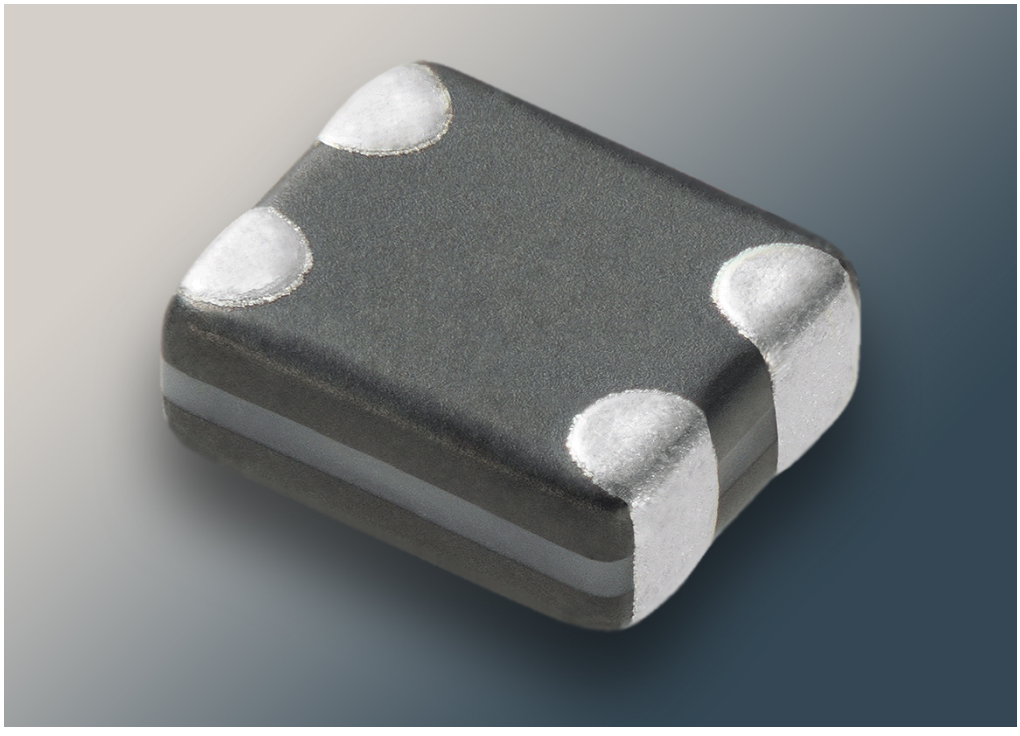
- RMD series:
  - Up to 94% efficiency
  - Remote on/off control
  - Output voltage trimming options
  - Parallel and redundant operation
  - DC OK signal
- RMOD series:
  - Up to 85% efficiency
  - Parallel operation without active current sharing

APPLICATIONS

- Railway:
  - Train communication networks
  - Traction control systems
  - Passenger information displays
  - Door control systems
- E-Mobility:
  - Electric forklifts
  - Construction vehicles
  - Agricultural vehicles
  - Automated guided vehicles
  - Airport ground support equipment

Common-mode choke coils reduce noise in compact automotive designs

The DLM11CN_HH2 series of common-mode choke coils from Murata provides effective noise suppression for high-speed differential signal lines in compact automotive powertrain and safety equipment.



muRata
INNOVATOR IN ELECTRONICS

FEATURES

- 10MΩ minimum insulation resistance
- Cut-off frequency: 2GHz to 6GHz
- Operating temperature range: -55°C to 125°C

APPLICATIONS

- Automotive powertrain and safety equipment
- Infotainment systems
- Medical equipment

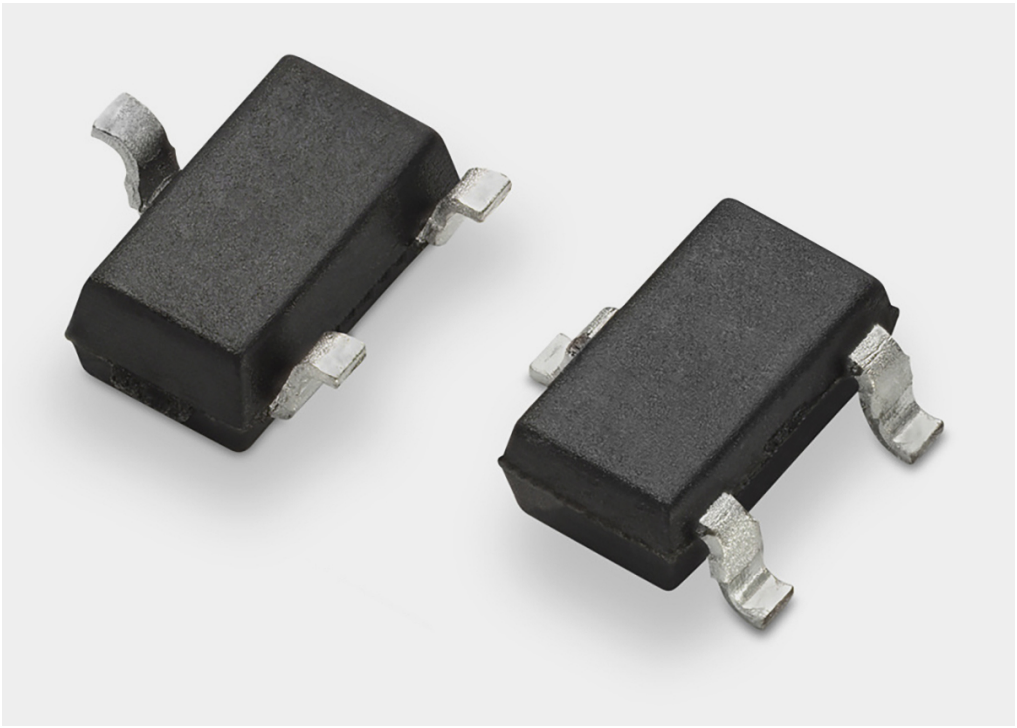
The DLM11CN_HH2 series of surface-mount chip common-mode choke coils features a compact 1.25mm x 1.0mm footprint while providing strong noise suppression in high-speed interfaces using differential signal lines.

