NEW IN THIS ISSUE

Developing an IoT End Node?
Turn to page 12 now to see the new Circuit Centre feature!

Application Spotlight on IoT: Connectivity and Sensing

Component Focus: pages 3-9
ST’s TSX711 precision op amp has very low offset voltage of 200µV and offers rail-to-rail operation.

Design Notes: pages 10-11
Atmel’s CryptoAuthentication™: Security, integrity, confidentiality and authenticity in IoT edge nodes.

Circuit Centre: pages 12-20
The best and latest recommended components for a new IoT end node.

Application Spotlight: pages 21-25
ON Semiconductor’s AX8052F143 RF MCU supports frequencies up to 1GHz for IoT devices.

Technical View: pages 26-27
Implementing a cost-effective, wide-area wireless lighting network in the unlicensed RF spectrum.

We’re at Embedded World, 23-25 Feb, Nuremberg
Stand No. Hall 5, 5/358

In association with my-boardclub.com: the designers’ site for FREE development boards
From Our Man in Berlin: a report from the IoT World conference

Towards the end of 2015 Kevin Price, the European Business Development Manager – IoT at Future Connectivity Solutions (FCS), spent three days at IoT World in Berlin. The first comprehensive conference on the subject of the integration and monetisation of the Internet of Things.

It was a remarkable event: leading executives from industry sectors such as transportation, lighting, security and industrial control were willing to pay more than €1,000 to learn what the ‘Internet of Things’ is and how to connect with it. The event was over-subscribed.

Yet could we help asking myself at the end, did these senior managers get value for the money they spent on their tickets?

There is no denying that the IoT is the decade’s big technology story, and so it is not surprising that the Berlin event was so well attended. But after the end of IoT World, product manufacturers were left asking the question, ‘How can I get a complete solution which provides everything I need to connect my product to the IoT?’

What underlies this question, it seems to me, is the sheer complexity of the IoT ecosystem and the huge number of competing suppliers, technologies and service providers. Faced with a maze of protocols and global standards such as ETSI, 3GPP, Bluetooth®, IEEE 802.1x, Sigfox, LoRa® and more, it is no wonder that manufacturers are looking for help. It’s certainly unrealistic to expect to get a comprehensive understanding of so much information in just a three-day seminar.

After all, many product manufacturers are new to the question of connectivity. A designer of domestic coffee brewing machines, for instance, has deep knowledge of coffee-related processes such as flow control, power management and temperature sensing. Why should he or she be expected to know how to ‘get connected’?

And, what’s more, to know exactly what benefit the manufacturer will derive from doing so?

And, what is more, to know exactly what benefit the manufacturer will derive from doing so?

One of the main benefits of this device is that it requires very few external components: only decoupling capacitors on the high-voltage and low-voltage supply, and a resistor to pull-up the thermal shut-down.

The STEVAL-JME031V1 offers a simple way to evaluate the STHV600, backed by a convenient graphical user interface supplied by the ST-GE kit. Once the output waveforms from the board are configured, they may be displayed directly on an oscilloscope by connecting the scope probe to the respective on-board connector.

Low-cost ultrasound pulsar application demonstrated in new STHV600-based board

The STEVAL-JME031V1 evaluation board from STMicroelectronics provides a complete demonstration of an ultrasound pulser circuit, based on the STHV600 IC, for ultrasound imaging applications.

The STHV600 is an eight-channel, high-voltage and high-speed ultrasound pulsar IC. The circuit integrates a parallel logic-interface circuit which is compatible with both 1.8V and 3.3V input signals, level translation and MOSFET gate drivers, noise-blocking diodes, and high-power P-channel and N-channel MC3SEs as the output stage for each channel. These MOSFETs are capable of providing more than 2A of peak output current. Each channel has a dedicated bridge in order to reduce power dissipation and jitter in continuous-wave mode.

5.4mA in Transmit and Receive modes. In Low-Power mode the module draws a current of less than 1.4mA. The PAN1760’s 512kb EEPROM memory may be used to store application code, thus providing for stand-alone operation as a fully autonomous device with no host microcontroller. Application code can be uploaded using an MCU to connect to the PAN1760 via its UART interface. The module is supplied with FCC, IC and CE approvals.

The PAN1760 series shares the same form factor and footprint as Panasonic’s PAN1026 module. Bluetooth Smart applications and profiles developed for the PAN1026 can be ported almost unchanged to the PAN1760. Only minor modifications are needed to take account of the additional features in the PAN1760.

PANASONIC

The PAN1760 from Panasonic is a highly integrated Bluetooth® Smart module which provides for a much shorter development time and lower component count. These implementations use discrete components.

The 15.6mm x 8.7mm x 1.8mm surface-mount PAN1760 includes a full featured Bluetooth Smart radio and controller, 512kbtye EEPROM, filter, antenna, a 29MHz crystal, interfaces and ten GPIOs. It is supplied with an embedded Bluetooth v4.1 software stack, Generic Attribute (GATT) profile and high-level application programming interface. It supports both the Bluetooth Central and Peripheral modes.

The module may be used to implement the very low-power Bluetooth Smart wireless technology (previously known as Bluetooth Low Energy), which is becoming very popular in wireless sensor networks, health and fitness monitoring devices and many other applications.

Operating from a 1.8V to 3.6V power supply, the PAN1760 draws a peak current of just 5.4mA in Transmit and Receive modes. In Low-Power mode the module draws a current of less than 1.4mA. The PAN1760’s 512kb EEPROM memory may be used to store application code, thus providing for stand-alone operation as a fully autonomous device with no host microcontroller. Application code can be uploaded using an MUC to connect to the PAN1760 via its UART interface. The module is supplied with FCC, IC and CE approvals.

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Compact Bluetooth Smart module combines high-speed operation with very low power consumption

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**Components Focus**

**DIODES INCORPORATED**

The AH37xx family of high-voltage Hall-effect latch ICs introduced by Diodes Incorporated offers a range of magnetic threshold values, enabling it to address motor-control, position-sensing and speed-measuring requirements in a wide variety of applications.

The AH37xx devices may be successfully used for controlling the commutation of brushless DC motors, to measure the speed of rotation in motors, pumps and fans, and for contactless position sensing and position indexing.

