Component Focus: Pages 3-11
IDT’s inductive position sensors offer flexible, reliable alternative to magnetic position sensing

Design Note: Page 12
Panasonic on trends in micro-miniature connector design

Application Spotlight: Pages 13-20
2GHz applications processor from NXP provides video and graphics acceleration

Board of the Month: Page 21
Sequana: hardware and software platform for the rapid development of connected and IoT devices

Technical View: Pages 22-23
How Arm® extended its TrustZone® technology from the mobile to MCU-based embedded systems

Application Spotlight on: Embedded Processing and Software
**New 600W DOISA-compliant DC-DC converter brick**

Murata Power Solutions has launched a series of DOISA-compliant 600W fused-brick DC-DC converter modules which provide a 12V output. The modules, which include a 32-bit ARM processor core, support the latest PMBus commands for digital control and telemetry functions. The D6QG, DCO and DAD series converters operate from an input voltage range of 36V to 75V, and offer typical efficiencies of 96% at full load from a 48V input. The modules are supplied with a base plate to provide for optimal thermal performance.

**Breakthrough in high-frequency operation of high-power infrared LEDs**

Lumileds and Melexis have developed an evaluation kit which enables designers to operate Lumileds’ LUXEON infrared LEDs at high frequencies of up to 40MHz. The LUXEON IR LEDs deliver the clean and repeatable response curve required for time-of-flight measurement operations performed in distance measurement and ranging applications at a range of up to 3m. The evaluation kit, developed by Lumileds, reduces the rise and fall times of the light pulses to fine, superior by a factor of four to similar LED technologies. The LUXEON LEDs are paired with Melexis’ Automotive QVGA time-of-light sensor chip.

**Vishay**

Vishay Intertechnology has released a new series of 1Mbaud optocouplers which feature an open collector, opto-isolated output with Schmitt trigger functionality for easy integration into digital systems.

**1Mbaud optocouplers feature Schmitt trigger functionality**

The VCH1016A series devices draw a low turn-on threshold current (3mA) with a high common-mode isolation voltage of 1.0kV. They are intended for use in Programmable Logic Controllers (PLCs), serial data communication, and bus systems, and switch-mode power supplies.

These optocouplers, which use an efficient input LED (coupled with an integrated optical photodiode IC detector), are perfect for galvanic isolation, breaking up ground loops in digital applications. In addition, their wide 3V to 15V power supply range enables isolated level shifting in applications using different voltage domains.

**19-ii 02**  
For samples or pricing e-mail info@my-ftm.com.
Multi-sensor dev kit includes Bluetooth Low Energy radio controller

The STEVAL-BCN002V1 from STMicroelectronics is a low-power wireless sensor node development kit which provides radio connectivity, an array of sensors, and intuitive programming and control interfaces.

The STEVAL-BCN002V1B consists of a STEVAL-BCN002V1 multi-sensor board and an STEVAL-BCN002VID adapter board, which is used to program and debug the sensor board.

The battery-powered sensor board features ST’s BlueNRG-2 system-on-chip, a wireless controller with an integrated Bluetooth® Low Energy radio for low-power wireless connectivity. The boards support an accelerometer, gyroscope and magnetometer for motion sensing, as well as pressure, humidity, time-of-flight and audio sensors.

*ST also supplies the BlueMS smartphone app: this connects the sensor board to any smartphone that supports the Bluetooth Low Energy wireless protocol. The app is available via the Google Play and Apple® iTunes app stores.*

**APPLICATIONS**
- IoT devices
- Smart home and building equipment
- Tracking systems
- Supply-chain/cold-chain management
- Smart agriculture

**FEATURES**
- BALF-NRG2 (DG3): ultra-miniature balun and harmonic filter
- LSM9DS0 six-axis inertial motion-tracking module
- LIS242DL three-axis magnetometer
- VLSI1X long-range time-of-flight sensor for distance measurements
- MPXIC02TS-A10100 capacitive MEMS digital microphone
- LPS22HH absolute pressure sensor
- HTS221 digital relative humidity and temperature sensor

**More information:**
Access the application note (AN10205) on the STMicroelectronics website: [www.st.com](http://www.st.com)

**Orderable Part Number:**
STEVAL-BCN002V1B

**Evaluation Board Kit**
The STEVAL-BCN002V1B kit includes:
- A powerful STM32L471VE6 microcontroller
- A BlueNRG-2 system-on-chip
- A user-friendly Bluetooth Low Energy smartphone app
- A comprehensive set of sensors
- A flexible prototyping platform

**Additional Features**
- A wide range of sensor modules
- A powerful development environment
- A comprehensive set of software tools

**Applications**
- Smart home
- Building automation
- Wearable electronics
- Industrial automation

**Features**
- Bluetooth Low Energy connectivity
- High-performance sensor modules
- Flexible and scalable platform
- Comprehensive development tools

**Orderable Part Numbers:**
STEVAL-BCN002V1B—Sensor board
STEVAL-BCN002V1D—Adapter board

**For more information:**
Visit the STMicroelectronics website at [www.st.com](http://www.st.com) or contact your local sales office.

---

Low-profile DC-DC power modules feature standard DSOA footprint

ST has introduced a new series of DC-DC converter modules which are compatible with a standard Distributed-power over Ethernet (D-POE) standard, allowing easy integration into systems designed to the standard. These modules are designed to be used with ST’s BlueNRG-2 system-on-chip, which is optimized for low-power applications and can support a wide range of sensor and actuator modules.

**Features**
- Small footprint: 32mm x 12mm x 4mm
- High efficiency: up to 96%
- Low profile: 4mm
- High power density up to 30W
- 5-year warranty

**Applications**
- Industrial automation
- Network equipment
- Storage devices
- FPGA power supply
- Battery-powered equipment
- Telecom equipment
- Plant or field devices

**Orderable Part Numbers:**
RPM3.3-6.0-EVM-1, RPM5.0-6.0-EVM-1

**For more information:**
Visit the STMicroelectronics website at [www.st.com](http://www.st.com) or contact your local sales office.
New double-pole option extends series of sealed power toggle switches for construction, agricultural and industrial applications

C&K Switches

C&K has extended its PT series of sealed power toggle switches with new double-pole, multiple-configuration options. The PT series was already available in a wide range of single-pole, single-throw and double-throw models. These robust switches, which are extremely resistant to dirt, dust, and moisture, are intended for use in harsh or challenging conditions, such as in off-road vehicles and outdoor construction equipment.

