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50th anniversary year
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Insight SiP claims to have the world's first drop-in single mode Bluetooth low-energy module, writes **Steve Bush**

Bluetooth low-energy module

French system-in-package (SiP) specialist Insight SiP has released what it claims is the world's first drop-in single mode Bluetooth low-energy module.

The 8x12x1.4mm ISP091201 is aimed at space-constrained applications, such as monitors for heart-rate, blood pressure or glucose, as well as watches, pedometers, remote controls and key fob-style proximity detectors.

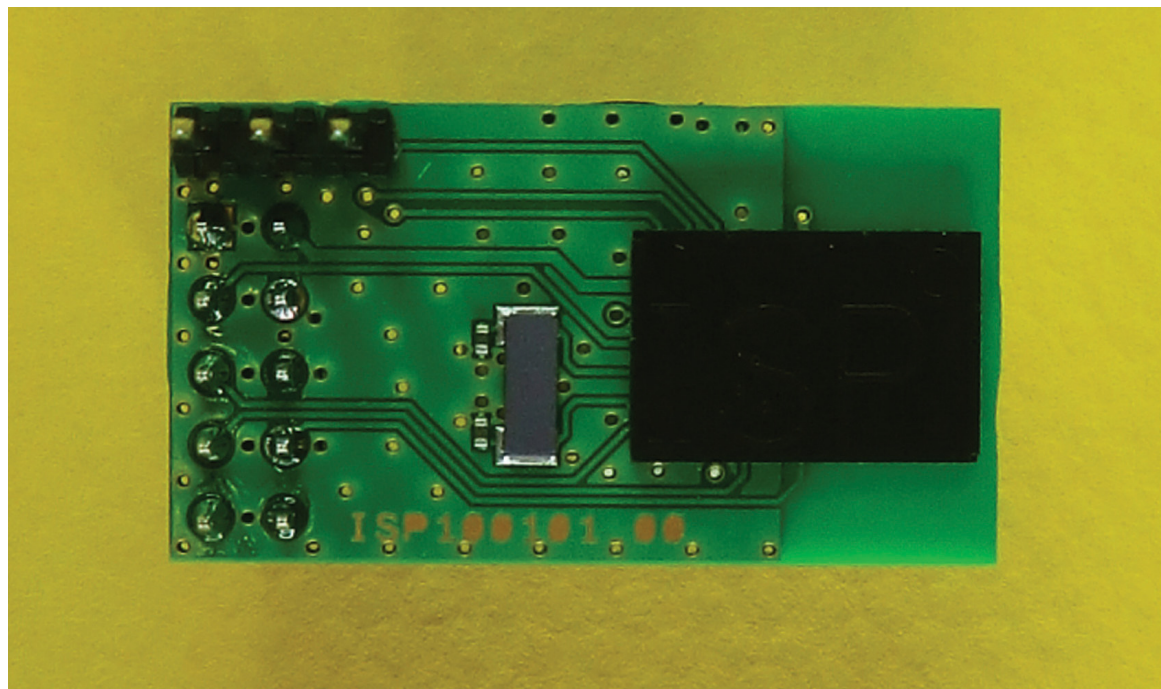
Inside, the circuit is based on a reference design from Nordic Semiconductor.

It includes Nordic's nRF8001 chip, which integrates radio, baseband and software stack (PHY, link layer and host); an integrated antenna; a 16MHz crystal; and 15 passives.

"The ISP091201 is designed to be fully compliant with FCC and CE EMC requirements and requires no other external supporting components beyond an external 8-bit microcontroller to run the profile and application layers of the stack, and a 3V power source," said Nordic.

The Bluetooth Special Interest Group adopted Bluetooth low-energy as part of the Bluetooth Version 4.0 Core Specification.

The low-energy part of v4.0 speci-



fies two types of implementation: single mode and dual mode. Single mode can only talk to other single mode and dual mode devices, and not classic Bluetooth devices.

"Single mode chips consume only a fraction of the power of classic

Bluetooth, allowing the short-range wireless standard to extend to coin cell battery applications for the first time," said Nordic.

Single mode devices have a lightweight link layer to cut power when idling, simple device discovery, and

point-to-multipoint data transfer with encrypted connections.

"Because the technology is optimised for devices requiring maximum battery life instead of a high data transfer rate, it consumes between 1 and 50% of the power of classic Bluetooth technology," said Nordic. "Single mode devices will be expected to run for many months or even years on, for example, CR2032 lithium cells."

Chips will typically operate with low duty cycles, entering idle and sleep modes to wake up periodically for a communication burst.

Nordic has also developed a master single mode emulator, which allowed Insight SiP to test the communication link of its module.

"Product developers do not need extensive RF experience to design-in our module into their first Bluetooth low-energy product," said Diana Moncoquit, marketing and sales director at Insight SiP. ●

Bluetooth low-energy technology

In December, the Bluetooth Special Interest Group (SIG) confirmed the adoption of Bluetooth low-energy wireless technology in the Bluetooth Core Specification version 4.0.

It shares much of classic Bluetooth technology's existing radio and functionality. So it is possible to use current Bluetooth technology (Bluetooth V2.1 + EDR or Bluetooth V3.0 + HS) chips with the low-energy stack.

Data Transfers

Bluetooth low-energy technology supports very short data packets (8 octet minimum up to 27 octets maximum), which are transferred at 1Mbit/s. All connections use advanced sniff-subruting to achieve ultra low duty cycles.

Host control

Bluetooth low-energy technology places a significant amount of intelligence in the controller, which allows the host to sleep for longer periods and be woken up by the controller only when the host needs to perform an action. This allows for the greatest current savings, since the host is assumed to consume more power than the controller.

Frequency hopping

Bluetooth low-energy technology uses the adaptive frequency hopping common to all versions of Bluetooth technology to minimise interference from other technologies in the 2.4GHz ISM band. Efficient multi-path benefits increase the link budgets and range.

Latency

Bluetooth low-energy technology can support connection set-up and data transfer as low as 3ms, allowing an application to form a connection and then transfer authenticated data in few milliseconds for a short communication burst before quickly tearing down the connection.

Range

Increased modulation index provides a possible range for Bluetooth low-energy technology of more than 100 metres.

Security

Full AES-128 encryption using CCM provides strong encryption and authentication of data packets.

Nordic Semiconductor
www.nordicsemi.com

Insight SiP
www.insightsip.com