**Applications**
- Washing machines
- Scanners
- Fridges-freezers
- Power supplies
- Two I²S interfaces
- Single Hi-Speed USB

**Features**
- 154kbytes of on-chip SRAM
- 1Mbyte of Flash memory and 16kbytes of EEPROM memory, performance security function.
- Users of the AH37xx benefit from the flexibility of various magnetic operation (BOP) and release (BRP) thresholds:
  - The AH3772/4 and AH3781/2 provide high sensitivity, with BOP and BRP of ±25G and ±25G/40G
  - The medium-sensitivity AH3775/6 parts are rated at 70G/110G and 70G/110G
  - The AH377 is the least sensitive, with a 140G and -140G specification for BOP and BRP.
- Two 10-bit, 400ksamples/s ADCs with up to six I²S interfaces as well as a third bus for data buses as well as a third bus for peripheral I/O.
- Three-stage pipeline, uses a Harvard architecture with separate local instruction and data buses.
- The ARM Cortex-M0 sub-system for managing the ICs and serial peripheral interface. The ARM Cortex-M0 co-processor and a second ARM Cortex-M0 sub-system for managing the I/Os and serial peripheral interface. The ARM Cortex-M0 co-processor is intended to perform functions that would otherwise be carried out by an additional 8- or 16-bit microcontroller.
- The ARM Cortex-M4 is a 32-bit core which operates at frequencies up to 204MHz. Offering low power consumption, enhanced debug features and a high level of support block integration, the core incorporates a three-stage pipeline, uses a Harvard architecture with separate local instruction and data buses as well as a third bus for peripherals, and includes an internal pre-fetch unit which supports speculative branching. A hardware floating-point processor is integrated into the core. The LPC435x family also includes an ARM Cortex-M0 application co-processor and a second ARM Cortex-M0 sub-system for managing the I/Os and serial peripheral interface. The ARM Cortex-M0 co-processor is an energy-efficient and easy-to-use 32-bit core which is code- and tool-compatible with the ARM Cortex-M4 core. The LPC435x co-processor is intended to perform functions that would otherwise be carried out by an additional 8- or 16-bit microcontroller.

**Applications**
- Motor control
- Power management
- White goods
- Embedded audio applications
- Industrial automation
- E-metering

**Features**
- Two banks (256 bits total) of one-time programmable memory for AES key storage
- Two PS interfaces
- LCD controller has programmable display resolution of up to 1024 x 768 pixels
- One 10-bit, 400ksamples/s DAC
- Two 10-bit, 400ksamples/s ADCs with up to eight input-channels per converter
- Four low-power modes

**Power modules provide for lower production costs and increased reliability**

The PressFit package is also not subject to solder fatigue, a common failure mechanism in power modules operating at high temperatures. The solderless PressFit technology allows for easy mounting to the PCB in a single step, greatly reducing assembly time, while simplifying maintenance in the field.

The VS-xM160P-P modules have a low 1nm profile, helping to save space in the end-product design and making the electrical layout easier in application-specific power supplies.

**Applications**
- AC-DC input rectification
- Welding equipment
- Uninterruptible power supplies
- Switch-mode power supplies
- Motor drives

**Features**
- May be directly mounted on a heat-sink
- 3.625V minimum insulation voltage
- Low junction-to-case thermal resistance
- 1,600V maximum repetitive peak reverse voltage

**Part Number**

<table>
<thead>
<tr>
<th>VS-60MT160P-P</th>
<th>VS-72MT160P-P</th>
<th>VS-100MT160P-P</th>
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<tbody>
<tr>
<td>Maximum DC output current (A)</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>Threshold voltage at 100°C junction temperature (V)</td>
<td>0.78</td>
<td>0.82</td>
</tr>
<tr>
<td>Maximum forward voltage drop at 25°C junction temperature, peak pulse current (V)</td>
<td>1.45</td>
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</tr>
</tbody>
</table>

**VISAY**

The VS-xxMT160P-P packages achieve 400m of 80% to 95% efficiency.
Precision op amp has very low offset voltage

Op amps provide very high output stability over time and temperature

The TSX711 from STMicroelectronics is a single precision operational amplifier which has a very low input-offset voltage of 200µV maximum at 25°C, providing a rail-to-rail input and output, this device may be used on full-range inputs and outputs without limitation. This is particularly useful when operating on a low-voltage supply. In fact, the TSX711 offers the great advantage of supporting a wide supply-voltage range, from 2.7V to 16V. The TSX711’s low input bias current makes it ideal for signal conditioning in sensor-interface designs. In addition, the rail-to-rail characteristic makes it suitable for low-side and high-side current measurements.

When used in motor-control feedback and power-supply control loops, the NCS325 and NCS333 op amp devices provide for very high accuracy, thereby helping designers to achieve higher system efficiency. The devices are complemented by the NCV333 AEC-Q100-qualified op amp offering similar functional performance for use in automotive applications. Featuring a typical 30nV/°C of offset temperature drift, these op amps are very well suited to low-side current sensing and voltage-differential measurement in front-end sensor functions. The very low drift and offset values ensure that their outputs remain stable over a wide operating-temperature range without the need for complex software calibration algorithms, resulting in easier system implementation and a longer product lifespan. The NCS325 and NCS333 provide rail-to-rail input and output performance, and operate from a power-supply voltage ranging from 1.8V to 5.5V. The devices offer a gain bandwidth of 500kHz.

Ambient light sensor for automotive applications offers accurate digital output

The VEML6030X01 incorporates a photodiode and signal processing IC in a compact, 6-pin 3mm x 2mm 0.85mm surface-mount package. It captures measurements of the intensity of ambient light over a range from 0.005 lux to 167 lux, providing them as a digital output over an I2C bus interface to any microcontroller.

The new sensor features an on-chip optical coating which modifies the photodiode's normal response in such a way as to match the response of the human eye to ambient light. The device’s measurements of ambient light are accurate to a maximum of ±10%. The sensor’s output is very stable over a temperature range of -40°C to 115°C.

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Low-cost, low-power ARM Cortex-M0+ core offers USB2.0 connectivity

The STM32L053 microcontroller from STMicroelectronics offers very high power efficiency thanks to a large choice of internal and external clock sources, an internal voltage-adaptation scheme and several low-power modes. The STM32L053 is based on the low-power ARM® Cortex®-M0+ 32-bit RISC core operating at a frequency of 32MHz.

The STM32L053 features a crystal-less USB2.0 interface. It also includes a memory protection unit and high-speed Flash programme memory, 2kbytes of EEPROM data memory and 64kbytes of RAM. Four variants of the STM32L053 are available: the STM32L053C (32kbytes of Flash) and STM32L053CB (64kbytes) are housed in a 48-pin LFQFP or TFBGA packages and contain a 16-channel 12-bit ADC. The STM32L053PR (32kbytes of Flash) and STM32L053PR8 (64kbytes) are housed in 64-pin LFQFP or TFBGA packages and contain a 16-channel 12-bit ADC.

All the devices offer several analogue features, including a DAC, two ultra low-power comparators, several timers, and a real-time clock and a SysTick, which can be used as time bases. They also feature two watchdogs, one watchdog has an independent clock and window capability, and one window watchdog is based on the bus clock. An integrated LCD controller has a built-in LCD voltage generator which can drive as many as eight multiplexed LCDs, with contrast independent of the supply voltage.

5A wire-to-board connectors withstand strong vibrations

The new DFSC3 series of compact 5A wire-to-board connectors from Hirose offers highly reliable operation when used in internal power supplies.