The PT series switches can operate reliably when doused by the powerful water jets used in heavy-duty cleaning operations. They also tolerate complete immersion. The PT series design occupies at least 15% less space than competing solutions, enabling designers to reallocate space behind the panel for other components. C&K’s PT series toggle switch is built with a patented single-piece injection-moulded seal for high ingress protection. It has a strong, heat-resistant housing and offers excellent resistance to contamination by oil or fuel.

The PT series have a versatile IP66/IP67 seal rating, and are IEC/UL 61058-1 certified.

Standard tin-plated brass receptacles offer new maximum operating temperature of 125°C

The new standard line of FASTON terminals includes:
- High-temperature, nickel-plated steel receptacles
- Tin-plated brass receptacles
- Tin-plated brass receptacles using new 2D crimp technology

The standard line of FASTON receptacles is easily identifiable by the dog-bone shaped front end and of the receptacle, which allows the mating tab to mate on a rolled edge instead of a sheared edge for reduced insertion force. The new standard tin-plated brass receptacles are UL rated to 125°C. By contrast, the legacy tin-plated brass FASTON receptacles were rated only to 110°C. In addition, the tin-plated brass receptacles are performance-tested on the sixth mating cycle rather than the first, to allow for construction and reorientation during service calls without needing to replace the receptacles. All standard FASTON receptacles are backward-compatible with existing FASTON housings.

600V, 1A power relay provides up to 4,000V rms of input-to-output isolation

IXYS Integrated Circuits Division, now part of Littelfuse, has introduced the CPC1984Y, a 600V, normally-open Power SIP relay rated for up to 1A DC/1A AC continuous load current, twice the load current of the company’s most popular previous Power SIP relay.

In addition, the HR41 connectors withstand 15kV lightning surges. The connector range consists of bayonet-locking, cable-mount plugs, and panel-mount receptacles which can handle currents up to 24A. The HR41 provides for easy field assembly with a standard crimp tool. A visual and tactile raised mating indicator on the plug and receptacle aids the mating operation in dark conditions. The cable can be clamped and the waterproof gasket sealed in one simultaneous step without additional tooling. The anti-loosening mechanism ensures that the tightening ring securing the cable will not come loose during operation. The innovative connector design incorporates a sequential contact structure. The contacts are arranged in sequence to ensure the ground contact is connected before the power contacts during the mating process to ensure safe connection. In addition, housing walls protect the contacts and ensure a long creepage distance. A contact removal tool is available to quickly remove the contact from the housing.

600V, 1A power relay provides up to 4,000V rms of input-to-output isolation

The HR41 connector has a visual and tactile mating indicator

Waterproof circular connector offers high-current capacity in harsh applications

Hirose has introduced the HR41 series of high-current circular connectors for outdoor, harsh environments. The lightweight circular housing is robust and resistant to harsh environmental conditions. Tests verify its reliability in:
- Surge tested for 2,000-hour operation
- Salt spray tested for 1,500-hour operation
- Water intrusion: IP68 rating

In addition, the HR41 connectors withstand 15kV lightning surges. The connector range consists of bayonet-locking, cable-mount plugs, and panel-mount receptacles which can handle currents up to 24A. The HR41 provides for easy field assembly with a standard crimp tool. A visual and tactile raised mating indicator on the plug and receptacle aids the mating operation in dark conditions. The cable can be clamped and the waterproof gasket sealed in one simultaneous step without additional tooling. The anti-loosening mechanism ensures that the tightening ring securing the cable will not come loose during operation. The innovative connector design incorporates a sequential contact structure. The contacts are arranged in sequence to ensure the ground contact is connected before the power contacts during the mating process to ensure safe connection. In addition, housing walls protect the contacts and ensure a long creepage distance. A contact removal tool is available to quickly remove the contact from the housing.
Load switches offer industry-best low-power performance in IoT, medical and battery-powered devices

Low quiescent current is an important requirement of sensor designs in power-constrained and battery-powered applications such as Internet of Things (IoT) edge nodes, wearable devices, and handheld medical, safety, and security equipment.

Now designers of these and product types can benefit from the low quiescent and shutdown current ratings of the Vishay SiP282432 MOSFETs. Typical quiescent current is just 0.014mA at 3V. By contrast, competing devices typically draw quiescent current of 10mA. Furthermore, the devices operate from a single power rail over an input voltage range of 1.7V to 5.5V, without the need for a bias power rail.

Main memory sockets for computing and communications

APPLICATIONS
- Wireless sensors and tags
- Smart meters
- Smart cards
- Data loggers
- Wearable devices
- IoT devices
- Medical devices
- Communications equipment
- Security systems

FEATURES
- 10µA quiescent current at 3.3V
- 100µs slew-rate-controlled turn-on time
- Reverse blocking at switch-off
- Operating temperature range: -40°C to 85°C

Digital and analog MEMS microphones deliver enhanced audio quality in miniature packages

CUI’s Audio Group has introduced a comprehensive line of MEMS microphones which are ideal for a range of portable consumer electronics applications.

Offering high audio quality, performance and reliability, CUI’s MEMS is housed in compact, low profile packages as small as 2.75mm x 1.85mm x 0.95mm, and in round and rectangular form factors. The microphones are compatible with no solder assembly processes, so they afford designers flexibility for use when surface-mount assembly is required. Designers can choose from a wide range of operating parameters in order to meet the performance requirements of any design. Sensitivity ratings for the CMM series models vary in a range from -44dB to -26dB. Tight sensitivity tolerance of as little as ±1dB means that the CMM series products perform well in the microphone array used to perform functions such as beam forming and noise cancellation. CUI’s MEMS microphones also feature high vibration sensitivity, low current draw of as little as 50µA, and wide operating temperatures ranging from -40°C to 100°C.

A unique inner chamber construction also provides more stable performance and gives these silicon-based microphones added protection against moisture and dust.

