RS10002 WiSeMCU™ Module

REDPINE SIGNALS®
Driving Wireless Convergence

PRODUCT BRIEF

RS10002 WiSeMCU™ RS10002: Multi-protocol Wireless and Secure Microcontroller for the Internet of Things

Redpine Signals' RS10002 WiSeMCU™ device is the industry's first Wireless MCU with a multi-protocol wireless (Wi-Fi+Bluetooth+Zigbee) sub-system. It is a fully integrated module with an ultra-low-power ARM Cortex M4F microcontroller as an application processor, a built-in wireless subsystem, advanced security, power-management, frequency reference, RF power-amplifiers, diversity RF Front-end and passives. The WiSeMCU™ comes with an SDK to enable plug-and-play hardware and software development for the wireless Internet of things.

The ultra-low-power microcontroller subsystem in RS10002 integrates an ARM Cortex M4F processor with 104 KB of on-chip SRAM and 512KB of on-chip flash available for application development. A slew of peripherals including, multiple USARTs, SPIs, I²Cs and I²S-bus interfaces, comprehensive timers and 12-bit ADC satisfy the interfacing needs of most IoT devices.

The comprehensive wireless networking subsystem in RS10002 integrates 1x1 802.11n, advanced TCP/IP networking stack, Bluetooth4.0 solution with integrated application profiles and ZigBee for Home Automation and Smart Energy applications.

Application Subsystem Features:

- ARM Cortex-M4F processor, running at a frequency of up to 100 MHz
- IntegratedFloating Point Unit (FPU), Memory Protection Unit (MPU), Built-in Nested Vectored Interrupt Controller (NVIC), Non-maskable Interrupt (NMI) input
- Debug options: Serial Wire Debug and JTAG boundary scan mode (BSDL)
- 512 kB on-chip flash program memory with flash accelerator and 256 byte page erase & write
- 104 kB SRAM for code and data use
- ROM with code for flash ISP/IAP, USART and I²C communication, and power control
- Boot loader with boot options from flash or external source via USART
- Flash In-Application Programming (IAP) and In-System Programming (ISP)
- Support for multiple Clock generation options: 12 MHz internal RC oscillator, watchdog oscillator, 32 kHz low-power RTC oscillator, External clock input option
- Peripheral Interfaces: Three USARTs support, One SPI controllers, four slave selects, Two I²C bus interfaces, one I²S bus interface and General-Purpose Input/Output (GPIO) pins.
- Comprehensive Timers: Five 32-bit general-purpose timer/counters, One 16/32-bit, multi-purose State-Configurable Timer (SCTimer/PWM), 32-bit Real-time clock (RTC), One 24-bit, four-channel Multi-Rate Timer (MRT), Windowed Watchdog Timer (WWDT). Ultra-low power Micro-tick Timer. Repetitive Interrupt Timer (RIT)
- Analog peripherals: 12-bit, 8-channel, Analog-to-Digital Converter (ADC) supporting 4.8 Msamples/s.
- Security: Unique ID for each device, Hardware Security Accelerators
- Four reduced power modes: Sleep, Deep-sleep, Power-down, and Deep power-down
- Power-On Reset (POR)
- Brown Out Detect (BOD) with separate thresholds for interrupt and forced reset

Wireless Subsystem Features:

- WLAN: Compliant to IEEE 802.11 b/g/n with dual band support.
- Bluetooth: Compliant to dual-mode Bluetooth V4.0
- ZigBee: Compliant to IEEE 802.15.4
- Supports both 20MHz and 40MHz bandwidth in WLAN.
- WLAN transmit power up to +18dBm and receiver with sensitivity of -97dBm.
- Support for Bluetooth Transmit power class-1 with integrated PA and high performance
- Bluetooth receiver with -94dBm Rx sensitivity.
- Support for multiple ZigBee output powers up to +15dBm with integrated PA and high performance ZigBee receiver with -102dBm Rx sensitivity.
- Dual external antenna (diversity supported).
- Embedded WLAN stack, ZigBee stack, BT stack and full-featuredTCP/IP network stack.
- Support for Embedded Wi-Fi Direct, Enterprise Security, Client mode and Access Point mode.
- Supports advanced security features: WPA/WPA2-Personal and Enterprise (EAP-TLS, EAP-FAST, EAP-TTLS, PEAP-MSCHAP-V2)
- BT profile support
- Zigbee Pro stack embedded.
- Advanced low power modes with deep power down <100nA, Wi-Fi standby associated mode <0.3mA

Power supply

- 2.2 V to 3.6 V for application and ultra-low-power processor subsystem.
- 3.0-3.6V for Wireless Subsystem...