The connector range consists of crimp sockets and vertical headers in single or double rows. The crimp-socket housing uses a two-point spring contact structure which stabilises the connection. The two contact points stop the contact from oscillating when exposed to vibration, thus eliminating the risk of corrosion due to fretting. In addition, part of the barrel section of the crimp is designed to remain open to restrict movement and to provide high contact reliability, a secure connection and strong resistance to vibration. The robust lock provides a clear tactile click when mated. This prevents incomplete mating and confirms the connector is fully engaged. The lock is centred to avoid the potential for uneven locking and cable entanglement, and to allow multiple connectors to be mounted side by side. Separate contact retainers are available to prevent incomplete contact installation and to increase the retention force, a useful feature in applications in which excessive pull forces might be applied to the cable. Spring variations are available to prevent the incorrect insertion of the mating connector when multiple connectors are used. Built-in guides ensure accurate connector positioning and orientation on the board.

The connectors can accept strain sealing up to 6.5mm above the surface of the board to provide protection against dust and moisture.

New series of tact switches has long life expectancy of 300,000 cycles

The latest addition to the company’s portfolio of switches is the TL3750 series. These miniature tact switches offer many features and have a life expectancy of 300,000 cycles. Also from E-Switch is the TL6100 series, which are sealed units and can withstand water washing.

They also offer a long operating life of up to one million cycles, and feature a range of actuator heights. They offer a choice of operating force options: 130gf, 160gf, 300gf or 500gf. The switches are supplied with either gold or silver contacts.

The 5mm x 5mm TL3301 series, for surface mounting, also offers a choice of operating forces, and has a life expectancy of 100,000 cycles. Its dielectric strength is rated at 250V AC. For designs which require an illuminated, sealed tact switch, the IP67-rated TL6215 series offers multiple colour LED and cap options. It also gives the user a choice of either right-angle or vertical through-hole mounting.

USB type-C connector provides data, power and A/V in one slim package

The new USB type-C receptacle from TE Connectivity® (TE) provides a solution which carries data at rates up to 10Gbits/s, power up to 100W and audio/video inputs, all in a single slim connection.

The USB type-C connector (part number 2120951-1) helps designers to meet the requirements of both current and future USB applications. Designed in conformity with the industry standard for USB connectors, it provides a slim profile which is small enough for handheld devices yet robust enough for industrial applications.

Featuring a reversible mating interface, the receptacle is designed to accept a plug in any direction, enabling easy, reliable mating. This connector supports a variety of protocols and, with the use of adaptors, is backwards compatible to HDMI, VGA, DisplayPort and other types of connections from the single USB type-C port. The receptacle offers very high levels of protection from EMI, and provides excellent retention capabilities for long term durability.

The connector is rated for a maximum 5A current on the power supply Bus pins, and 6.25A on the Ground pins. On Connection pins, it can carry up to 1.25A, and the Signal pins are rated for a minimum 0.25A.

New ultra low-power MCUs with USB and LCD

Based on STMicroelectronics’ ST7 microcontroller, the ST7DK-128DKF32 offers rich features and a complete development kit, including a debugger, firmware, libraries and ecosystem. The ST7DK-128DKF32 is a 32-bit Flash microcontroller with 128kbytes of flash memory, 12kbytes of RAM, two UARTs, three SPIs and two I2C interfaces.

SECURITY AUTOMOTIVE MEDICAL LIGHTING INDUSTRIAL ENERGY CONSUMER TELECOMMS

APPLICATIONS
- Industrial control systems
- Robots
- Medical devices
- Smart meters
- Home appliances
- LED lighting
- Office equipment

FEATURES
- Contact positions: 2-6 (single row), 4-12 (double row)
- 3.3mm contact pitch
- 500V AC/DC voltage rating
- 30 mating cycles
- Cable sizes: AWG 22-20

STMICROELECTRONICS
COMPUTER FOCUS

The STM32L053 can drive eight multiplexed displays.

TE CONNECTIVITY

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Secure USB2.0 data transfer via the single USB type-C port.

The USB type-C connector provides high throughput USB2.0 at 480Mbits/s and High Speed USB1.1 at 480Mbits/s.

E-Switch for samples or pricing e-mail info@my-ftm.com

APPLICATIONS
- Factory automation equipment
- Industrial machinery
- Data centres
- Medical devices
- Power packs and chargers
- Automotive infotainment systems
- Business equipment
- Lighting
- Wearable devices

FEATURES
- 30V maximum voltage
- Supports high-speed data transfers:
  USB2.0 at 480Mbits/s
  USB1.1 at 12Mbits/s
  USB1.1 at 480Mbits/s
- 100W maximum power at 20V
- Operating temperature range:
  -30°C to 85°C

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S E C T I O N

10G bits/s, power up to 100W and future USB applications.

TE Connectivity™ (TE) provides a solution for designers to meet the needs of current and future USB applications. Designed in conformity with the industry standard for USB connectors, it provides a slim profile which is small enough for handheld devices yet robust enough for industrial applications.

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Contact the nearest TE Connectivity distributor or visit www.te.com for samples and datasheets.

For samples or pricing e-mail info@my-ftm.com

© Switch tact switches, IP67 rated versions are available.

APPLICATIONS
- Medical devices
- Consumer electronics
- Handheld electronics equipment
- Audio/visual equipment
- Test instrumentation
- Telecoms equipment
- Computer peripherals
- Wearable devices

FEATURES
- Surface-mount 2.0mm x 3.0mm x 0.8mm
- Operating temperature range:
  -30°C to 85°C

For samples or pricing e-mail info@my-ftm.com

© Switch tact switches, IP67 rated versions are available.

APPLICATIONS
- Industrial control systems
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- Medical devices
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For samples or pricing e-mail info@my-ftm.com

© Switch tact switches, IP67 rated versions are available.
Introducing a proven method for securing intelligent IoT edge nodes

ATMEL

In assessing IoT ecosystem management techniques and network vulnerability, developers’ focus is today on the most fundamental element: the edge node. Otherwise known as the ‘things’ in the Internet of Things, these edge nodes are the sensors and actuators which provide the data for the IoT, and carry instructions from the cloud or from a user interacting via a computer, mobile phone, in-car system, smart appliance or other platform.

In IoT nodes, TLS is also used to create a secure connection, such as to the cloud. But to be truly secure, an IoT node must also implement application-layer security. That means that the node itself, and not just the communication channel the node uses, should be authenticated. In addition to channel authentication, encryption and data integrity should be established at the application layer to protect the data flowing through the pipe.

Implementing reliable security in resource-constrained devices

IoT devices are often very small and simple, and little or no human interaction may be required for their operation. The automated nature of an IoT device’s functions tends to prompt system designers to ask important questions about the nature of the security apparatus they require. They commonly ask:

- How is it possible to be certain that an object connected to the network is proven to be trusted, a myriad of other benefits can be fully realised, as shown in Figure 2. These include secure communications, ecosystem control, and secure storage.

Various technologies can be used to implement these three elements of network security, but common among them is the use of secret or encrypted format and in protected hardware is an excellent and proven methodology.

Fig. 1: Even when the channel is secure, attackers can access the network through unsecured nodes.

It is clear, then, that authentication of every node, to confirm its identity, is a crucially important element of IoT network security.

While existing internet security technologies such as the Secure Sockets Layer (SSL) transport protocol and TLS can protect communications channels between an uncompromised edge node and a server, they are not invincible. And SSL/TLS protection does not help if an attacker takes control of an edge node.

