

Thread + Bluetooth 4.2 Low Energy

Overview

Rigado's R41Z series is an ultra-low-power, highly-integrated single-chip device that enables Thread with IEEE 802.15.4 and Bluetooth Low Energy (BLE) RF connectivity for portable, extremely low power embedded systems. With an ARM® Cortex®-M0+ CPU, integrated 2.4GHz transceiver, and an integrated antenna, the R41Z provides a complete RF solution allowing faster time to market with reduced development costs.

Providing full use of the NXP's KW41Z's capabilities and peripherals, the R41Z Series can power the most demanding applications, all while simplifying designs and reducing BOM costs. The R41Z is an ideal solution for designs that require concurrent communication on both an 802.15.4 based network such as Thread and a Bluetooth Low Energy network. This multi-mode capability enables participating in a mesh network for local and remote control/monitoring and direct communication using Bluetooth Low Energy via a mobile device.



Key Features

- Complete Thread (802.15.4) and Bluetooth Low Energy v4.2 solution
- Powerful & ultra-efficient 48MHz 32-bit ARM® Cortex™ M0+ CPU with 512kB Flash & 128kB SRAM
- Secure Bootloader (encrypted over-the-air updates)
- Transmitter certifications: FCC (USA), IC (Canada), MIC (Japan)
- Transmitter compliance: CE (Europe), RCM (Australia / New Zealand)
- Bluetooth & Thread certifications: (pending)

Quick Specifications

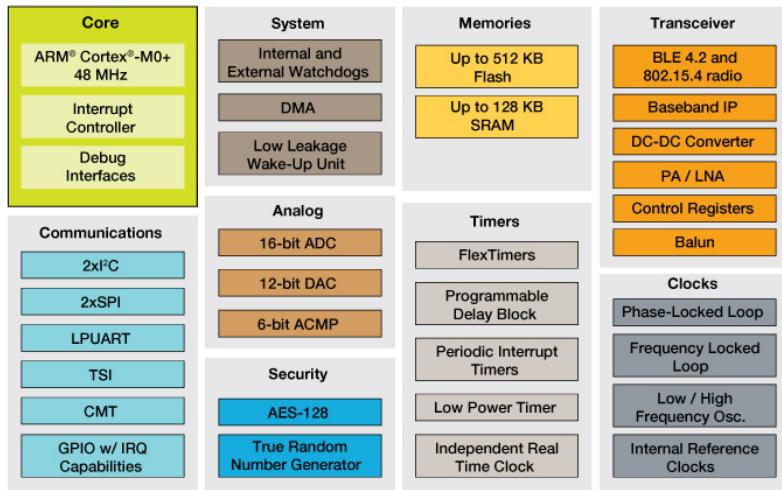
- Supply: 0.9V – 4.2V
- TX Power: 0 dBm @ 6.5mA
- Rx Sensitivity: -95 dBm @ 6.5mA
- Pins: 25 GPIO, 2 dedicated analog
- Interfaces: UART / I2C / SPI / PWM / TSI / PDM / ADC
- Memory: 512kB Flash / 128kB RAM
- Dimensions: 10.6 x 16.2 x 2.1mm
- Operating Temp: -40°C to +105°C

Applications

- Climate Control
- Lighting
- Safety and Security
- Home Appliances
- Access Control
- Internet of Things
- Home Health Care
- AV Remote Controls
- Smart Energy Management
- Low-Power Sensor Networks
- Key Fobs
- Interactive Entertainment Devices
- Environmental Monitoring
- Hotel Automation
- Office Automation