These Murata common-mode choke coils address increasing demand for more compact components for automotive electronic control units (ECUs), safety sensors, and infotainment systems which often make use of differential interfaces. The DLM11CN_HH2 series can handle rated currents up to 100mA supporting signal lines in various circuit configurations

The coils offer common-mode impedance values of 45Ω, 90Ω, and 200Ω at 100MHz featuring a rated voltage of 5V and a withstanding voltage of 12.5V dc. The maximum dc resistance ranges from 2.5Ω to 4.75Ω.

Ultra-low-power magnetic switches improve accuracy in battery-powered sensing

The LF21177TMR, LF21173TMR, LF21112TMR, and LF11215TMR switch ICs from Littelfuse combine tunneling magnetoresistance (TMR) sensing with CMOS signal processing to provide low-current magnetic switching with temperature-compensated thresholds.



Littelfuse®

FEATURES

- X-axis sensing direction
- Push-pull output
- Supply voltage range: 1.8V to 5.5V
- Ultra-low current consumption
- Digital switch

APPLICATIONS

- Proximity switches
- Utility meters
- Speed sensing
- Rotary and linear position sensing

The Littelfuse TMR magnetic switch range integrates a TMR sensing element and CMOS signal processing into a single surface-mount package, reducing standby current to 160nA, and improving switching uncertainty caused by temperature drift and external magnetic interference. The range includes omnipolar and bipolar devices, triggering on a sufficient strength northern magnetic field, or triggering on any sufficient strength field respectively.

Ultra-low supply current is used to support battery-powered and energy-harvesting systems. The LF21112TMR is specified at 200nA, with a 50Hz response and operate and release thresholds of 7G and 5G, respectively. The LF21173TMR and LF21177TMR switches use the same 160nA class current specification, with different magnetic thresholds to suit low-field and higher-field trigger requirements.

Switching stability is supported by signal conditioning intended to reduce false triggers. The LF11215TMR datasheet describes offset cancellation and a Schmitt trigger stage that introduces switching hysteresis for noise rejection, alongside a temperature-compensated internal supply for consistent switching points across temperature. This approach is used to improve tolerance to stray field interference in proximity and position sensing installations where external magnetic fields and electrical noise can be present.

Switching Type	Output	Supply Current	Sensitivity	Operation Frequency	Package	Operating Temperature
LF21177TMR	Omnipolar	160nA	30G operate, 21G release	50Hz	LGA4	-40°C to 85°C
LF21173TMR	Omnipolar	160nA	9G operate, 6G release	50Hz	LGA4	-40°C to 85°C
LF21112TMR	Omnipolar	200nA	7G operate, 5G release	50Hz	SOT23-3	-40°C to 125°C
LF11215TMR	Bipolar	1500nA	17G operate, -17G release	1000Hz	SOT23-3	-40°C to 125°C

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Simplifies motor control design with integrated MCU and gate driver

The STSPIN32G0602Q controller from STMicroelectronics integrates a MCU and three-phase gate driver to deliver advanced control and simplified design for industrial pumps, fans, servo drives, and other motor-driven systems.

The integrated STSPIN32G0602Q controller combines a high-voltage three-phase gate driver with a 32-bit STM32G0 microcontroller in one package. This system-in-package approach streamlines the design of industrial motor drives by reducing component count and ensuring tight integration between control and power stages. The single-chip solution enables designers to build more compact applications such as industrial pumps, fans, factory automation equipment, and servo systems.

The embedded Arm® Cortex®-M0+ MCU provides resources for real-time control algorithms. This enables implementation of field-oriented control (FOC) and sensorless six-step commutation, which maximize motor efficiency and dynamic response. By handling complex control loops and position/speed feedback in software, STSPIN32G0602Q allows precise regulation of torque and speed.

For motor-drive integration, the STSPIN32G0602Q includes a dedicated 16-bit advanced timer with six PWM channels for precise three-phase gate control. An on-chip 12-bit analog-to-digital converter monitors motor currents and voltages, working with a comparator to trigger an immediate shutdown on over-current faults. Operating from a 9V to 20V driver supply, the STSPIN32G0602Q can control motors on dc buses up to 600V, covering both low-voltage and main-powered systems.

FEATURES

- High-voltage three-phase gate driver
- 1A/0.85A source/sink current at 25°C
- Integrated bootstrap diodes
- Read-out protection (RDP)
- Write protection (WRP)
- Arm® Cortex®-M0+ Core up to 64MHz with 64KB Flash, 8KB SRAM
- Motor control peripherals:
  - 16-bit advanced timer (6 PWM)
  - 12-bit ADC (15 channels, 2MSps)
- Interfaces:
  - 2x I2C
  - 2x SPI
  - 3x USART/UART
  - Low-power UART
- Protection features:
  - Smart shutdown
  - Under-voltage lockout (UVLO)
  - Interlocking and programmable deadtime
- Voltage range: 9V to 20V
- Operating temperature range: -40°C to 125°C
- QFN 10×10 72L pitch 0.5 creepage 1.8mm package

APPLICATIONS

- Three-phase motor drivers
- Inverters
- Industrial appliances and fans

FREE DEV BOARD

Three-phase inverter based on STSPIN32G0602Q.