In fact, tight security for IoT edge nodes involves three fundamental elements, which may be denoted by the acronym CIA:

- Confidentiality – data, whether stored or in transit in a message, should be visible only by authorised persons
- Integrity – a message sent should not change on its way to its destination
- Authenticity – the user must have confidence that the identity of the sender of a message can be trusted

The proper function of encryption

What's the problem if a stranger knows what temperature my house are on?

• Identification – prove the identity of any visitors coming in over the network
• Authenticity – authenticate any accessories that try to attach to a node
• Confidentiality – encrypt messages

Those with responsibility for designing or operating an IoT network, then, tend to have real and pressing concerns about the vulnerability of their ecosystem control, and secure storage.

For some individual users, such breaches of privacy might genuinely be trivial. But this is to miss the real risk associated with impaired or incomplete security at the network level. Here, it is important to consider not only the data on the device, but the data and systems that the device provides or has access to on the network.

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Users will commonly ask:

- What’s the problem if a stranger knows what temperature setting my connected smart home thermostat is set to?
- Who cares if a stranger finds out remotely that the lights in my home are on?
- Why does it matter if a stranger knows how many steps are logged in my pedometer?

For individual users, such breaches of privacy might genuinely be trivial. But this is to miss the real risk associated with impaired or incomplete security at the network level. Here, it is important to consider not only the data on the device, but the data and systems that the device provides or has access to on the network.

In fact, history shows that several high-profile data breaches have been accomplished by spoofing the identity of unsecured network nodes. In these cases, malicious entities were able to get onto companies’ networks by pretending to be an IoT node. And once inside the network, security normally becomes much weaker: the attackers were then able to gain access to their victims’ customer databases and damage their brand. By breaking IoT network security, attackers can also access cloud services, and potentially even access nodes and control their operation.

It is also important to protect keys during the entire manufacturing process. The use of hardware security modules which store the keys in encrypted format and in protected hardware is an excellent and proven methodology.

ICs with trusted security capability

Security is fundamental for the successful adoption of the IoT. Edge nodes are currently the weakest link in ensuring IoT security, the protection of cryptographic keys secures these edge nodes. And the best way to achieve lock-down is through the use of protected hardware.

The Atmel CryptoAuthentication™ family of cryptographic elements provides a rock-solid means of storing keys in protected hardware and managing those keys to achieve multi-layer security, as shown in Figure 3. The broad Atmel portfolio of microcontrollers, wireless devices, and cryptographic elements brings state-of-the-art intelligence to enable users to securely connect devices to the IoT and beyond.

Fig. 1: Even when the channel is secure, attackers can access the network through unsecured nodes.

Fig. 2: Numerous benefits become available to a node the identity of which has been verified.

By providing a cryptographically verifiable, hardware-secured identity for edge-node devices, system designers can ensure that these devices comply with all required standards and do not present a risk to the entire network ecosystem.

In practice, this means taking the following steps:

- Identification – prove the identity of any visitors coming in over the network
- Authenticity – authenticate any accessories that try to attach to a node
- Confidentiality – encrypt messages
- Integrity – append a Message Authentication Code (MAC) to all messages to prove that no one has altered the message in transit

In addition, steps can be taken to protect a node from proximity or side-channel attacks. They can be implemented on the entire system, or just on a key sub-system.

- Store keys in protected hardware so that there is no electrical access to the key
- Shield the system to prevent electromagnetic emissions from divulging key information
- Add circuitry specifically to confound attempts to monitor power or other signals. This may include dummy counters or circuits with some element of randomness to scramble useful information.
- Encrypt the key in storage. Even though the key may be electrically inaccessible, a determined attacker may try to strip away layers of the device to see into embedded Flash memory and retrieve the key that way. Encryption neutralises this attack.
- Eliminate unnecessary ports

For more information e-mail sales@my-ftm.com
Wi-Fi module draws just 4µA in Sleep mode

The RN1723 from Microchip is a compact embedded Wi-Fi module which offers the very low power consumption required in battery-powered IoT applications.

Measuring just 27mm x 18mm x 3.1mm, the RN1723 is a full-featured IEEE 802.11b/g wireless module, which uses a single 27mm x 15mm x 2mm form factor, ideal for fixed and mobile wireless networks. The modules also include timing clocks and voltage regulators.

The RN1723 includes a temperature-sensing digital output 10dBm power amplifier. This device is notable for its high-precision radio, network protocol and applications on-chip.

The RN1723 is designed to meet the requirements of an end node such as a programmable microcontroller, which provides for a very low-cost crystals, specified at 85°C, in a smart-lighting application. The RN1723 typically draws 2.5mA in sleep mode, while the RN1723s x 2 parts have 3.1x3ytes.

The RN1723 provides a variety of antennas and interfaces, including a microSD card acting as a border router, which can be used to provide for over-the-air upgrades without recourse to external memory.

The off-chip peripherals support a wide range of applications. They include PC and serial peripheral interfaces which can be used to upgrade the RN1723 using the UART serial port; the user can easily access the stack for further customisation.

The XNUCLEO-WG1M1, an expansion board which allows access to the RN1723 to evaluate the chip in an application environment, comes supplied with a ZigBee® PRO protocol stack with added web server and additional functionality. The software package includes an AT command layer interface for user-friendly access to the stack functions via the module’s UART serial port.

For samples or pricing information, e-mail info@my-ftm.com.

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Wi-Fi modules include options for integrated TCP/IP stack

The SPWF01S intelligent Wi-Fi module from STMicroelectronics is a stand-alone solution based on the IEEE 802.11b/g/n system which enables designers to quickly integrate wireless Internet connectivity into existing or new products for the Internet of Things.

The module consists of a single-chip 802.11 transceiver with an integrated power amplifier, and an STMicrocontroller with an extensive general-purpose I/O. The module also includes timing clocks and voltage regulators. Benefitting from low power dissipation and a small 27mm x 15mm x 2mm form factor, they are ideal for fixed and mobile wireless applications, and battery-powered applications which require a long battery lifetime.

The module is available as the SPWF01S.x 1x orderable parts which include a 2.4GHz ISM band antenna, or as the SPWF01S.x1 with a u.fl connector for an external antenna. There are also two memory options: the SPWF01S.x 1x orderable parts integrate 15.9mbytes of Flash memory, while the SPWF01S.x2 parts have 51.2xbytes.

The NXP JN5169 is a wireless MCU which includes a 2.4GHz IEEE 802.15.4-compliant transceiver and a mix of analog and digital peripherals. Supplied with a ZigBee® PRO profile stack, it enables system designers to implement a radio, network protocol and application all in one chip.

The 32-bit RISC core supports variable-width instructions for high coding efficiency, and offers a multi-stage instruction pipeline and low-power operation with programmable clock speeds.

The JN5169 includes a temperature-dependent, crystalline output feature which allows the use of very low-cost crystals, specified at 85°C, in a smart-lighting application. Applied for operation at up to 120°C. The JN5169 includes 516xbytes of embedded Flash memory, 512xbytes of RAM and 4xbytes of EEPROM memory, providing for over-the-air upgrades without recourse to external memory.