DIP sockets for IC connections with 6-48 contacts

APPLICATIONS
- Servers
- High-performance computing equipment
- Workstations
- Memory storage devices
- Communications equipment
- Desktop PCs
- Instrumentation

FEATURES
- Designed to JEDEC industry standards for new and existing DIMM memory modules
- End fittings for module retention, ejection and mechanical voltage keying
- SO DIMM sockets offered in several stacking heights

LGA sockets compatible with Intel and AMD microprocessors

APPLICATIONS
- Servers
- High-performance computing equipment
- Workstations
- Desktop computers

FEATURES
- Solder tail and surface-mount options
- TE Connectivity’s TE1000 series LGA LGA sockets: Stainless-steel load plate
- LGA sockets are the newest socket technology for Intel or AMD LGA microprocessor packages that range in size up to 3.647 pins. This generation of LGA sockets from TE Connectivity (TE) provides a comprehensive electrical interface to the microprocessor package. They are solder-ball surface-mounted to the PCB.
- TE Connectivity: Solder tail and surface-mount options
- Stainless-steel load plate provides a reliable interconnection to the microprocessor package, and includes a single lever handle for package actuation. The contact tip geometry is optimized to reduce risk of contact damage during handling and package installation.
Humidity and temperature sensors offer consistent, linear outputs

TE Connectivity (TE) provides a range of combined relative humidity and temperature sensors which produce accurate digital or analog outputs. They include the HTU20, a digital combined relative humidity and temperature sensor in a low-profile DFN package with a small 3mm x 3mm footprint. The sensor provides linear measurement outputs in a digital format over an I²C interface. TE’s polymer sensor materials combined with an optimized calibration slope and accurate offset give reliable, consistent performance even in the most demanding conditions. Every unit is individually calibrated and tested; a lot identification mark is printed on the sensor and an electronic identification code is stored on the chip for easy traceability. The adjustable resolution of the HTU21D’s measurements can be configured by the system designer, from 8- to 12-bit resolution for relative humidity, and from 12- to 14-bit resolution for temperature. The measurement range of the relative humidity sensor is 0-100%. The temperature sensor operates between -40°C and 125°C. Other relative humidity and temperature sensors from TE include the analog HTU20DF, and a digital part, the HTU20DF, which is suitable for use in harsh environments.

Integrated VOC gas sensor supports standard indoor air-quality ratings

Integrated Device Technology (IDT) has introduced the ZMOD4410 Indoor Air Quality (IAQ) sensing platform which offers best-in-class measurement stability and high sensitivity to Volatile Organic Compound (VOC) gases. VOCs in indoor air include pollutants released by new furniture, paints and coatings, and cleaning products. The ZMOD4410 is an integrated digital gas sensor module which detects VOCs in ambient air, and converts them to recognized indoor air-quality definitions published by the German UBA environment agency. The ZMOD4410 module’s sensor element consists of a heater element on a silicon-based MEMS structure and a Metal Oxide (MOx) chemiresistor. An integrated signal-conditioner IC controls the sensor temperature and measures the MOX conductivity, which is a function of gas concentration. It performs chemical and electrical concentration, and provides a flexible interface which enables software-configurable indoor air-quality sensing solutions for applications in homes and offices. In addition to measuring Total VOC (TVOC) levels, the ZMOD4410 module can be configured to sense VOCs in specific rooms such as bathrooms or kitchens, to enable tailored air-quality management solutions. The ZMOD4410 sensor connects to a host microcontroller, which can be configured with IDT’s library of downloadable firmware to address specific applications, such as thermostats, air purifiers, building controls, smart fans and HVAC equipment. For example, if an application requires a battery-powered source, a low-power firmware configuration can be downloaded, providing an optimized duty cycle operation within a restricted power budget.

650V MOSFETs optimized for soft-switching power-conversion applications

The power semiconductor product line from IXYS, now part of Littelfuse, includes the 650V Ultra Junction X2-Class HiPerFET™ Power MOSFETs with fast body diodes. Featuring on-resistance as low as 17mΩ and current ratings from 220 to 150A, these devices are optimized for soft-switching resonant-mode power-conversion applications. The intrinsic fast body diodes in the HiPerFET MOSFETs display very soft-recovery characteristics, minimizing EMI especially in half- or full-bridge switching topologies. Notable for their low reverse-recovery charge and time, the body diodes can be used to make sure that all the energy is removed during high-speed switching to avoid device failure and to achieve high efficiency. These HiPerFETs benefit from application of a charge compensation principle and proprietary process technology to produce low-on-resistance and gate charge. They also exhibit a superior fast-switching performance, and are avalanche-rated. Thanks to the positive temperature coefficient of on-state resistance, they can be operated in parallel to meet higher current requirements.
Understanding key features of the latest micro-miniature connectors

**PANASONIC INDUSTRY EUROPE**

When evaluating the latest generation of micro-miniature connectors for use on the tightly populated circuit boards in consumer and medical electronics devices, designers need to consider factors including packaging, durability, current-carrying ability and ease of replacement as early as possible in the design process.

There is a certainly a growing choice of micro-miniature connectors on the market: designers can now source high density connectors with terminal pitches as tight as 0.2mm and widths down to 1.7mm on the socket side. And Panasonic Industry’s Narrow Pitch Connector series includes more than 3,000 board-to-board and board-to-Flexible Printed Circuit (FPC) connectors.

Panasonic’s connector design expertise and know-how are based on more than 30 years of experience in this market. This Design Note draws on this experience to provide advice on design features that are particularly pertinent to the engineering constraints involved in device miniaturization.

**Tough Contact for board-to-board connections**

Panasonic’s narrow pitch board to board connectors feature a rugged contact geometry called ‘bellows’, as shown in Figure 1. It uses advanced operating life and high resistance to corrosion. These are critical attributes to consider during the design process.

In the metal bellows, spring forces strike a balance between easy insertion and resistance to shock loads. This ‘Tough Contact’ design also features a notched cross-section to ensure the edge-to-edge contact between connector halves has a high retention force. This V-shaped notch has the side benefit of sealing out contamination from flux and other particulates. It also features an integrated solder barrier and a proprietary anti-corrosion treatment. Finally, these connectors also offer a co-planarity of 0.08 maximum up to 60 pins with a 0.38mm pitch.