Orderable Part Number
EVSPIN32G06Q2S1

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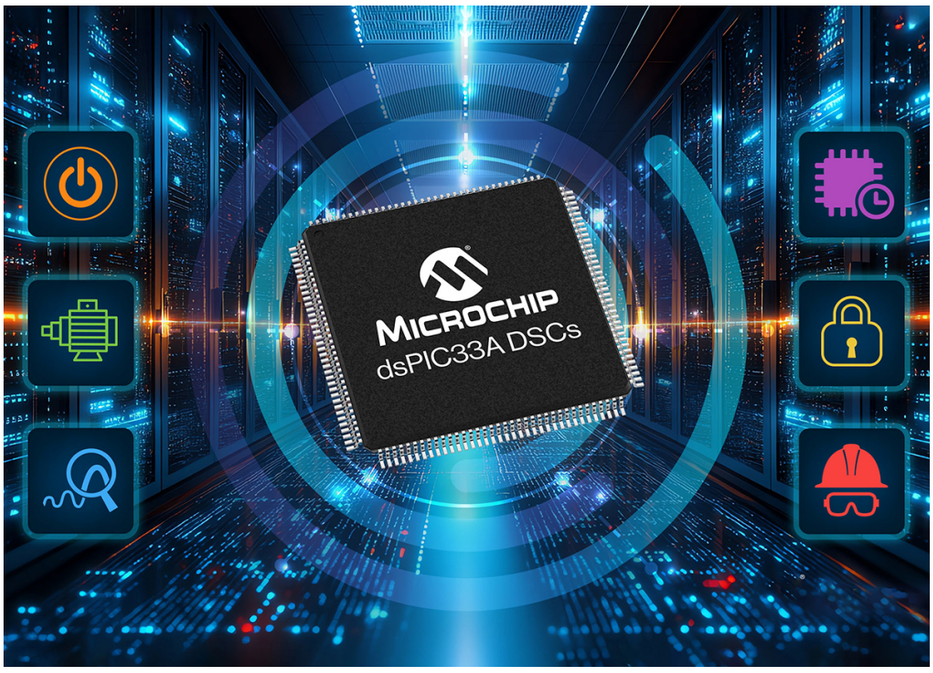
Digital signal controllers offer high-speed control for safety-critical motor drives

The family of dsPIC33AK512MC510 digital signal controllers from Microchip combines a 200MHz, 32-bit core with high-speed analog peripherals to enable precise control in safety-critical automotive and industrial drives.



The dsPIC33AK512MC510 digital signal controllers (DSCs) include a high-performance digital signal processing (DSP) engine, operating at 200MHz. These controllers are ideal for the growing processing demands of modern high-efficiency industrial drives.

By integrating a single- and double-precision floating-point unit, the DSCs can efficiently handle complex control algorithms with minimal latency. This eliminates the need for fixed-point scaling, simplifying software development while improving system response times in dynamic load conditions.

The controllers are equipped with intelligent peripherals, including high-speed pulse-width modulation (PWM) generators with 78ps resolution. This precision enables the implementation of high-frequency switching topologies commonly seen in power conversion applications.

The PWM generators are complemented by five 12-bit analog-to-digital converters capable of up to 40Msamples/s. This high sampling rate enables oversampling techniques that minimize noise and improve current-sensing accuracy, contributing to smoother motor operation and reduced torque ripple. The architecture also includes dedicated hardware for direct memory access (DMA) to streamline data movement between peripherals and memory, without loading the CPU.

Safety and security are critical for automotive systems, such as on-board chargers and dc-dc converters. The dsPIC33AK512MC510 incorporates robust hardware safety features, including:

- Flash and RAM error correcting code (ECC)
- Memory built-in self-test (MBIST)
- Clock monitoring
- Integrated hardware cryptographic accelerator
- Immutable secure boot

These features enable the controller to be compliant with ISO 26262 ASIL B and IEC 61508 SIL 2 functional safety standards.

MICROCHIP

FEATURES

- Memory provision:
  - Up to 512kbytes of Flash program memory
  - Up to 64kbytes of ECC RAM
  - Dual flash panel
- 32-bit wide data paths
- Support for 32- and 64-bit floating point unit (FPU)
- Four quadrature encoder interfaces
- Virtual peripheral pin select (PPS) pins
- Cyclic redundancy check module

APPLICATIONS

- Motor-control systems
- Digital power supplies
- Automotive actuators
- Industrial equipment
- On-board chargers

FREE DEV BOARD

Inverter board supports 300W 3-phase motor control development.

Orderable Part Number
EV18H47

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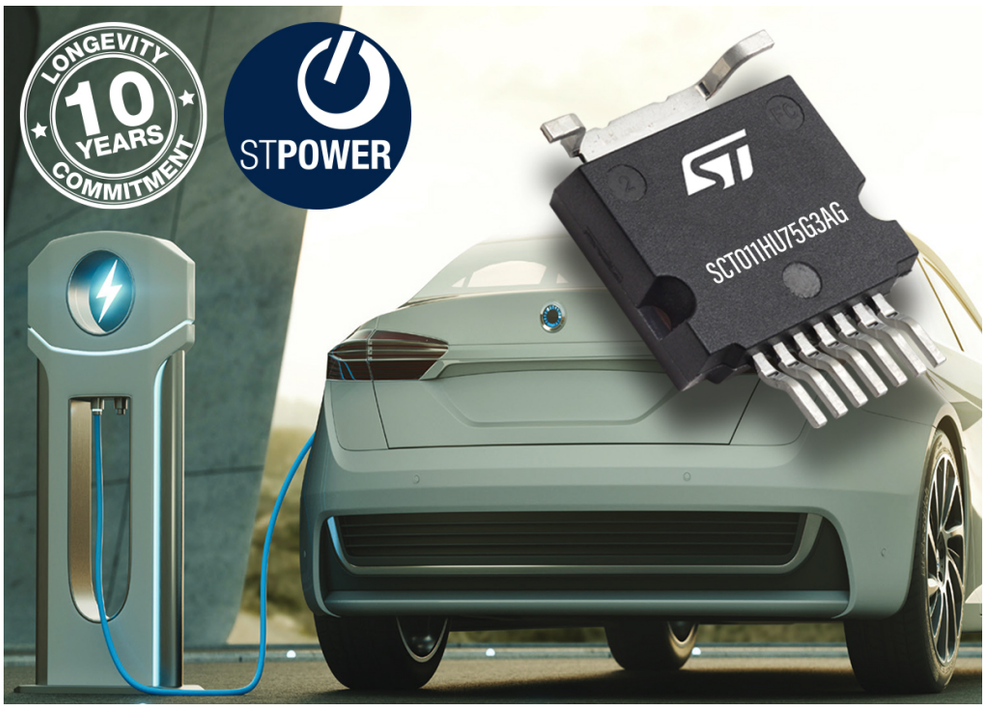
Automotive-grade MOSFET boosts power density for high-voltage converters

STMicroelectronics brings its silicon-carbide switch in a layout-friendly through-hole format, helping high-voltage designers tame fast edges and reduce thermal overhead in bidirectional EV and industrial conversion stages.