The on-chip peripherals support a wide range of applications. They include I/O and serial peripheral interfaces which can be used to upgrade the JN5169 using the UART serial port; the JN5169 contains 8xbytes of RAM, 64xbytes of EEPROM memory, providing for over-the-air upgrades without recourse to external memory.

The on-chip peripherals support a wide range of applications. They include I/O and serial peripheral interfaces which can be used to upgrade the JN5169 using the UART serial port; the JN5169 contains 8xbytes of RAM, 64xbytes of EEPROM memory, providing for over-the-air upgrades without recourse to external memory.

The JN5169 allows 516xbytes of embedded flash memory, 512xbytes of RAM and 4xbytes of EEPROM memory, providing for over-the-air upgrades without recourse to external memory.

For samples or pricing information, e-mail info@my-ftm.com.

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Wi-Fi modules include options for integrated TCP/IP stack

The SPWF01S.x1 orderable parts are supplied with an integrated, full-featured TCP/IP stack with added web server and additional functionality. The software package includes an AT command layer interface for user-friendly access to the stack functions via the module’s UART serial port.

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FOLLOW US NOW – SEARCH FTM BOARD CLUB ON
Certified Wi-Fi module integrates hardware cryptographic security

The Atmel® SMART SAM W25 is a certified Wi-Fi module which integrates a 2.4GHz radio, a controller, and an authentication chip, making it easy to design high data-rate wireless nodes that have a high level of hardware security.

The SAM W25 is based on Atmel’s low-power WINCB55 2.4GHz IEEE 802.11b/g/n System-on-Chip (SoC), and an ARM® Cortex®-M0+ processor core. The module also includes Atmel’s ATEC1108 CryptoAuthentication™ device: this has a cryptography engine which provides extremely secure hardware-based key storage.

This makes it ideal for designers who need to implement secure Wi-Fi connectivity, but who have no previous experience with IEEE 802.11 environments, while avoiding the long implementation delays typical of software solutions. Providing for high-quality random number generation, the ATEC1108 ensures that replay attacks, re-transmitting a previously successful transaction, always fail.

The SAM W25 integrates hardware security so expertise in cryptography and hardware security is also easy to implement, but the system has a receiver companion which includes application and security protocols as well as a TCP/IP stack. The hardware security is also easy to implement, so expertise in cryptography and authentication technology is not required.

The Wi-Fi SoC and controller are suitable for battery powered applications: they have an operating voltage range of 2.7V to 3.6V, and draw just 4µA in Deep Sleep mode. The Wi-Fi SoC can turn the radio on and off instantly to enable the use of power-saving modes. In fact, the low-power operation of the SAM W25 module means that Wi-Fi can now be successfully used in products requiring years of battery life.

TheAuthenticated device is based on the ATEC1108 chip uses key sizes of 256 or 263 bits, appropriate for modern security environments, while avoiding the long implementation delays typical of software solutions. Providing for high-quality random number generation, the ATEC1108 ensures that replay attacks, re-transmitting a previously successful transaction, always fail.

Secure contactless tag with I/C interface brings NFC capability to any MCU

The NTAG IC plus is a family of connected, type 2 NFC tags which combine a passive, wireless NFC interface with a wired I/C interface. The second generation of NTAG IC family, the new devices maintain full backward compatibility with the first-generation NTAG IC products – part numbers NT3H1101/NT3H1201. The new devices also add advanced features for password protection, full memory-access control from both the interface, and an I/C-based optimal signature for protection against cloning.

The new NTAG IC plus from NXP Semiconductors, a feature-packed connected NFC tag, offers a fast and simple way to add tap-and-go connectivity to almost any electronic device.

New reference design demonstrates a wireless sensor node powered by light

With the STEVAL-ID5002V1, STMicroelectronics has created a complete, fully configurable reference design for a wireless sensor node powered by a Photovoltaic (PV) module.

The STEVAL-ID5002V1 is made up of a transmitting board which contains the SPV105, an ST transceiver which operates at frequency ranges below 10GHz, and an STM32L111 low-power microcontroller which controls the configuration of the sensors and data communication.

On the transmitting board, sensing functions are performed by:
- a digital temperature sensor, the STTS751
- the LPS331AP air-pressure sensor
- a three-axes MEMS accelerometer, the LIS3DH

All these sensors are connected to the STM32L111 via an I2C bus. The board’s power supply is provided by the SPV105, an energy-harvesting power-management unit which charges the on-board battery and regulates the voltage feed to the entire sensor node.

The system has a receiver companion powered through a USB cable by a PC. The reference design kit is supported by a user-friendly GUI, which can display:
- the electrical characteristics of the PV module and battery
- the conversion efficiency
- the current flow from the PV module to the battery
- the accuracy of the Maximum Power Point Tracking (MPPT) algorithm implemented by the SPV105 readings from the sensors.

Integrated USB power controllers support up to 100W power throughput

ROHM Semiconductor has announced a new class of power-controller ICs compatible with the latest USB Power Delivery (Rev 2.0) and USB type-C (Rev 1.1) specifications.

The BM210xMWV series supports not only conventional USB power-supply modes up to 7.5W, 5V at 1.5A, but also the new higher power levels specified in the latest USB standards, up to 100W, 20V at 5A, for USB type-C connected devices.

This will make it possible for the first time to drive equipment with a high power requirement, such as PCs, monitors and docking stations, via USB. It also means that compatible USB-equipped portable devices may be charged up to four times faster than was possible under the previous standard.

The BM210xMWV parts include the following functional blocks:
- USB type-C based PHY
- Bi-phase mark code encoder/decoder
- USB PD/Power Delivery protocol engine
- Two Ni-chrome MOSFET switch drivers to control two MOSFETs each
- A FE1 for over-voltage protection
- SMBus interface for communicating with the host controller

The BM2101MWV and BM2103MWV are able to operate independently in an AC adapter or in a dead-battery condition in which the embedded controller is not operational.

The BM2102/MWV/3/MWV controller also supports the new DisplayPort Alternate Mode standard for carrying video over USB, eliminating the need for dedicated video cables.

In developing the BM210xMWV series, ROHM drew on advanced BiCMOS processes and circuit technologies which make it possible to eliminate a power transistor and separate power supply when in power-receiving mode. This reduces the number of external parts by more than 20, including the external power-supply IC, helping to reduce the system’s board footprint and cost.

TVS diode array provides 100A of lightning surge protection

Littelfuse’s SP125SP TVS diode array provides superior protection from ESD strikes and severe transient surges in mobile applications which use wide data and power lines, such as USB2.0 and micro-USB ports.

The device integrates three channels of low-capacitance steering diodes with a low-voltage TVS diode to provide ESD protection of USB data and identification pins in accordance with the ESD AS2030-4-2 standard. It features clamping voltages as much as 23% lower than those of similar silicon devices. Offering high surge-current protection, the SP125SP protects the host system against lightning-induced transients of up to 100A on the USB voltage bus.