The most important feature of the bellows type contact structure, however, is that it improves resistance to drop impacts and twisting forces. Unlike standard tuning fork contacts, Panasonic’s connectors are not stamped out of a metal sheet with a die. With this die-stamping technique, the plate width cannot be smaller than the plate thickness. This in turn makes the contacts inflexible, and so more susceptible to drop impacts which cause solder cracks. Also, the plated surfaces tend to wear out quickly because the cut ends rub against each other.

Panasonic’s bellows contacts, by contrast, are made by stamping a thin plate at the terminal pitch, and then bending it into the contact shape. The bellows-type contacts have excellent contact reliability and resistance to solder joint removal, because the plate width can be optimized for the terminal pitch. The high flexibility of the contacts also means drop forces are readily absorbed, providing the ultra miniature body with high tolerance of drop impacts, and the high reliability required in mobile equipment.

The seamless surface area of the plated surfaces from wearing out, providing high resistance to corrosion. The simple locking structure gives tactile feedback to ensure reliable insertion and removal operations.

**Back-lock construction for FPC/FPC connectors**

Panasonic’s connector design expertise and know-how are based on more than 30 years of experience in this market. This Design Note draws on this experience to provide advice on design features that are particularly pertinent to the engineering constraints involved in device miniaturization.

The four walls surrounding the FPC inlet prevent displacement of the FPC, allowing smooth FPC insertion. Since the lever is located on the opposite side of the FPC inlet, fitting will not affect the lever, thus enhancing reliability.

The time taken to assemble these devices can be markedly reduced as Panasonic connectors are provided with their bars open. And in contrast to traditional front-lock connectors, these back-lock devices only require two rather than three assembly steps:

- Insert the FPC
- Lock the lever

The Y5BW and Y6BW series feature a lock holder which is ideal for applications that require high reliability and high retention force, as shown in Figure 2. The FPC holding contacts located on both ends of the connector further enhance the holding power. A tactile click confirms FPC insertion. Panasonic’s unique locking structure temporarily holds the FPC until the lever is closed. As soon as the bar is closed, the holding contacts lock the FPC, enhancing the FPC’s retention strength.

The bellows-type contacts have excellent contact reliability and resistance to shock loads. This ‘Tough Contact’ design also features a notched cross-section to ensure the edge-to-edge contact between connector halves has a high retention force. This V-shaped notch has the side benefit of sealing out contamination from flux and other particulates. It also features an integrated solder barrier and a proprietary anti-corrosion treatment. Finally, these connectors also offer a co-planarity of 0.08 maximum up to 60 pins with a 0.38mm pitch.

The most important feature of the bellows type contact structure, however, is that it improves resistance to drop impacts and twisting forces. Unlike standard tuning fork contacts, Panasonic’s connectors are not stamped out of a metal sheet with a die. With this die-stamping technique, the plate width cannot be smaller than the plate thickness. This in turn makes the contacts inflexible, and so more susceptible to drop impacts which cause solder cracks. Also, the plated surfaces tend to wear out quickly because the cut ends rub against each other.

Panasonic’s bellows contacts, by contrast, are made by stamping a thin plate at the terminal pitch, and then bending it into the contact shape. The bellows-type contacts have excellent contact reliability and resistance to solder joint removal, because the plate width can be optimized for the terminal pitch. The high flexibility of the contacts also means drop forces are readily absorbed, providing the ultra miniature body with high tolerance of drop impacts, and the high reliability required in mobile equipment.

The seamless surface area of the plated surfaces from wearing out, providing high resistance to corrosion. The simple locking structure gives tactile feedback to ensure reliable insertion and removal operations.

**Back-lock construction for FPC/FPC connectors**

Panasonic’s connector design expertise and know-how are based on more than 30 years of experience in this market. This Design Note draws on this experience to provide advice on design features that are particularly pertinent to the engineering constraints involved in device miniaturization.

The four walls surrounding the FPC inlet prevent displacement of the FPC, allowing smooth FPC insertion. Since the lever is located on the opposite side of the FPC inlet, fitting will not affect the lever, thus enhancing reliability.

The time taken to assemble these devices can be markedly reduced as Panasonic connectors are provided with their bars open. And in contrast to traditional front-lock connectors, these back-lock devices only require two rather than three assembly steps:

- Insert the FPC
- Lock the lever

The Y5BW and Y6BW series feature a lock holder which is ideal for applications that require high reliability and high retention force, as shown in Figure 2. The FPC holding contacts located on both ends of the connector further enhance the holding power. A tactile click confirms FPC insertion. Panasonic’s unique locking structure temporarily holds the FPC until the lever is closed. As soon as the bar is closed, the holding contacts lock the FPC, enhancing the FPC’s retention strength.

**Scalable family of automotive-qualified MCUs backed by suite of development software**

The S32K1 from NXP Semiconductors is a scalable family of Arm® Cortex®-M-based automotive-qualified MCUs built on future-proof features combined with a breakthrough suite of production-grade tools and software.

- **S32K1 from NXP Semiconductors** is a scalable family of Arm® Cortex®-M-based automotive-qualified MCUs built on future-proof features combined with a breakthrough suite of production-grade tools and software.

- **Scalable family of automotive-qualified MCUs** backed by suite of development software.

- **NXP SEMICONDUCTORS**

- **S32K1 MCUs** include a CAN-FD controller allowing increased CAN message payloads and fast message encryption, decryption and secure boot over all communication and connectivity interfaces.

- **For automotive ISO 26262 functional safety-rated applications, ECC-enabled Flash and RAM memories, a memory protection unit and built-in self-test modes and full safety-software documentation support up to ASIL-B grade designs.**

- **S32K7 MCUs** are supported by a complete ecosystem to minimize development effort and reduce time to market. This includes:
  - **Free Model Based Design Toolbox plug-in for Simulink**
  - **Production-grade software development kit**
  - **GNU compiler and debugger.**
  - **FreeRTOS operating system.**
  - **Guaranteed minimum of 15-year supply via NXP’s Product Longevity Program**
  - **Programmable FlexIO controller for emulating common communication protocols and peripherals**
  - **QuadSPI interface to external memory devices.**
  - **26µA current in very low-power stop mode at 25°C**

- **Orderable Part Number:** S32K144EVB-Q100

- **For samples or pricing e-mail info@ftm.com**
Mid-range 32-bit MCUs offer USB device capability and memory protection mechanisms

The Cortex-M4 core features a floating point unit which supports all Arm single-precision data-processing instructions and data types. It also implements a full set of digital signal processing instructions and a memory protection unit which enhances application security. Embedded memory provision includes 40kbytes of SRAM and up to 128kbytes of Flash memory, as well as a quad serial peripheral interface to external Flash memory. The STM32L412xx devices embed several protection mechanisms for embedded Flash memory and SRAM, including: Read-out protection Write protection Proprietary code read-out protection Freeware

Diodes Incorporated

Diodes Incorporated has introduced the PH4L55V108, an eight-channel, high-speed, bi-directional level shifter. It is designed for inter-IC communication between devices operating on different voltage supply rails. This competitively-priced device is suitable for use in computing, telecommunications and consumer electronics products.