FEATURES

- 750V drain-to-source maximum voltage rating
- 110A continuous drain current at 25°C limited by case temperature
- Operating temperature range: -55°C to 175°C
- Low gate and output capacitances for high-speed switching efficiency
- 15-year product availability commitment
- AEC-Q101 qualified

APPLICATIONS

- EV/HEV traction inverters
- Dc/dc converters
- Renewable energy inverters
- Energy storage power converters
- Industrial high-power motor drives

The SCT011HU75G3AG is an automotive-grade silicon carbide (SiC) MOSFET rated at 750V and 110A, with an ultra-low typical on-resistance of just 11mΩ. Leveraging 3rd-generation silicon carbide (SiC) technology from STMicroelectronics achieves exceptionally low conduction losses and supports high-frequency switching in demanding EV, renewable energy, and industrial power converters.

In a specific type of surface-mount power component HU3PAK package developed by STMicroelectronics for high-performance power semiconductors, the SCT011HU75G3AG maintains low drain-to-source on-resistance across the full operating temperature range. The low capacitances and fast switching characteristics minimize switching losses, enabling efficient operation at high switching frequencies. The intrinsic fast body diode allows reliable bidirectional current flow for applications like bidirectional chargers, such as STMicroelectronics' 11 kW STEVAL-11BID1KCB design board and inverter systems.

The HU3PAK package includes a dedicated driver-source connection to reduce parasitic inductance and optimize switching performance. SCT011HU75G3AG is ensuring automotive-grade reliability for electric vehicle power stages and other high-stress environments.

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Transceiver enables multi-drop connectivity with low-power microcontrollers

Combining a controller and physical layer, the T30HM1TS2500 Ethernet transceiver from onsemi allows standard microcontrollers to communicate via 10BASE-T1S Ethernet, reducing cabling complexity in automotive and industrial networks.

onsemi

FEATURES

- Sleep and wake control
- Time stamping control
- Distance measurement between nodes
- Up to 48V battery voltage pin support
- ESD protection on MDI pins up to ± 6kV

APPLICATIONS

- Automotive zonal architectures
- Industrial automation systems
- Sensor and control interfaces
- Field instrumentation

The T30HM1TS2500 is an IEEE 802.3cg-compliant Ethernet transceiver that addresses the need for seamless Ethernet connectivity at the network edge, replacing legacy fieldbus protocols with a unified architecture.

Manufactured on the onsemi Treo platform, the transceiver combines high-voltage analog capability with dense digital logic. This process technology provides higher performance in a smaller footprint, using less power.

The T30HM1TS2500 uses the 10BASE-T1S layer which enables multi-point communication over short ranges up to 25m, and a minimum of 8 nodes, allowing designers to eliminate heavy point-to-point wiring harnesses used in legacy networks. This reduction in cabling complexity contributes to simplified assembly in industrial and automotive applications. Meanwhile, the T30HM1TS2500 enhanced noise immunity (ENI) feature enables 10BASE-T1S segments of 40nodes/25 meters, 16 nodes/50 meters, or 6 nodes/60 meters.

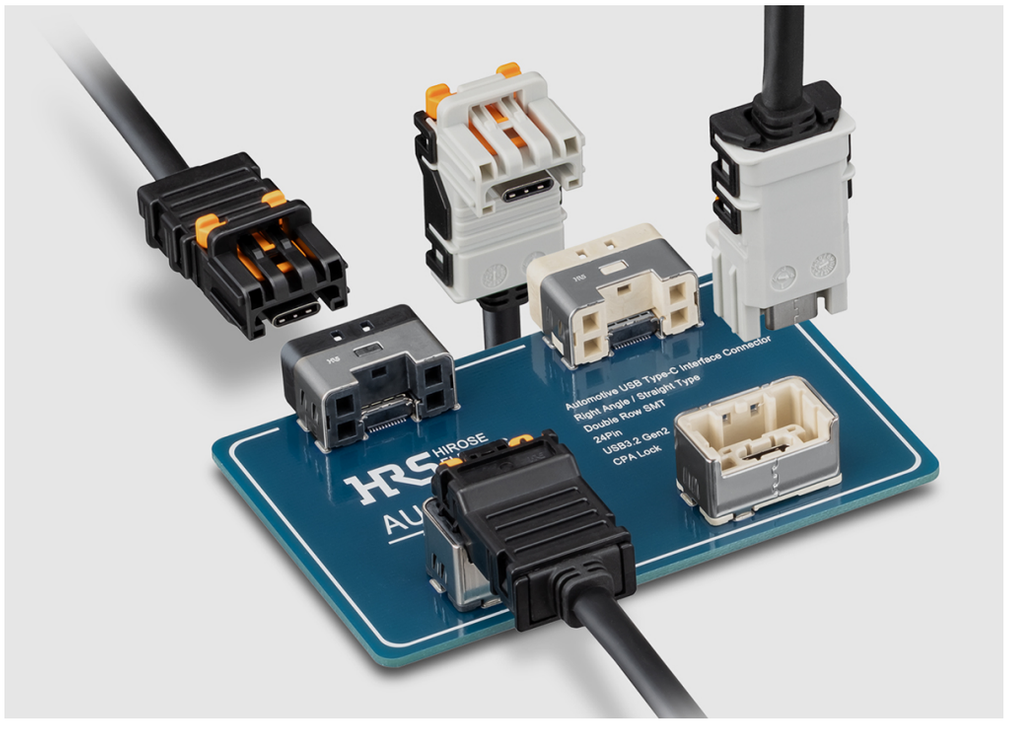
By integrating the media access controller (MAC) directly with the physical layer (PHY), the transceiver removes the requirement for an Ethernet MAC within the host microcontroller, permitting the use of lower-cost MCUs.