Package and Operating Temperature

- Module size: 14mm x 15mm
- Industrial Grade -40ºC to +85ºC

Module Specifications

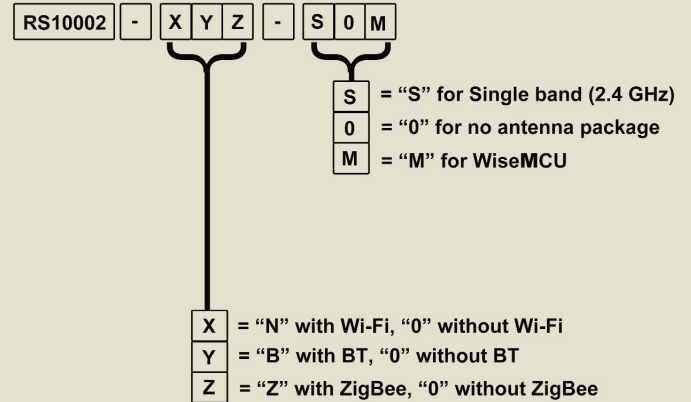|	
Network Standard Support	IEEE 802.11 b/g/j, 802.11n, 802.11d/e/i/w, 802.1X, 802.11k/r/v, Bluetooth v2.1 EDR, v3.0 + HS, v4.0 802.15.4-2006 (2.4GHz)
Data Rates	802.11n: from 6.5 Mbps to 150 Mbps (MCS 0-7) 802.11b: from 1 Mbps to 11 Mbps Bluetooth: 1, 2, 3Mbps 802.15.4-2006: 250Kbps
Modulation Techniques	OFDM with BPSK, QPSK, 16-QAM, 64-QAM and 256-QAM 802.11b with CCK and DSSS Bluetooth: GFSK, DQPSK, 8DPSK 802.15.4-2006: DSSS
802.11n Advanced Features	1-SS, 40MHz bandwidth, Greenfield Preamble, Short-GI, 1 spatial stream STBC, RIFS, A-MSDU, A-MPDU, Aggregation with Block-ack, A-MSDU inside A-MPDU, PSMP, MTBA, Fragmentation and Virtual AP support
Bluetooth Advanced Features	Scatternet, Adaptive Frequency Hopping, Interlaced scanning, 15 active slaves in proprietary mode, hold, sniff and park modes
ZigBee Advanced Features	CCM* security, orphan scanning, coordinator realignment, mesh routing
Wi-Fi modes	Embedded Wi-Fi client, Access point, Wi-Fi Direct
Bluetooth Modes	Master, slave, scatternet
Zigbee Modes	Zigbee Coordinator, Router, End device
Network Protocols	TCP, UDP, DHCP, ARP, IGMP, DNS client. Integrated web server, ZigBee and BT Stack.
QoS	WMM and WMM Power Save Support
MCU Peripherals/Interfaces	I2C, I2S, SPI, USART, GPIO, JTAG, Analog(ADC) and Ultra-low-power peripherals, Timers, SCT-Timer/PWM,RTC, MRT, WWDT, POR, BOD, RC OSC,WD OSC,32kHz RTC, PLL
Supply Voltage	3.0-3.6V, 2.2-3.6V
Operating Temperature	Industrial Grade -40ºC to +85ºC
Tx Power(+/-2 dBm)	Wi-Fi: 18 dBm for 802.11b CCK 18 dBm for 802.11g/n OFDM Bluetooth: 15dBm ZigBee: 15dBm
Rx Power (+/-1 dBm)	Wi-Fi: 1 Mbps -97 dBm 54 Mbps -75 dBm MCS7: -72 dBm Bluetooth: -94 dBm ZigBee: 250 Kbps -102 dBm
Software and Regulatory WMM,Certification Support	WiFi Alliance (802.11bgn, WPA, WPA2 Personal and Enterprise, WMM-PS, WPS, Wi-Fi Direct™, Voice-Personal, Protected management frames), Cisco CCX v5[†], Zigbee Certification Bluetooth Qualification, FIPS 140-2, World-Wide Regulatory Compliance (FCC, IC, CE, ETSI, TELEC)

14mm x 15mm Module

Applications

- Home Automation - Displays/Thermostats
- Home Appliances – Smart Meters
- Security Systems – IP Network Sensor Nodes
- Wi-Fi- BT Gateway, WiFi-ZB Gateway
- Portable fitness & health monitoring
- Fleet management and asset tracking
- Wireless Headsets and speakers
- Other M2M applications
- Medical Devices
- Gaming Consoles
- Intelligent Sensing
- Wearables
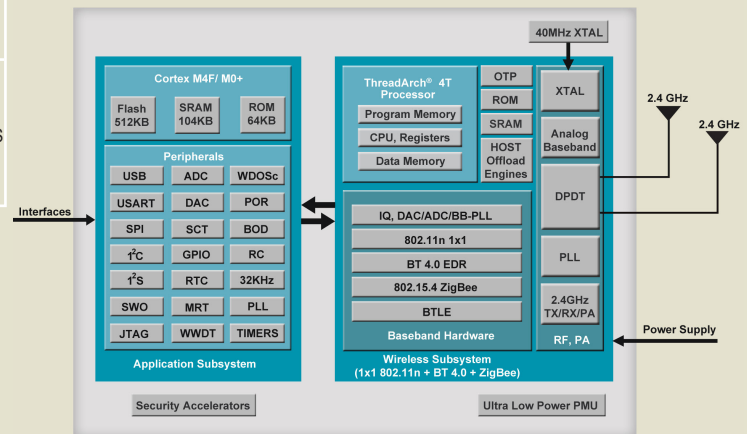- Industrial monitoring and control

Evaluation Package

The evaluation package comprises WiSeMCU module based board, accompanied by SDK and source code for peripheral interfaces, API library and hardware and software documentation. For details on availability please contact sales

Device Ordering Information

The device numbering is based on the following naming convention. All the devices are labeled as RS10002-XYZ-S0M Where

RS10002 - X Y Z - S 0 M

S = "S" for Single band (2.4 GHz)
0 = "0" for no antenna package
M = "M" for WiseMCU

X = "N" with Wi-Fi, "0" without Wi-Fi
Y = "B" with BT, "0" without BT
Z = "Z" with ZigBee, "0" without ZigBee

System Block Diagram

†: These features are not supported by current software releases. Contact Redpine Signals sales (sales@redpinesignals.com) for details.

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