The PH4L55V108 supports up to four I2C channels, each of which can be configured with different voltage translation levels for system flexibility. On-resistance is very low, yielding minimal signal distortion, while the wide voltage-translation range of the PH4L55V108 is well suited to consumer interfaces.

This level shifter operates at voltages between 0.9V and 5V across eight I/O channels, all of which can be configured with different voltage translation levels for system flexibility. On-resistance is very low, yielding minimal signal distortion, while the wide voltage-translation range of the PH4L55V108 is well suited to consumer interfaces.

Bi-directional eight-channel level shifter offers wide voltage range and flexible output options

New 2GHz multi-core applications processor provides sophisticated video- and audio-processing capabilities

The Cortex-A core can be powered off while the Cortex-M subsystem powers low power, real-time system monitoring. When turned on, they provide the processing power necessary for demanding applications such as machine-learning training and inference across a range of cloud providers. The Cortex-A cores provide a scalable core complex of one, two or four Arm Cortex-A7 processor cores running at up to 2GHz. Alongside these processor cores is a Cortex-M4 microcontroller core. This architecture combines high-performance computing, power efficiency, enhanced system reliability and embedded security. These capabilities are all required in the next generation of edge computing, streaming multimedia, and machine learning applications.

NXP SEMICONDUCTORS

NXP Semiconductors’ new i.MX 8M Mini processor applications processors boast advanced processing capabilities with sophisticated video, audio, and graphics functions for use in embedded consumer and industrial applications.

APPLICATIONS

Consumer electronics Portable devices

FEATURES

DC/DC Power supply

Stable and quiet operation

Wide input voltage range

Low input voltage

Output voltage regulation

Low EMI and noise

APPLICATIONS

Digital signage

Human-machine interfaces

Multi-channel audio and digital microphone inputs

Two USB 2.0 interfaces with PHY

Three SDIO interfaces

PCi interface with 1.1 sub-states for fast wake-up and low power

Four-lane MVI-CSI display interface

Four-lane MPI-CSI camera interface

Ethernet controller with AVB and IEE capability

I2C, UART, serial audio and serial peripheral interfaces

Low-power and standard DDR memory support

Multiple pin-compatible product offerings

For more cost-sensitive, high-performance applications, consumer device options are available across a range of temperature ranges from 0°C to 95°C at core operating speeds.
Cypress’ Wireless & Compute Portfolio: Powering Tomorrow’s IoT Platforms

PSOC® 6: Industry’s Lowest-Power Microcontroller, Purpose-Built for the IoT

PSOC® 6 is Cypress’ ultra-low-power MCU built on a dual-core architecture integrating an Arm® Cortex®-M4 and Cortex®-M0+ onto a single chip. A range of IoT designs requiring low power can benefit from PSOC® 6’s industry-leading low power consumption of 22 µA/MHz. In addition, PSOC® 6 provides the critical security required by connected devices including a hardware-based root-of-trust and hardware-accelerated cryptography. PSOC® 6 is in full production with silicon and Bluetooth®-Wi-Fi® Dev Kits available at Future Electronics. Future also provides the innovative Sequana Dev Kit which features a BLE 5.0 Module based on the PSOC 63 MCU, with support for the Arm® Mbed® OS. Apply for a free board now at my-boardclub.com.

Cypress Provides Market-Proven Wi-Fi, Bluetooth & Combo Wireless Connectivity

Get to production faster with Cypress’ ecosystem of certified IoT Partner Modules

Murata 10X Module

Powered by the Cypress CY4343AW 802.11n Wi-Fi & Dual-Mode Bluetooth Combo chipset

Murata’s 10X certified module (LBEUS510XDK) is powered by Cypress’ CY4343AW chipset which provides developers with wireless connectivity to connect a range of IoT applications with proven 802.11b/g/n 2.4 GHz Wi-Fi and dual-mode Bluetooth. The Murata 10X is designed for space-constrained applications with a form factor smaller than a dime. Engineers can get started with the Murata 10X by leveraging Cypress’ Nucleo IoT Dev Kit. Learn more at www.futureelectronics.com/nucleo.

Laird Sterling-LWB Modules

Leveraging Cypress’ combo and 802.11ac-enabled chipsets

Laird’s certified Sterling-LWB Wi-Fi-Bluetooth Combo Module is available with 3 different antenna options and features Cypress’ CY4343AW combo chipset. Two different Dev Board options are available – one in an SD Card form factor as well as a form-on WiGig® SBK compatible carrier board. In addition, the Sterling-LWB is a pin-compatible upgrade that adds 802.11ac Wi-Fi for higher bandwidth and increased range within IoT applications.

Inventek Wi-Fi Module

Powered by the Cypress CY43903 802.11n SoC with integrated Arm Cortex®-R4

The Inventek CY43903-based Wi-Fi module (SM43903-R48-15A-E/U) provides an integrated or optional external antenna with 1 MHz of SDRAM available for applications. In addition to WICED support, the module can also run with no operating system while leveraging an integrated TCP/IP stack that requires only a simple AT command set to establish connectivity within your wireless product. Companies developing end-point devices often lack the resources to handle the complexities of cloud-based AI. End-point applications benefit from local AI resources that can react quickly, while providing for low power consumption and lifetime cost. At the same time, the diversity of end-point use cases creates a need for application-specific algorithms and models.

STM32L0 Value Line MCUs

affordable ultra-low power

STM32L0 series of ultra-low power and compact 32-bit devices.