Real-time control systems are dependent on reliable communication. The T30HM1TS2500 incorporates physical layer collision avoidance (PLCA) which optimizes bandwidth usage and guarantees deterministic latency. Data rates of up to 10Mbits/s over the shared bus are supported, offering a robust and high-speed alternative to legacy CAN, CAN FD, or LIN protocols.

The transceiver is equipped with advanced diagnostic features such as harness defect detection (HDD) and a signal quality index (SQI), allowing the system to identify cabling faults and monitor link health proactively.

Wire-to-board connector supports 10Gbps data transmission in automotive systems

The AU1 series of wire-to-board connectors from Hirose provides high-speed connectivity for vehicle infotainment systems, utilizing a connector position assurance mechanism to resist vibration in harsh driving environments.



HIROSE ELECTRIC EUROPE B.V.

FEATURES

- Available as straight or right-angle receptacles
- Supports internal USB Type-C connections
- Number of positions: 24
- Operating temperature range: -40°C to 105°C

APPLICATIONS

- Automotive systems:
  - In-vehicle infotainment
  - Navigation systems
  - Head-up displays
  - Vehicle-to-vehicle communication modules

The AU1 series from Hirose are wire-to-board connectors that address the demand for high-capacity data transmission in advanced driver-assistance systems (ADAS) and infotainment architectures. Leveraging the design of the CX series, to provide a USB Type-C connection, the connector facilitates internal routing of signals for large, high-resolution displays without compromising signal integrity.

These connectors support transmission speeds of up to 10Gbits/s, making them suitable for USB 3.2 Gen2, DisplayPort 1.4, and HDMI protocols.

To ensure reliability in harsh automotive environments, the AU1 series complies with USCAR-2 and USCAR-30 mechanical and environmental standards. The design incorporates a connector position assurance (CPA) mechanism. This feature allows the assembly operator to visually and physically verify secure mating, preventing accidental disconnection due to vibration and shock.

The AU1 series offers multiple keying options including Standard and A keys to improve board design flexibility and ensure precise internal connections between vehicle control units and external interfaces.

SiC Schottky diode improves efficiency and surge robustness in power conversion

The Nexperia PSC1065H-Q silicon carbide (SiC) Schottky diode reduces switching losses while improving surge robustness, supporting efficient and compact automotive power-conversion designs operating at higher voltages and temperatures.

nexperia

FEATURES

- Operating temperature range: -55°C to 175°C
- Maximum forward voltage: 1.8V
- Maximum reverse leakage current: 60µA
- Total power dissipation: 58W
- Surface-mount DPAK R2P package
- Qualified to AEC-Q101

APPLICATIONS

- Traction inverter
- Dc-dc converter
- Onboard charger

As a 650V, 10A silicon carbide Schottky diode, the PSC1065H-Q from Nexperia is designed for high-efficiency automotive and industrial power-conversion stages. Through its SiC construction, the diode exhibits zero recovery switching behavior, eliminating reverse recovery losses that typically limit efficiency and increase electromagnetic interference in high-frequency designs.

Efficiency is further supported by an outstanding figure-of-merit based on total capacitive charge and forward voltage, helping to minimize switching losses and reduce overshoot and ringing during fast transitions. This makes the PSC1065H-Q suitable for high power-density converters where thermal headroom and switching performance are tightly constrained.

The robustness of the diode is improved through its merged PiN Schottky (MPS) structure. At low and nominal currents, the diode operates as a Schottky device, while during surge or fault conditions the PiN region conducts and shares current. This architecture increases non-repetitive peak forward current capability to 440A and improves tolerance to transient stress compared with a conventional Schottky diode.

FUTURE ELECTRONICS
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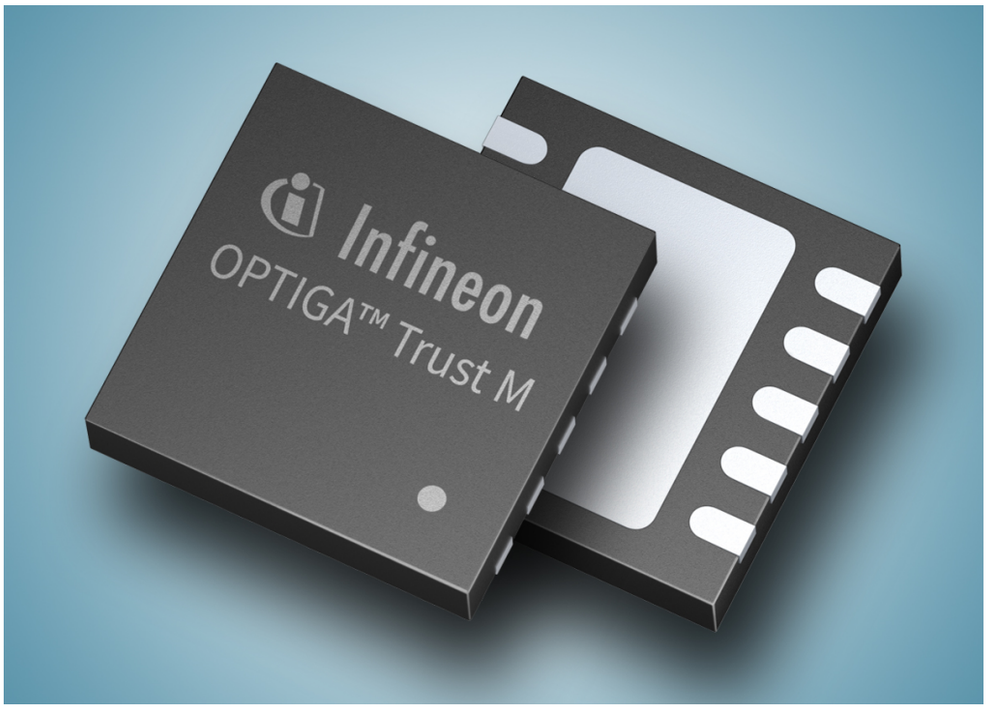
FTM
NPIs, DESIGN AND TECHNOLOGY NEWS

