ARM CORTEX-M CORE

Bluetooth connectivity for CAN MCU series

Renesas Electronics introduced its first RA micro-controller unit (MCU) with an integrated Bluetooth 5.0. The single-chip RA4W1 MCU includes a 48 MHz, 32-bit ARM Cortex-M4 core, and Bluetooth 5.0 core delivered in a 56-pin QFN package.

MCU with Bluetooth housed in 7 mm x 7 mm 56-pin (Source: Renesas)

The MCU enables embedded designers to develop IoT (Internet of Things) endpoint devices for Industry 4.0, building automation, metering, healthcare, consumer wearable, and home appliance applications. The MCU, which provides one CAN interface (29-bit identifier extended frame format), is also suitable for developing IoT edge devices for wireless sensor networks, IoT hubs, an add-on to gateways, and an aggregator to IoT cloud applications.

The MCU and so called Flexible Software Package (FSP) enable engineers to begin development with ARM ecosystem software and hardware building blocks that work out-of-the-box with RA MCUs, explained the company. The FSP open architecture allows customers to re-use their legacy code and combine it with software examples from the company and ecosystem partners. It features FreeRTOS and middleware offering a premium device-to-cloud option for developers. These out-of-box options can be replaced and expanded with any other RTOS or middleware.

The single-chip 48-MHz MCU features field upgradeable 512 KiB flash memory, 96 KiB Sram, and connectivity such as CAN, USB, and the company's HMI-capacitive (human machine interface) touch technology. It also includes Renesas' Secure Crypto Engine supporting customers with symmetric encryption and decryption, hash functions, true random number generation (TRNG), and advanced key handling with key generation and MCU-unique key wrapping.

The product includes full Bluetooth 5.0 functions such as 2 Mbit/s data throughput, all advertising extension functions with maximum advertising length (1650 byte), periodic advertisements, and channel selection algorithm #2 for applications requiring large amounts of traffic. The RA4W1 also offers peak power consumption at 3,3 mA during receiving and 4,5 mA while transmitting. An industry sensitivity of -105 dBm in 125 kbit/s mode is achieved without additional loss from external components, said the company.

In addition to the Bluetooth 5.0 basic protocol stack package, Renesas provides several API functions that conform to all standard profiles, including a Heart Rate Profile (HRP), an Environment Sensing Profile (ESP), and an Automation I/O profile (AIOP).

The company's Smart Configurator GUI generates Bluetooth code and MCU peripheral function driver code as well as pin settings for the e2 Studio integrated development environment (IDE). The QE tool for BLE generates programs for custom profiles and embeds them in user application programs to support application program development. And the Bluetooth Trial Tool Suite GUI allows users to perform initial wireless characteristics evaluations and Bluetooth functional verification. Users can typically have the RA4W1 evaluation board up and running with the downloadable smartphone applications demo in 30 minutes. The unit includes an on-chip oscillator, and also integrates an RF oscillator adjustment circuit and on-chip matching circuit for antenna connection.

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