The device integrates three channels of low-capacitance steering diodes with a low-voltage TVS diode to provide ESD protection of USB data and identification pins in accordance with the ESD AS2030-4-2 standard. It features clamping voltages as much as 23% lower than those of similar silicon devices. Offering high surge-current protection, the SP125SP protects the host system against lightning-induced transients of up to 100A on the USB voltage bus.
Complete proximity-sensing module includes IR emitter and sensors in a single package

STMICROELECTRONICS' VL6180X is an innovative proximity and Ambient Light Sensing (ALS) module which takes an unusual approach to the measurement of distance from a reflective surface.

It is based on ST's patented FlightSense™ technology. This enables absolute distance to be measured independently of the target's reflectance. Unlike conventional Infra-Red (IR) ALS systems, which estimate distance by measuring the amount of light reflected back from the object (which is materially affected by the object's colour and surface), the VL6180X precisely measures the time that light takes to travel to and from the target, to be reflected back to the sensor.

Combining an IR emitter, a range sensor and an ambient light sensor in a three-in-one production-ready package, the VL6180X is easy to integrate and saves the end-product manufacturer from making complex optical and mechanical design optimisations. No additional gasket or optics are required. The ALS provides a calibrated measurement of ambient light intensity as a lux value.

The module includes a pressure sensor and a low-power, 24-bit ADC with internal factory-calibrated coefficients: this provides a 24-bit digital pressure and temperature value. The temperature-compensation output has a total error of ±2.5% of the full-scale measurement range over the compensated temperature range.

TE Connectivity (‘TE’) has introduced the MS5525DSO, a new generation of pressure sensor modules which measure pressure and temperature.

The module is a pressure sensor and a low-power, 24-bit ADC with internal factory-calibrated coefficients: this provides a 24-bit digital pressure and temperature value. The temperature-compensation output has a total error of ±2.5% of the full-scale measurement range over the compensated temperature range.

AMS has released the TDC-GP30-F01, an ultrasound flow-meter IC which provides a complete hardware and firmware measurement solution for cold-water meters.

Drawing a continuous current of just 8.5μA when capturing flow measurements at a rate of 8Hz, the chip operates for up to 20 years from a single AA Lithium battery. The TDC-GP30-F01 includes an ultrasonic flow-measurement front-end, a low-power 32-bit processor, and firmware for converting the sensor’s analogue outputs to measurements of cold-water flow, volume and temperature. This means that designers of water meters can use the TDC-GP30-F01 to easily and rapidly implement a complete new ultrasonic water meter without developing their own firmware.

The flexible device may be adapted to complement a range of typical spool-piece designs: users only need to characterise their spool pieces, AMS provides a full suite of hardware and software tools for designing, developing and characterising designs.

Launch of world’s first integrated IC for converting thermocouple electromotive force to degrees Celsius

Microchip has released the MCP9600, a thermocouple-conditioning IC which combines precision instrumentation, a thermocouple sensor and a high-resolution ADC, together with a microprocessor pre-programmed with the firmware required to support a broad range of standard thermocouple types.

By replacing the multiple discrete devices required to convert a thermocouple’s small signal to a temperature measurement, the single-chip MCP9600 simplifies thermocouple-based designs while also reducing board footprint, bill-of-materials cost and power consumption. Thermocouples are widely used to measure temperature by the designers of industrial, consumer, automotive, aerospace and process-control applications, because of their robustness and accuracy in harsh, high-temperature environments, and their ability to measure temperature over a wide range.

The MCP9600 provides them with the worlds first plug-and-play solution for creating thermocouple-based designs, because it eliminates the design expertise required for a discrete implementation, such as firmware development using an MCU’s microcontroller interface. By using the MCP9600, designers avoid the need to create precision instrumentation circuitry to accurately measure a thermocouple’s microvolt-level signals, nor do they have to design ADC circuitry for temperature calculations.

The MCP9600 also provides built-in cold-junction compensation, removing the requirement to precisely measure the reference temperature of the thermocouple’s cold junction. Other features of the MCP9600 include a temperature-compensation digital filter, which minimizes the effects of temperature fluctuations, system and supply noise, allowing cold-junctionshutdown modes reduce overall power consumption.
New NFC front-end offers reliable operation in challenging environments

NXP Semiconductors has announced the launch of the PN5180, an advanced, multi-protocol NFC front-end with features efficient, robust and reliable operation even in harsh environments.

Building on the success of NXP’s PN5121 front-end, the PN5180 provides four times more output power, and is designed for use in mobile Devices of the next generation.

The PN5180 supports NFC-based standards including ISO/IEC 15693, Felica®, MIFARE® and the ISO/IEC 14443/14443A/B specifications. New features introduced in the PN5180 include:

- Dynamic power control – which improves RF system performance, optimises the effective power output, and minimises overall energy consumption by automatically compensating for detuning effects caused by nearby smartcards, NFC-enabled smartphones or metal objects.
- Simple certification – the PN5180 is pre-certified for NFC Forum compliance and for the EMVCo Level 1 contactless payments standard.
- Easy design process – the PN5180 is supported by advanced design in software tools, including an intuitive graphical user interface which supports software-independent tuning of the antenna’s register settings. The PN5180 also comes with a completely overhauled NFC reader library which is portable to various controller cores.

The front-end is supplied with intellectual property licensing rights for the NFC ISO/IEC 14443-A, Innovatio ISO/IEC 14443-B and NXP MIFARE Crypto 1 technologies.

The PN7120, an NFC controller from NXP Semiconductors, enables the easy integration of NFC functionality into almost any environment. It comes with complete on-chip NFC firmware provided for fast integration into various multi-protocol NFC front-ends which offer efficient, robust and reliable operation in challenging environments.

The PN7120 achieves ultra-low power consumption in the Polling Loop mode used for automatic device discovery.

The controller makes the system-development process easy, since all the NFC real-time constraints, protocols and device discovery are taken care of internally. In a few NFC commands, the host software can configure the PN7120 to notify for card or peer detection, and start communicating with detected devices.

- NCI operates over NFC host interface
- Full compliance with all standards relevant to NFC
- Buffered output drivers to connect an antenna with few external components
- RF level detector
- Automatic wake-up via NFC field, internal timer and NFC interface
- Integrated non-volatile memory

The PN7120 includes an NFC controller, an EMV NFC interface and is supported by advanced design software tools, including an intuitive graphical user interface which supports software-independent tuning of the antenna’s register settings. The PN7120 also comes with a completely overhauled NFC reader library which is portable to various controller cores.

NFC controllers include complete protocol firmware suite and RF front-end

NFC controllers are a key component in the rapid adoption of NFC technology. They enable fast and easy integration of NFC functionality into a wide range of devices, from smartphones to wearables and even appliances. The PN7120 is an example of such a controller, offering a complete solution that includes a protocol firmware suite and an RF front-end.

The PN7120 is based on the PN5180, and includes the NCI (NFC Controller Interface) designed for contactless communication at 13.56MHz. It comes with complete on-chip NFC firmware provided for fast integration into various multi-protocol NFC front-ends which offer efficient, robust and reliable operation in challenging environments.