Complete cloud security solution protects IoT devices from cyber-attack

The OPTIGA™ Trust M tamper-resistant security solution from Infineon is based on Common Criteria EAL6+ certified hardware. The secure element can be used with any MCU or application processor to enhance the security of IoT designs.



The OPTIGA Trust M is a high-end security solution which provides an anchor of trust for connecting IoT devices to the cloud, giving every IoT device its own unique identity. This individual, turnkey solution offers secure, zero-touch onboarding and the high performance needed for quick cloud access.

A wide range of security features are offered by the OPTIGA Trust M chips and supporting software. In particular, these features support common asymmetric cryptography algorithms including:

- RSA up to 2048
- AES key up to 256, HMAC up to SHA512
- TLS v1.2 PRF and HKDF up to SHA512

The turnkey set-up with full system integration minimizes the design, integration and deployment effort required of product manufacturers. The OPTIGA Trust M development process is certified according to the security standard IEC 62443-4-1 for industrial automation and control systems, acting as an enabler to achieve component-level certification according to IEC 62443-4-2.

The OPTIGA Trust M chip is supplied in a USON-10 package that has a footprint of 3mm x 3mm.

Infineon

FEATURES

- Based on high-end CC EAL6+ certified hardware
- ECC: NIST curves up to P-521, Brainpool r1 curve up to 512
- Hibernate mode for zero power consumption
- Open-source host code available on GitHub under MIT license
- Up to 10kbytes of memory
  - Protected updates
  - Usage counters
  - Dynamic object locking
- Configurable device security monitor
- 20-years lifetime for industrial and infrastructure applications

APPLICATIONS

- Smart lightning
- Smart home
- Building automation
- Industrial robotics
- Programmable logic controllers
- Motor drives
- Drones

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Evaluation shield for OPTIGA™ Trust M secure element.

Orderable Part Number
TRUSTMV3SHIELDTOBO1

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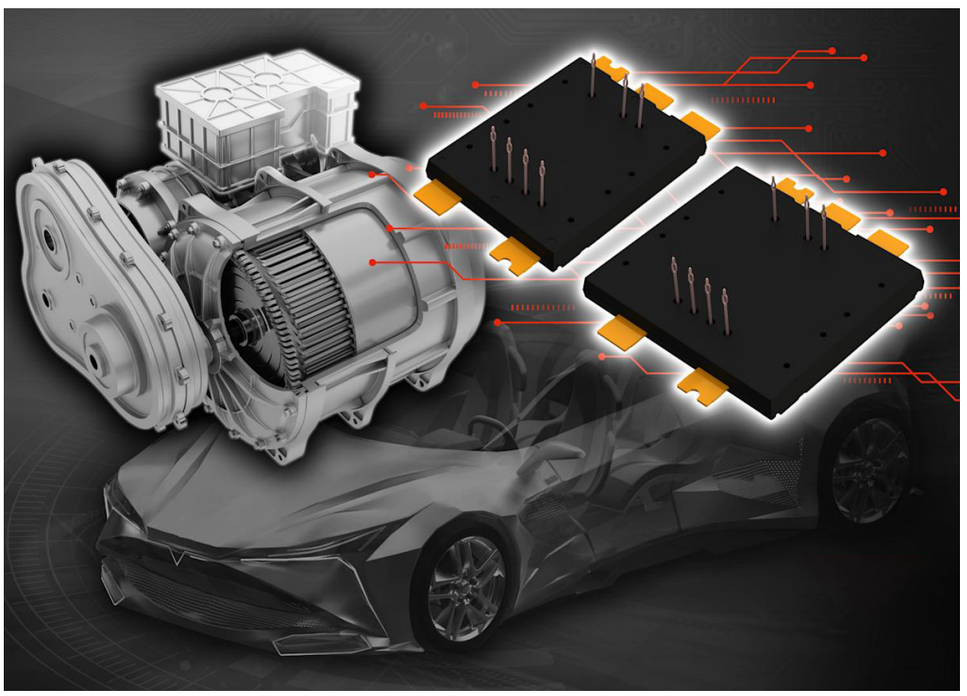
Automotive half-bridge power module increases power density with SiC MOSFETs

The ROHM TRCDRIVE pack™ half-bridge modules use silicon carbide MOSFETs and press-fit interconnects to support compact, high-power inverter and converter designs with simplified production flow.



ROHM SEMICONDUCTOR

FEATURES

- 2.0mΩ on-resistance @ 25°C
- 5.7nH stray inductance
- 506A continuous drain current
- 4.2kV dc 1s insulation
- Weldable power terminals
- Higher power cycling capability
- Virtual junction temperature range: -40°C to 175°C
- Low on-resistance for reduced conduction losses
- Low switching losses for high-frequency operation

APPLICATIONS

- Automotive traction inverters
- Onboard chargers and dc-ac converters
- Industrial motor drives
- Power conversion systems for electric and hybrid vehicles

The TRCDRIVE pack half-bridge modules integrate fourth-generation silicon carbide MOSFETs into a compact molded package intended for automotive traction inverters and high-power dc-ac conversion stages. The BST400D12P4A101 and BST500D08P4A104 combine low switching losses with low drain-source on-resistance to support high switching frequencies and increased power density in space-constrained systems.