The STM32L0 series of MCUs are based on an Arm® Cortex®-M0 core, and include up to 128kbytes of embedded Flash memory, 32kbytes of SRAM and 512bytes of true on-chip EEPROM. ST’s power-saving, low-leakage process technology alongside device features such as low-power peripherals, a 10kSamples ADC which draws just 41µA, and a wake up time from power-saving mode as little as 5µs bring ambitious energy-management targets within reach. Designers can use these devices to achieve goals such as increasing wireless mobility, or endowing devices such as smart meters or IoT sensors with up to 10 year battery life.

These new Value Line devices are backed by a low-cost development ecosystem: the Kit® MDK-ARM professional integrated development environment supports STM32L0x devices free of charge, and ST’s STM32CubeMX configuration-code generator easy-to-use design analysis, including a power-consumption calculator.

New hardware/software platform enables artificial intelligence and cognitive sensing at the edge

QUICKLOGIC

QuickLogic’s QuickAI™ platform provides a comprehensive development environment for implementing Artificial Intelligence (AI) and cognitive sensing applications in system endpoints. It combines feature extraction/analytic tools from SensiML and System-on-Chip (SoC) silicon from QuickLogic. Companies developing end-point devices often lack the resources to handle the complexities of cloud-based AI. End-point applications benefit from local AI resources that can react quickly, while providing for low power consumption and lifetime cost. At the same time, the diversity of end-point use cases creates a need for application-specific algorithms and models.

The flexible hardware of the QuickAI platform and the ready-made AI software enable fast, effective development of individual solutions for AI and cognitive sensing implementation. The platform is composed of two elements: QuickLogic’s EDS® B3 voice- and sensor-processing platform features an Arm® Cortex® M4F processor core with embedded FPGA fabric and low-power sound detector IP to make it the ideal host SoC. The FPGA enables the SoC to implement proprietary interfaces, sample IoT sensor data, and perform feature extraction. The QuickAI platform also provides the SensiML® Analytics Toolkit. This software enables developers to quickly and easily train data, build models and classifiers, and program the EDS S3 device to implement end-point AI.

SEE PREVIOUS ISSUES OF FTM AT WWW.MY-FTM.COM
New high-performance MCUs support Platform Security Architecture from Arm to boost protection of connected, smart devices

STMICROELECTRONICS

STMICROelectronics recently introduced STM32H7 high-performance microcontrollers implement the Platform Security Architecture (PSA) from Arm to provide best-in-class cybersecurity for smart, connected and IoT devices.

Support for the PSA framework is underpinned by the enhanced security features and services offered by the new MCUs.

In addition, secure firmware-loading features help OEMs to ensure their products can be programmed safely and securely, even off-site at a contract manufacturer or programming house. To enable secure loading, security keys and software services already on the MCU enable OEMs to provide manufacturing partners with encrypted firmware, making it impossible for hackers to intercept, copy or tamper with the code. This process for programming and authenticating the device establishes a root-of-trust so that the device may be securely connected to the end-user’s network and remotely updated over the air throughout the lifetime of the device.

The introduction of the STM32H7 family comes in response to the demand from device manufacturers for security technology that will safeguard the user’s identity and personal information, and protect physical assets and Intellectual Property. The PSA running on an STM32H7 MCU helps OEMs to implement state-of-the-art security cost-effectively in small, resource-constrained devices.

The STM32H7 MCU integrates hardware-based security features including a true random number generator and advanced cryptographic processor, which will simplify the implementation of features to protect embedded applications and global IoT systems against eavesdropping, spoofing or man-in-the-middle attacks.

Updated STM32CubeMX MCU configuration features multi-panel GUI

STMICROELECTRONICS

STMICROelectronics has introduced a new version 5.0 of its STM32CubeMX configuration tool for STM32 microcontrollers, providing a more intuitive and efficient Graphical User Interface (GUI).

The multi-panel GUI lets users visualise design and select tools without changing the design, or changing the design without affecting tools. The configuration comes as standalone software ready to run on desktop operating systems or through the Eclipse plugin.

The STM32CubeMX v6.0 is a new experience

is recognised by numerous popular development environments including IAR EWARM, MDK-ARM and AC6 SystemBuilder. The configuration comes as standalone software ready to run on desktop operating systems or through the Eclipse plug-in.

STM32CubeMX v6.0

NEW FEATURES
- STM32 M4C development projects

APPLICATIONS
- ARM Cortex-M4 development projects

FEATURES
- Pin-out selector with conflict solver
- Clock-tree settings tool
- Power consumption calculator
- Peripherals configurator
- Middleware stack configurator

NEW FEATURES
- STM32 M4C development projects

APPLICATIONS
- ARM Cortex-M4 development projects

FEATURES
- Pin-out selector with conflict solver
- Clock-tree settings tool
- Power consumption calculator
- Peripherals configurator
- Middleware stack configurator

For samples or emailing info@my-ftm.com

Launch of world’s first general-purpose Arm Cortex-M33 based MCU

NXP SEMICONDUCTORS

NXP Semiconductors has introduced the LPC55S6x family, the world’s first general-purpose MCUs to include the new Arm® Cortex®-M33 processor core for embedded designs that require very high levels of system and data security.

The advanced security capabilities of the LPC55S6x family include support for Arm’s TrustZone® security technology, which today provides the platform for secure transactions on mobile phones such as mobile payments and money transfers. The TrustZone technology provides for isolation within the MCU to create a trusted execution environment for functions and peripherals that require security protection.

The LPC55S6x MCUs also include a hardware cryptographic acceleration engine, supported by a programmable digital signal processing accelerator which reduces clock cycling by a factor of 10.

Additional layers of protection for embedded systems isolate end products from known or unexpected threats over their lifecycle. These include:
- SRP: Physically Unclonable Function (PUF)-based root-of-trust and provisioning
- Real-time execution from encrypted images
- Debug authentication

An optional second Cortex-M33 core offers flexibility to balance high performance and power efficiency.

The new LPC55S6x parts are backed by a comprehensive software enablement framework including MCUXpresso software and a tools ecosystem.

Industrial predictive maintenance design kit includes sensors and IoT-LINK capability

STMICROELECTRONICS

The STEVAL-BFA001V1B from STMICROelectronics is an industrial reference design kit which gives designers a head start in developing systems for condition monitoring and predictive maintenance applications.