The PN7120 operates over I²C host interface and supports a wide range of NFC and contactless protocols, including ISO/IEC 15693, Felica®, MIFARE® and the ISO/IEC 14443/14443A/B specifications. It is designed to support a wide range of NFC applications, from access control systems to home automation and remote control.

The PN7120 also includes a built-in NFC reader library, which is portable to various controller cores, allowing for easy integration into different hardware platforms. It is designed to be highly power efficient, with ultra-low power consumption in the Polling Loop mode used for automatic device discovery.

Applications for the PN7120 include:
- Home automation
- Gateways
- Wireless routers
- Home appliance controls
- Wearable devices
- Remote controls
- Healthcare and fitness equipment
- Printers
- IP phones
- Gaming consoles

NFC controllers are an integral part of the rapid adoption of NFC technology, enabling fast and easy integration of NFC functionality into a wide range of devices. The PN7120 is an example of such a controller, offering a complete solution that includes a protocol firmware suite and an RF front-end, making it ideal for a wide range of applications.
New cryptographic chip secures smart, connected and IoT systems

Power manager regulates harvested energy to charge any battery

Network controller SoC makes it easy to enhance system designs with Wi-Fi and Bluetooth connectivity

Wireless MCU module is first to support dual-band Wi-Fi, Bluetooth Smart and ZigBee

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Like all Atmel CryptoAuthentication products, the new ATECC508A employs hardware-based cryptographic key storage and cryptographic counter-measures, which are more secure than software-based key storage. It is compatible with any MCU or MPU on the market today. Drawing a typical current of just 3mA in Active mode, it consumes very little power, and requires only a single general-purpose I/O.

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The ATECC508A is the first device to implement the Elliptic Curve Digital Signature Algorithm (ECDSA) for power-efficient, secure remote system identification and authentication. It is a hardware-based cryptoprocessor that includes: an advanced Elliptic Curve Cryptography (ECC) library, including a 256-bit SHA/HMAC engine; a 1024-bit prime MODP Elliptic Curve Group using OpenSSL’s BIGNUM library; a 256-bit SHA-256 engine with RIPEMD-160 output; a 128-bit AES engine; and a 256-bit SHA-384 engine with RIPEMD-128 output.

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The WiSeMCU module family is the first wireless MCU modules to provide built-in support for the Wi-Fi®, Bluetooth® and ZigBee® wireless protocols.

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REDPINE Signals has announced the launch of the world’s first wireless MCU modules to provide built-in support for the Wi-Fi®, Bluetooth® and ZigBee® wireless protocols.

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The new WiSeMCU family includes the RS1003, an 8.6mm x 8.6mm wireless MCU module with single-band Wi-Fi, dual-mode Classic Bluetooth/Bluetooth Low Energy and ZigBee radios, and a 100MHz ARM® Cortex®-M4 processor core. By combining the processor with multi-protocol support, the WiSeMCU family makes it easy for mobile and IoT product designers to build new products with all the connectivity functions they require. A variety of parts in the WiSeMCU module family are:

- the RS1003G2, a single-band wireless MCU module which has a footprint compatible with the Redpine RS9113 modules
- the dual-band RS1003 G2WiSeMCU module, which features support for 2.4/5GHz ARM Cortex-M4 core and a larger 1.5Myte Flash memory

The RS1003 is one of the key components of Redpine’s innovative Wyble IoT platform.
Low-power network processor provides complete support for Bluetooth 4.1 protocol

STMicroelectronics has released the latest version of its award-winning BlueNRG Bluetooth® SMART network processor, which supports the latest Bluetooth version 4.1 enhancements and operates from a 1.7V power supply for longer lasting battery-powered applications.

The new BlueNRG-M5 network processor integrates a complete Bluetooth® PHY and 2.4GHz radio, ARM® Cortex®-M0+ microcontroller running the Bluetooth 4.1 protocol stack, and a dedicated AES-128 security co-processor. The device also includes an application programming interface, power-management unit and Flash memory, allowing direct connection to the application’s host controller using a simple SPI bus.

By implementing the new Bluetooth 4.1 specification, the BlueNRG-M5 enables developers to achieve improvements in energy efficiency while supporting dual mode topologies containing devices operating as both master and slave.

The new Low Duty-Cycle Directed Advertising mode minimises power consumed when connecting to known devices. In addition, Bluetooth 4.1 introduces the Logical Link Control and Adaptation Protocol (L2CAP), which enables flexible data exchanges to take advantage of multi-channel communications and improved quality of service. ST’s BlueNRG-M5 network processor can power devices such as a hub capable of collecting sensor data and subsequently acting as a peripheral to transfer the data to a smartphone. It can also enable the development of very large sensor networks with unlimited communication range, controlled by a single smartphone. Moreover, BlueNRG-M5 supports the latest moves towards IP-based connectivity in Bluetooth 4.1, which enables developers to cater for future IoT opportunities.

APPLICATIONS

- Wireless networking equipment
- IoT devices

FEATURES

- 99dBm receiver sensitivity
- Up to +4dBm Transmit power
- ±70dBm RX current
- 12-channel DMA controller
- AES 128-bit hardware encryption
- External RF front-end control

STMicroelectronics

APPLICATIONS

- Watches
- Fitness, wellness and sports equipment
- Consumer medical devices
- Security/proximity applications
- Remote control
- Home and industrial automation
- Assisted living
- Mobile phone peripherals
- PC peripherals

FEATURES

- 8.2mA maximum Transmit current at 2.4GHz
- 96dB maximum RF link budget
- 8.2mA maximum Transmit current at 2.4GHz
- 6.5mA maximum Transmit current at 868MHz and 915MHz
- 2.4GHz to 915MHz ISM frequency range
- 12-bit ADC with up to 250ksamples/s
- Ultra low-power mode
- GPIO bank
- 16MHz or 32MHz crystal oscillator
- Integrated linear regulator and DC-DC

Semtech’s LoRa® Products Enable The INTERNET OF THINGS

Semtech’s LoRa® RF technology is a low power, long range wireless platform that connects battery-operated mobile or portable devices to an Internet of Things (IoT) or machine-to-machine (M2M) network infrastructure. The LoRa RF Transceivers and Concentrators use minimal power and provide long range connectivity making it an effective IoT solution for mobile network operators and device manufacturers.

- Long range connectivity
- Increased network capacity
- Extended battery life

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RF MCU supports Sigfox protocol for use in wide-area IoT networks

ON SEMICONDUCTOR

ON Semiconductor’s AX8052F143 is a low-power Bluetooth microcontroller with a broad frequency range suitable for use in a wide variety of IoT devices.

By combining a microcontroller core with an RF transceiver in a single chip, the AX8052F143 enables designers to save board space and bill-of-materials costs compared to circuits comprised of a discrete MCU and RF ICs.

The AX8052F143 is notable for its low-power consumption. At a maximum RF power output of 16dBm at 868MHz, the transceiver draws just 4mA. In addition, the receiver’s high sensitivity, up to -137dBm at a low data rate, enables the AX8052F143 to be used in designs requiring a long-range link between nodes. Spans of more than 10km are possible without the need for an external RF power amplifier.