Both modules share an identical mechanical package, internal layout, press-fit contact technology, and integrated NTC temperature sensor. The primary difference between the two variants is the rated drain-source voltage of the integrated SiC MOSFETs. The BST400D12P4A101 is rated for 1200V operation, while the BST500D08P4A104 is rated for 750V operation, allowing selection based on dc-link voltage requirements without changes to the mechanical or thermal design.

Press-fit power terminals remove production steps from the power stage assembly process and support automated production. The molded package integrates copper clip interconnects and silver-sintered die attach to reduce parasitic inductance and improve thermal cycling capability under automotive operating conditions.

An integrated NTC temperature sensor provides direct junction-proximate thermal feedback, enabling real-time temperature monitoring for inverter protection and control. Both modules are designed for mounting directly to a heatsink using thermal interface material, supporting high continuous current operation and stable thermal performance in traction and power conversion systems.

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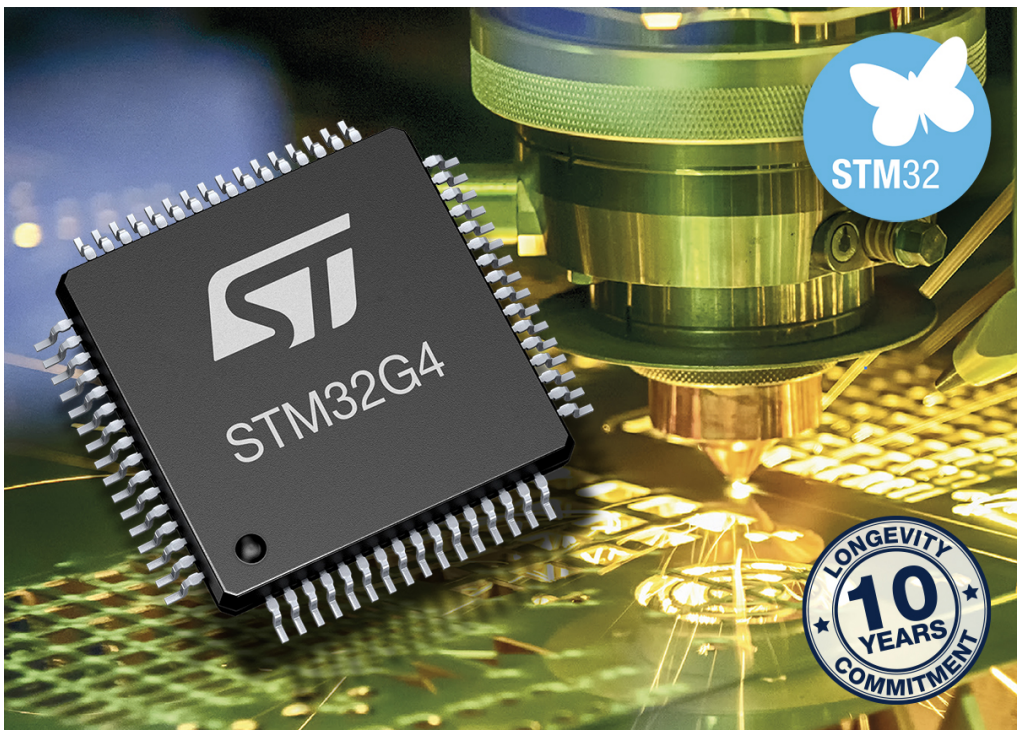
Empower digital power conversion with high-performance microcontroller

To boost efficiency in digital power control, the STMicroelectronics STM32G484 32-bit MCU features a fast Arm Cortex -M4 core and integrates advanced analog peripherals.



STMicroelectronics' STM32G484 microcontroller is suitable for next-generation digital power converters and mixed-signal control systems, combining high processing performance with precise analog control. It features a 170MHz Arm Cortex-M4 core with extensions, augmented by dedicated hardware math accelerators that offload complex control algorithms. This architecture enables fast control loops and real-time signal processing for high-efficiency power conversion and other demanding control applications.

To interface directly with power electronics, STM32G484 integrates rich analog and timing peripherals. It offers five multi-channel, simultaneous voltage and current sensing, along with six on-chip programmable-gain operational amplifiers and seven comparators for real-time signal conditioning and protection.

The STM32G484 features extensive connectivity for system integration. Also, multiple low-power modes, such as sleep, stop, standby, and shutdown help to minimize energy consumption when full performance is not required. Developers also benefit from the STM32 ecosystem: the STM32CubeG4 software package provides HAL/LL libraries and control examples, and tools like STM32CubeMX and STM32CubeIDE are supported. This ecosystem, combined with the chip's dual-bank Flash enables rapid development of safe, high-performance digital power solutions.

FEATURES

- 170MHz Arm Cortex-M4 core with 213DMIPS
- FPU and DSP instructions
- 128/256-bit key encryption hardware accelerator (AES)
- Hardware accelerators:
  - Coordinate rotation digital computer (CORDIC)
  - Filter math accelerator (FMAC)
- Analog communication:
  - 5 x 12-bit SAR ADC, 4Msps each, up to 16-bit with oversampling
  - 7 x comparators
  - 6 x programmable-gain op amps
  - 7 x DAC channels
  - Internal reference voltage buffer
- High-resolution timer (HRTIM):
  - 6 x 16-bit counters
  - 184ps step size
  - Up to 12 PWM outputs
- Connectivity interfaces:
  - 3 x FDCAN
  - USB 2.0 FS
  - USB Type-C™ Power Delivery
  - 4 x I2C
  - 4 x SPI, 2 ×x I2S
  - 3 x USART
  - 2 x UART
  - 1 x LPUART
  - 1 x SAI audio interface
- Operating voltage range: 1.71V to 3.6V

APPLICATIONS

- Solar inverters
- Charging systems
- Uninterruptible power supplies (UPS)
- Power supply units
- LED lighting controllers
- Class-D audio amplifier systems

FREE DEV BOARD

Discovery kit with STM32G474RE MCU.