The kit includes a sensor board that features motion and environmental sensors, a STEVAL-BFA001V1B with a high-performance microphone to perform signal processing and to run sensor firmware.

The kit supplies a firmware package with the kit which includes algorithms for advanced time- and frequency-domain signal processing, and analysis of 1D accelerometer outputs with 36-lambda flat bandwidth. The package also includes drivers for pressure, relative humidity and temperature sensor monitoring, and audio-processing algorithms.

The kit includes the following features:
- STEVAL-IDDS001VB industrial sensor board
- STEVAL-IDDS001VB1 adapter for the ST-LINK V2-1 probe and debugging tool
- 0.05" pin flat cable
- For-pole cable mount connector plug with male contacts
- M12 female connector with a 2m cable

Apply now at my-boardclub.com

For samples or emailing info@my-ftm.com

For samples or emailing info@my-ftm.com

For samples or emailing info@my-ftm.com

STMICROELECTRONICS

ST supplies a firmware package with the kit which includes algorithms for advanced time- and frequency-domain signal processing, and analysis of 1D accelerometer outputs with 36-lambda flat bandwidth. The package also includes drivers for pressure, relative humidity and temperature sensor monitoring, and audio-processing algorithms.

The kit includes the following features:
- STEVAL-IDDS001VB industrial sensor board
- STEVAL-IDDS001VB1 adapter for the ST-LINK V2-1 probe and debugging tool
- 0.05" pin flat cable
- For-pole cable mount connector plug with male contacts
- M12 female connector with a 2m cable

Apply now at my-boardclub.com

For samples or emailing info@my-ftm.com

For samples or emailing info@my-ftm.com

STMICROELECTRONICS

ST supplies a firmware package with the kit which includes algorithms for advanced time- and frequency-domain signal processing, and analysis of 1D accelerometer outputs with 36-lambda flat bandwidth. The package also includes drivers for pressure, relative humidity and temperature sensor monitoring, and audio-processing algorithms.

The kit includes the following features:
- STEVAL-IDDS001VB industrial sensor board
- STEVAL-IDDS001VB1 adapter for the ST-LINK V2-1 probe and debugging tool
- 0.05" pin flat cable
- For-pole cable mount connector plug with male contacts
- M12 female connector with a 2m cable

Apply now at my-boardclub.com

For samples or emailing info@my-ftm.com

For samples or emailing info@my-ftm.com
NXP Semiconductors has added a new LS1028A system-on-chip to its QorIQ® EMBEDDED PROCESSING & SOFTWARE architecture via a hardware security engine, 3D graphics processing for advanced human high-performance Arm networks.

huge flows of data from machines and sensor generation of Industry 4.0 applications that provide industrial equipment designers with NXP’s intention in creating the LS1028A is to capability for deterministic data transmission over an Ethernet network. functions for Industry 4.0 equipment including Time-Sensitive Networking (TSN).

At the heart of the Sequana main board is a PSoC 63 MCU module, which includes an on-chip Bluetooth 5.0 radio. The module includes an antenna and RF peripherals, and is supplied with FCC, CE and Bluetooth certificates. In response to rising demand from embedded system developers for strong security in new generations of smart home, smart office and smart factory equipment, the Sequana board provides tight integration between the security features of the PSoC 63 and of the Mbed OS. The PSoC 63 provides integrated secure element functionality, including hardware-accelerated cryptographic functions such as AES, 3DES, RSA, ECC and SHA. In Sequana, these reference examples of these capabilities are provided by the Mbed OS’s support for partition management, cryptography and Transport Layer Security (TLS) for authentication and confidentiality.

Application development on the Sequana platform is facilitated by the board’s array of sensors, interfaces and headers. On the main board, these include a choice of ROHM Semiconductor MEMS motion sensors to support the development of machine condition-monitoring and prestige from over 30 applications. It also includes Arduino® and mikroBUS™ headers for easy integration of function-specific boards. Future Electronics can provide customers with expertise and technical support to help design engineers to develop in the Mbed software environment.

The Sequana platform may also be supplied to customers with an optional Sequana Environmental plug-in board, which features an array of sensors from ams, IDT, Murata, Sensirion and STMicroelectronics.

These sensors detect and measure airborne pollutants (Volatile Organic Compounds or VOCs, carbon dioxide and particulate matter), as well as acoustic noise and humidity. The board also includes a visible light sensor to measure the colour and intensity of ambient light, and an infrared light sensor for presence detection.

The dual-core architecture of the PSoC 6 microcontroller running the Mbed OS gives engineers to develop in the Mbed software ecosystem.

APPLICATIONS
- IoT devices
- Industrial equipment
- Medical devices

FEATURES
- Cypress CYBLE-416045-02 EZ-BLE™ Creator module based on PSoC 63
- Cypress CY15B104QSN-108SX Excelon™ Ultra 4Mbit non-volatile ferroelectric RAM
- ROHM Semiconductor BD70522GL4 DC-DC buck converter
- Eight high-LEDs
- ROHM LCD24MV/WH 24-channel constant-current LED driver IC
- Capacitive touch button and dial sensors

New development platform for IoT devices integrates advanced hardware and software security capabilities.

FUTURE ELECTRONICS

In response to rising demand from embedded system developers for strong security in new generations of smart home, smart office and smart factory equipment, the Sequana board provides tight integration between the security features of the PSoC 63 and of the Mbed OS. The PSoC 63 provides integrated secure element functionality, including hardware-accelerated cryptographic functions such as AES, 3DES, RSA, ECC and SHA. In Sequana, these reference examples of these capabilities are provided by the Mbed OS’s support for partition management, cryptography and Transport Layer Security (TLS) for authentication and confidentiality.

Application development on the Sequana platform is facilitated by the board’s array of sensors, interfaces and headers. On the main board, these include a choice of ROHM Semiconductor MEMS motion sensors to support the development of machine condition-monitoring and prestige from over 30 applications. It also includes Arduino® and mikroBUS™ headers for easy integration of function-specific boards. Future Electronics can provide customers with expertise and technical support to help design engineers to develop in the Mbed software environment.
How Arm TrustZone security technology made the transition from mobile phones to small, resource-constrained embedded systems

By John Robins
EMEA Vertical Segment Manager (Embedded Systems), Future Electronics

TrustZone® technology for ARM® CPUs is a successful security system IP which is today used in hundreds of millions of mobile phones. Its adoption by mobile phone manufacturers has been driven by the need to provide an isolated, secure space in which the online financial transactions performed by banks and online payment systems can run. This security IP removes the risk that a user’s secure data may be obtained, allowing a hacker to make unauthorised payments or money transfers.