Block Diagram



Specifications

| General | |
|---|---|
| Operating Temperature | -40°C to +105°C |
| Storage Temperature | -40°C to +125°C |
| Physical Dimensions | 10.6 x 16.2 x 2.1 mm |
| Operating Supply | 0.9V to 4.2V |
| Material | RoHS compliant |
| MAC Address | Unique MAC address provided (in flash & on label) |
| 2.4 GHz Transceiver | |
| Frequency (ISM) | 2.400GHz to 2.4835GHz |
| Frequency (MBAN) | 2.360GHz to 2.4000GHz |
| IEEE Standard 802.15.4 Modulation | OQPSK @ 250kbps |
| Bluetooth Low Energy 4.2 Modulation | GFSK @ 1 Mbps |
| IEEE Standard 802.15.4 Receiver sensitivity | -100 dBm |
| Bluetooth Low Energy 4.2 Receiver sensitivity | -95 dBm |
| Transmit power | -30 dBm to +3.5 dBm |
| RSSI | -95 dBm, 1 dB resolution |
| Antenna | Integrated antenna |
| Approvals (All Pending – Estimated Q4 2016) | |
| FCC | FCC part 15 modular qualification – FCC ID: 2AA9B07 |
| IC | Industry Canada RSS-210 modular qualification – IC: 12208A-07 |
| CE | EN 60950-1: 2011-01 3.1 (a) : Health and Safety of the User |
| | EN 301 498-17 V2.2.1 3.1 (b) : Electromagnetic Compatibility |
| | EN 300 328 V1.8.1 3.2 : Effective use of spectrum allocated |
| Thread | Applying to be Thread Certified Component |
| Bluetooth | Applying to be RF-PHY Component - DID: TBD |

Ordering Information

- [Order a Development Kit](#)
- [Contact Us](#) for pricing and ordering info

| Part Number | Description |
|--------------|---|
| R41Z-TA-R | R41Z module, KW41Z512, integrated antenna |
| R41Z-TA-EVAL | R41Z Evaluation Kit with OpenSDA programmer |

Availability Information

- Current Status: Production
- Shipping December 2016
- Modules will be available through Digi-Key and Arrow.

Secure Bootloader (Pending)

Encrypted Over-The-Air (OTA) and UART firmware updates add a layer of security to your application. The R41Z Series bootloader uses AES-128 encryption allowing for secure updates of your application firmware, bootloader, and Bluetooth / Thread stacks over Bluetooth low energy

Evaluation Kit

The R41Z Series evaluation kit (R41Z-EVAL) provides a great starting point for Thread and Bluetooth 4.2 Low Energy projects. It is designed for ease of use while still providing full access to the features of the R41Z. The built-in USB programmer allows for easy programming and configuration. All of the I/O is accessible through an Arduino R3 form factor and the evaluation kit supports plug-and-play accessory shields.

| Power Consumption | |
|-------------------|---|
| Radio - Tx | 6.5mA @ 0dBm |
| Radio - Rx | 6.7mA @ 1Mbps (BLE mode) |
| CPU - running | 6.4mA @ 48MHz core / 24MHz flash / bus clock disabled |
| | 5.9mA @ 48MHz core / 24MHz flash / all peripheral clocks disabled |
| CPU - off/idle | 1.8µA Very-Low-Leakage Stop 3 (RAM retained, DC-DC enabled) |
| | 182nA Very-Low-Leakage Stop 0 (bypass mode) |

| Peripherals | |
|------------------|--|
| LPUART | 1 block. 1200 baud to 1M baud, parity, CTS & RTS support |
| SPI Master | 2 blocks. 125kHz to 12Mhz clock rates, double-buffered transmit/receive |
| SPI Slave | 2 blocks. 125kHz to 12MHz clock rates, double-buffered transmit/receive |
| TWI (I2C) Master | 2 blocks. 100kHz to 400kHz clock rates |
| TWI (I2C) Slave | 2 blocks. 100kHz to 400kHz clock rates |
| TSI | 16 external electrodes, internal reference oscillator for high-accuracy |
| ADC | 16-bit @ 500ksps |
| PWM | 3 blocks, 1x 4 channel and 2x 2 channel |
| DAC | 12-bit @ 1µs high-speed, 2µs low-speed |
| CMP | 8 selectable comparator inputs, 6-bit programmable reference generator input |
| GPIO | Input High: 0.7 x VDD, Input Low: 0.3 x VDD, 20-50kΩ pull-up/pull-down |
| Timers | 16-bit low-power timer, 1x 4-channel TPM |
| PIT | 32-bit resolution, 2 interrupt timers |
| CMT | Time, baseband, FSK |
| VREF | 0.5mV steps, 1.2V output at room temp |
| RTC | 32-bit seconds counter with 32-bit alarm, 16-bit prescaler |

Design Services

Rigado has an experienced team of software, electrical, and mechanical engineers that provide solutions to today's technological challenges. Whether you need a network of industrial sensors, or a complete product ready for mass production; Rigado can turn your ideas into reality.

Our expertise

- Electrical, software, mechanical and industrial design
- Bluetooth Low Energy and Low-Power Wireless
- iOS and Android mobile application design
- Turnkey products
- Product Management