Orderable Part Number
B-G474E-DPOW1

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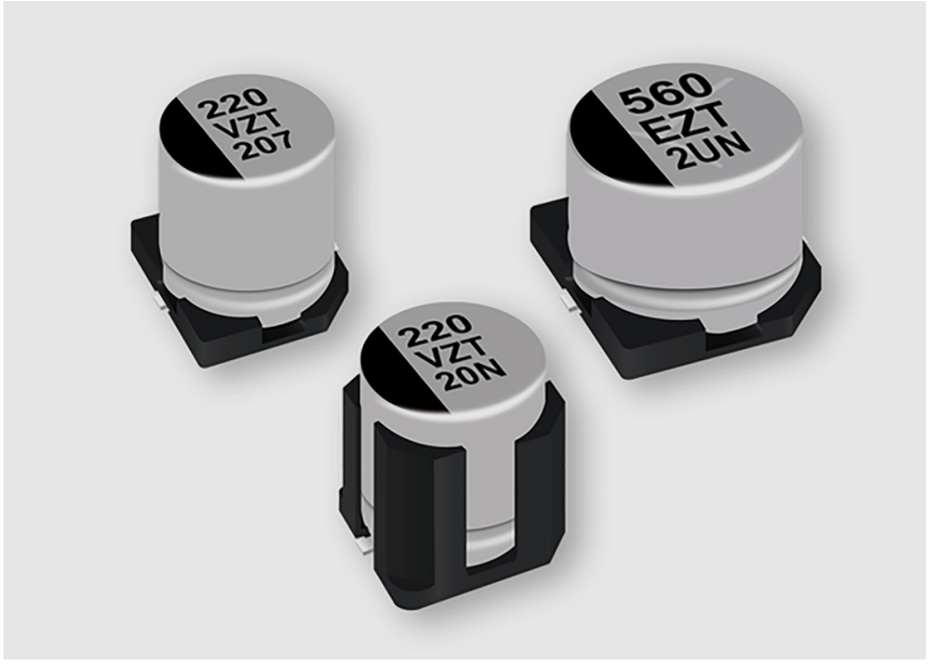
Hybrid capacitors boost e-mobility, reliability and lifespan

The Panasonic Industry ZTU series of hybrid capacitors targets the most demanding automotive conditions, while the ZUU series pushes the envelope on capacitance and ripple current for high-power circuits.



Panasonic
INDUSTRY

FEATURES

- ZTU: 25V to 35V voltage
- ZUU: 25V to 63V voltage
- 120µF to 1000µF capacitance, series/voltage dependent
- Available in vibration-proof variants up to 30G

APPLICATIONS

- Electric and hybrid vehicles
- E-bikes and e-scooters
- Industrial AGVs and robotics

The ZTU and ZUU series conductive polymer hybrid aluminum electrolytic capacitors are designed to enhance reliability in advanced e-mobility platforms. These capacitors combine the low ESR of conductive polymer technology with the stability and long life of hybrid aluminum electrolytics, delivering strong performance under harsh thermal and electrical stress.

Wide coverage for automotive and industrial power rails:

- ZTU rated voltages: 25V and 35V
- ZUU rated voltages: 25V, 35V, 50V and 63V

Across both series, capacitance values span from 120µF up to 1000µF depending on series and voltage rating, supporting functions such as dc-link buffering, power-rail smoothing, and transient suppression in e-mobility and industrial power systems.

Both series are specified for high endurance: 4,000 hours at 125°C and 4,000 hours at 135°C according to datasheet endurance conditions, enabling long service life in high-temperature environments.

In advanced mobility applications, ZTU and ZUU capacitors help to stabilize dc links and power rails despite heat, vibration, and high ripple currents. The hybrid construction delivers low impedance characteristics suited to demanding power stages, and their surface-mount form factor supports dense layouts where board area and weight are at a premium.

Both families are offered in versions intended for demanding mechanical environments. Vibration-proof variants are available, with Panasonic test conditions indicating maximum acceleration up to 30G for the vibration-proof capacitors.

Series	Capacitance	Ripple Current	Miniaturization
ZTU	1.7x larger than entry-level hybrid series Example 330µF 560µF, φ10x10.2mm	1.8x 2900mA 3500mA	φ10×10.2 φ8×10.2 Smaller case size for same capacitance
ZUU	Largest capacitance series up to 1000µF	Largest ripple current series up to 6.1A	Saves cost and space with 1-to-many replacements

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Miniature MLCCs deliver high capacitance and stability for automotive systems

The KAM series from KYOCERA AVX provides high-value capacitance in miniature surface-mount packages, utilizing X7T dielectric to ensure stability in demanding automotive electronic control units and advanced driver assistance systems (ADAS).

KYOCERA AVX

FEATURES

- Operating temperature range: -55°C to 125°C
- ±10% capacitance tolerance
- 12.5% dissipation factor

APPLICATIONS

- Automotive systems:
  - Infotainment
  - ADAS
  - Body control
  - Navigation
- Power supplies

KYOCERA AVX Components supplies the KAM family of multi-layer ceramic capacitors (MLCCs) intended for space-constrained automotive circuits. These AEC-Q200-qualified capacitors employ X7T dielectric material to maintain performance across a wide operating temperature range, suitable for the rigorous conditions found in vehicles.

The series offers high capacitance values in miniature footprints to support the densification of automotive electronic control systems. High capacitance-to-volume ratio allows engineers to reduce the component count and board space required for power supply smoothing and decoupling.

The capacitors feature tin plating on the terminations to ensure reliable solderability during board assembly.

Part Number	Case Size	Capacitance	Rated Voltage
KAM03CT71A474KH	0201	0.47µF	10V
KAM03CT70J105KH	0201	1.0µF	6.3V
KAM05CT70J475KH	0402	4.7µF	6.3V
KAM05CT70G106KH	0402	10µF	4V
KAM15CT70J226KM	0603	22µF	6.3V

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