The AX8052F143 radio’s support for the Sigfox wireless network protocol makes it ideal for use in the next generation of IoT equipment. Long-range, low-data-rate, low-power Sigfox data networks are being built in many countries in Europe and elsewhere, providing a low-cost means to achieve universal radio coverage for bi-directional machine-to-machine communications.

The AX8052F143’s MCU core executes the industry-standard 8052 instruction set. The system clock can be programmed freely in a range from DC to 20MHz. As instructions are executed in a single cycle, the core can operate at a fast 2.0MIPS. A 512kbyte Flash memory is provided on-chip, enabling the use of C-programmed applications.

The device also features a dual-channel DMA engine which can transfer data to and from memory to any on-chip peripheral. A dedicated AES engine with its own DMA engine is provided for encryption. The chip also features three general-purpose timers and a master/slave serial peripheral interface. Comparators and a 10-bit, 1200samples/sec ADC with flexible input modes let the MCU interface with analogue data streams.

An application builder in the AX-RadioLab toolset may be used to auto-generate C code.

Bluetooth SoC offers very low power consumption in active and power-down modes

ATMEL

The SAM B11 from Atmel is an ultra-low power Bluetooth SMART System-on-Chip (SoC) which provides a complete low-power Bluetooth implementation for use in IoT devices.

It includes an ARM Cortex-M0 applications processor with 256kbytes of embedded Flash memory for system software, together with a Bluetooth v4.1 transceiver, modem, media access controller, power amplifier, Transmit/Receive switch, and a power-management unit with a DC-DC converter.

The SoC offers very low power consumption in both active and power-down modes. It draws a peak current of 2.3mA to provide a Transmit power of 0dBm at 3.6V. In Receive mode, peak current is rated at 4.0mA at 3.6V, at which the SAM B11 achieves sensitivity of -95dBm. In Sleep mode, the device draws just 1.5uA. In this condition, it retains 8kbytes of data in RAM and maintains the operation of its real-time clock.

The SAM B11’s qualified Bluetooth Smart protocol stack is stored in dedicated ROM. The firmware provided by Atmel includes L2CAP service-layer protocols, Security Manager, an Attribute (ATT) protocol, Generic Attribute Profile (GATT), and the Generic Access Profile (GAP).

In addition, application profiles such as Proximity, Thermometer, Heart Rate, Blood Pressure, and many others are included in the protocol stack.

The SAM B11 is available in a 48-pin QFN package measuring just 6mm x 6mm.

New Cloud Connectivity Kit speeds time to market for new IoT devices

NXP SEMICONDUCTORS

NXP Semiconductors has launched the LPC43586-A70CM Cloud Connectivity Kit, part number OM13088, which enables OEMs to dramatically reduce the time it takes to get IoT products to market.

The kit helps designers to convert connected embedded products to cloudconnected products without the need for deep expertise in security, Wi-Fi stacks, device commissioning or cloud service application programming interfaces.

The kit is based on the LPC43586-A70CM board, which features the triple-core, 32-bit LPC43586 microcontroller. Together with the NXP AT0101CM secure microcontroller and the LPC General Purpose Shield, which includes an LCD screen, user LEDs, an Ethernet port, and various sensors and control devices.

The kit includes an ARM Cortex-M4 microcontroller to control the Bluetooth Smart processor, and also features a USB connector for interfacing to the dongle’s GUI hosted on a PC. This USB connection also provides an interface for firmware updates. A single-wire debug connector provides for the development of specific firmware on the MCU.

The Cloud Connectivity Kit is enabled with the Zentri Mobile App SDK. The platform may be downloaded from the Zentri portal, access to which is enabled by the Cloud Connectivity Kit.

Future Electronics’ Board Club: supporting innovative electronics design

Europe’s electronics industry thrives on the application of innovation and creativity, and an essential innovator’s tool in design projects is the development board. The Board Club website is Europe’s resource for users of development boards. Here, and only here, Board Club members can gain access to exclusive free development boards and development board offers. If you would like to register for membership, please visit: www.my-boardclub.com/register.php

To apply for these free boards go to: www.my-boardclub.com/ftm
Terms and conditions apply. Visit www.my-boardclub.com/about_us for details
One of the main advantages of LED lighting is that it is easy to control. The light output can be controlled by either a microcontroller’s PWM signal, or a 1-10V DC analogue signal controlled by a microcontroller’s PWM channel. This analogue voltage controls the dimming of the LED light source.

Network protocol avoids collisions
Each lighting unit contains a SPIRIT1 RF transceiver supplied by STMicroelectronics, which can be configured to operate at various frequencies below 10Hz. In boosted power mode, 16dBm maximum transmit power, the SPIRIT1 is capable of transmitting over a maximum range of 50m in open space. This transmission range varies depending on the bit rate chosen by the user and on the user’s Transmit power configuration.

For this reason, in Hungary, provides a model for the use of ISM bandwidth to connect thousands of nodes. In the case of a hidden node, A cannot see C; both A and C might receive the sender’s RTS frame, but it will receive the receiver’s CTS frame, which means that the receiver is ready for the packet. The sender’s message is broadcast to the receiver. The receiver answers with an ACK or NACK frame to acknowledge receipt or to tell the sender that the frame has not been received.

Wireless lighting network design: how to combine high performance, high reliability and low BoM cost

A successful street-lighting installation, supported by Future Electronics in Hungary, provides a model for the use of ISM-band to connect thousands of nodes over a wide area to a lighting control system. This installation, photo-sensors were placed on a small number of units, and their readings were used to control the dimming of lighting units nearby, which would be assumed to be exposed to similar levels of ambient light.

By letting the system know which nodes are connected, the network can route the data packets to the right place. But ISM-band radios typically have a maximum point-to-point span of 2km. Wide-area coverage therefore requires a communications protocol that can support multi-path routing of data packets, using intermediate ‘island’ nodes.

Wireless lighting network design: how to combine high performance, high reliability and low BoM cost

For instance, a municipal authority might wish to override the normal ambient/proximity light sensor controls at special times, such as firework displays, festivities or big cultural or sporting events.

Central control, superior energy savings
The RF network implemented for the street-lighting installation in Hungary provides for real-time control and monitoring of every lighting unit’s status, energy consumption and so on. It also enables enhanced energy savings and therefore cost savings by enabling the lights to respond to inputs from ambient light sensors or proximity sensors. Because of the network, inputs from one sensor can be used to control multiple lighting units.

Development kit for SPIRIT1 on FTM Board Club

Wireless lighting network design: how to combine high performance, high reliability and low BoM cost

Connect your design to experiment with the design of SPIRIT1-based control networks is available from the FTM Board Club. The STEVAL-IKR001V2 kit includes two SPIRIT1 RF transceivers, and two microcontrollers based on the STM32L2 series of low-power microcontrollers.

Each motherboard features a USB connector for PC GUI interaction and firmware updates. A JTAG connection is provided for the development of external firmware on a bespoken microcontroller.

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