An online financial transaction is a complex software process, and the value at risk in internet transactions is colossal. That TrustZone technology is approved by giants of the financial world is testament to the high security that it provides to mobile devices.

But the importance of security in the mobile phone and financial ecosystem has extended its application to the embedded world as well. On mobile phones, the Arm TrustZone technology is implemented in the Cortex®-A class of large, high-performance application processors. In the embedded world, devices are more commonly based on a microcontroller platform, which offers a far more constrained computing environment appropriate to the devices’ more limited functional requirements and lower power and cost budgets.

Whether in an MCU or a processor, the TrustZone technology provides a private platform for the execution of software in a Trusted Execution Environment (TEE). Arm has worked with the GlobalPlatform organisation to provide Application Programming Interfaces (APIs), compliance processes and certification for a TEE.

The TEE consists of three parts: hardware-based isolation technology (such as Arm TrustZone), trusted boot, and a small trusted Operating System (OS). The TEE can be used to run multiple, isolated trusted applications which may have different access policies.

As software technologies, security technologies, a TEE provides higher performance and access to larger amounts of memory. A TEE, which may be home grown or supplied by a third party, provides the important security functions of:

- Trusted boot
- Integrity management
- Authentication
- Payment
- Context protection
- Mobile device management

Now, following the introduction by Arm of its digital Cortex-M23 and Cortex-M33 microcontroller-based embedded systems can implement software securely in a TEE running on a Cortex-M platform, enabling embedded system designers to emulate many of the security capabilities of today’s smartphones.

The role of secure software isolation in embedded systems

It is important to understand the difference in execution systems from which they have most to gain. A mobile phone which can make withdrawals from the user’s bank account is clearly a valuable criminal target. It would be easy to assume that an embedded device has much less appeal to hackers.

But imagine a device as simple as a smart home thermostat, connected to the internet to provide access to cloud computing applications. A hack into that device could expose a user’s home to remote access and control. The TrustZone technology protects against this threat.

Embedded systems use a secure authentication device, a typical example is the A1006 from NXP Semiconductors, which provides a unique encoded identity to protect against attacks via a TFA process. A remote update, for instance, might be required to recognise the device’s identity before the device allows the update to run. Authentication provides some ‘connection security’ and is one of the functions of TrustZone technology.

But TrustZone does more than secure-the-CPUs’ identity: it provides a system-wide, hardware-level isolation of functions and resources into ‘trusted’ and ‘non-trusted’ elements. Arm says, ‘The System-On-Chip (SoC) and CPU system-wide approach to security, helping to isolate and protect secure hardware, software and resources. TrustZone is hardware-based security built into SoCs by semiconductor chip designers, then used by software developers.’

It provides Application Programming Interfaces (APIs) to allow developers to access trusted resources which may be protected over the air. Compared to other security technologies, a TEE provides higher performance and access to larger amounts of memory. A TEE, which may be home grown or supplied by a third party, provides the important security functions of:

- Trusted boot
- Integrity management
- Authentication
- Payment
- Context protection
- Mobile device management

Microcontroller products with TrustZone technology

This development ecosystem can now be used in new system designs including TrustZone technology. With the launch of compatible microcontroller products, including the SAM L11 from Microchip and the LPC5505 family from NXP Semiconductors.

The SAM L11 and the SAM L10, launched at the same time, are based on the Cortex-M3 core of the two Cortex-M cores which support TrustZone new Cortex-M technology. The Sam L11 and L10, share the same architecture and core, enabling Arm’s TrustZone technology embedded in the smartphones’ Arm Cortex-A-based application processor provides the hardware basis for this very high security.

The security architecture of the SAM L11 includes Arm TrustZone technology and the Kinibi-M GUI (image credit: Microchip).

No impediment to embedding security in embedded systems

Smartphones are today bought to set the gold standard in online security, because billions of users safely use them to make countless payments at stores and in public transit systems, and to transfer money online via banking apps. Arm’s TrustZone technology embedded in the smartphones’ Arm Cortex-A-based application processor provides the hardware basis for this very high security.

The SAM L10 includes chip-level tamper resistance, secure boot and secure key storage. When combined with TrustZone, these technologies enable the OEM to establish a hardware root-of-trust, and provide protection from both remote and physical attacks, as shown in Figure 3.

The SAM L11 MCU also embeds TrustZone’s root-of-trust during silicon manufacturing to work with Kinibi-M software, as shown in Figure 4. The Kinibi-M abstracts away the lower-level details of the SAM L11’s hardware security to provide a modular approach through a Graphical User Interface.

Partnerships with Secure Thingz and Data I/O Corporation offer secure key-provisioning services for customers that have a proven security infrastructure.

Both the SAM L10 and SAM L11 include chip-level tamper resistance, secure boot and secure key storage. When combined with TrustZone, these technologies enable the OEM to establish a hardware root-of-trust, and provide protection from both remote and physical attacks, as shown in Figure 3.

The SAM L11 MCU also embeds TrustZone’s root-of-trust during silicon manufacturing to work with Kinibi-M software, as shown in Figure 4. The Kinibi-M abstracts away the lower-level details of the SAM L11’s hardware security to provide a modular approach through a Graphical User Interface.

Partnerships with Secure Thingz and Data I/O Corporation offer secure key-provisioning services for customers that have a proven security infrastructure.

The SAM L11 MCU also embeds TrustZone’s root-of-trust during silicon manufacturing to work with Kinibi-M software, as shown in Figure 4. The Kinibi-M abstracts away the lower-level details of the SAM L11’s hardware security to provide a modular approach through a Graphical User Interface.

Partnerships with Secure Thingz and Data I/O Corporation offer secure key-provisioning services for customers that have a proven security infrastructure.
Accelerating Evaluation, Simplifying Design

Unified Software & Collateral

• Plug & play system
• Software & collateral integrated
• Automatic updates & alerts

Benefits

• Fast & Easy evaluation
• Design ready solutions
• Advanced support capability

Learn More at www.onsemi.com/Strata