

# RN2903 (915 MHz) LoRa® Modem

## Long-Range, Low-Power Wireless Solution

### Summary

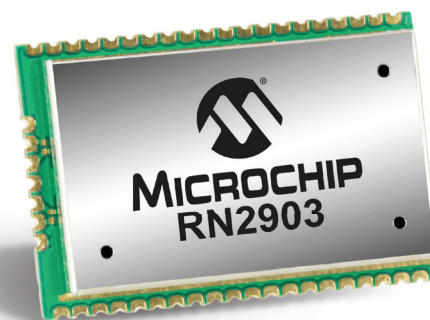
The RN2903 is a LoRa®-integrated modem with a range of more than 15 km (suburban), low power enabling a battery life greater than 10 years and the ability to connect millions of wireless sensor nodes to LoRa gateways and IoT-connected Cloud Servers. This robust system is due to LoRa's unique spread-spectrum-based modulation that is capable of demodulation 20 dB below noise level. This enables high sensitivity for ultra-long range, improved network efficiency and eliminates interference. The RN2903 modem operates over the 915 MHz license-free Industry Scientific and Medical (ISM) frequency bands and serves as the end-device in the LoRa network infrastructure (see Figure 1).

The RN2903 has the complete LoRaWAN™ protocol stack on the modem and is easy to configure via simple ASCII commands through the UART, greatly reducing development time. The RN2903 is FCC-certified, saving significant certification costs. Additionally, it combines a small form factor 17.8 × 26.7 × 3 mm with 14 GPIOs, providing the flexibility to connect and control a large number of sensors and actuators while taking up very little space.

The RN2903 modem resolves the age-old wireless developer's dilemma to choose between longer range and lower power consumption. By employing the RN2903, you can now maximize both, while eliminating the cost of additional repeaters and increasing battery life. With its scalability, robust communication, mobility and the ability to operate in harsh outdoor environments, the RN2903 is well suited for a broad range of low-data-rate wireless monitoring and control designs.

### Features

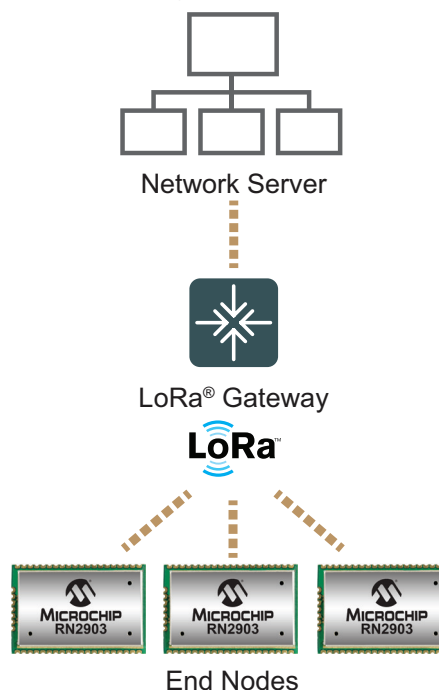
- Long range: greater than 15 km
- Low power consumption for 10+ year battery life
- Operates in 915 MHz band
- Embedded LoRaWAN Class A protocol
- Easy to use ASCII command interface over UART
- Supply voltage: 2.1–3.6V
- Temperature range: –40°C to 85°C
- Adjustable output power up to +18.5 dBm
- High receiver sensitivity down to –146 dBm
- Device Firmware Upgrade (DFU) over UART
- 14 GPIO for control, status and ADC
- Excellent interference immunity
- Secure AES-128 encryption
- FCC and IC certified
- Environmentally friendly, ROHS-compliant



### Applications

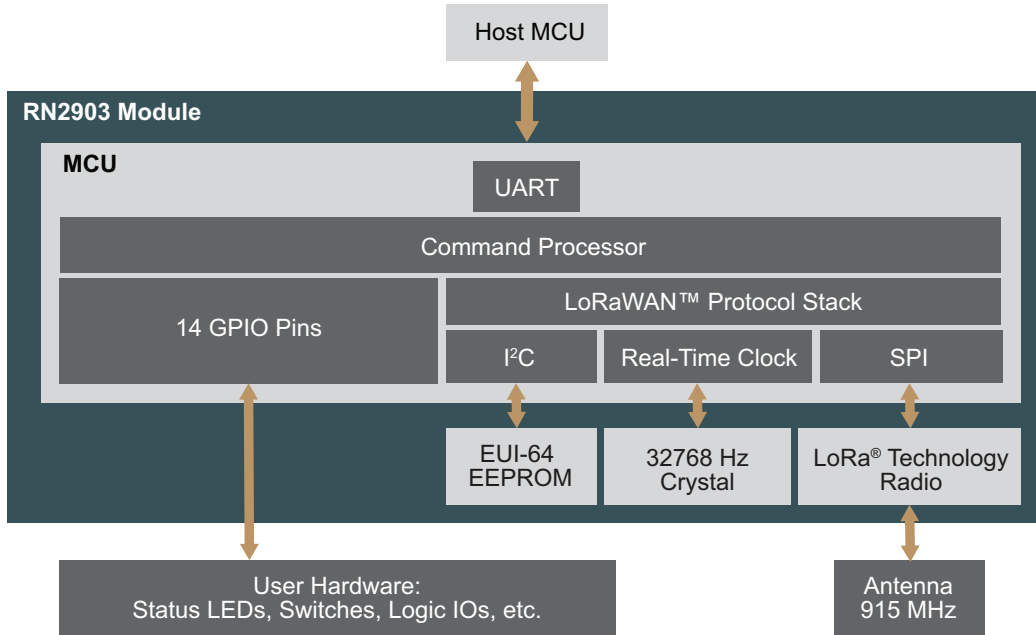
- Internet of Things (IoT)
- Metering
- Machine to Machine (M2M)
- Smart city
- Sensor networks
- Industrial automation
- Smart home

Figure 1: LoRa Technology Network



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## Block Diagram



## Ordering Information

Part Number	Description
RN2903-I/RMXXX	Low-power, long-range LoRa® transceiver modem - NA version (915 MHz)
RN-2903-PICTAIL	RN2903 development tool with USB interface and PICTail™/PICTail Plus interface for connecting to Microchip development boards
DM164139	Battery-powered RN2903 LoRa Mote Development Board with USB interface

Specification	Details
Frequency	915 MHz (North America)
Tx Power	Adjustable up to +18.5 dBm
Modulation Method	FSK, GFSK and LoRa® Technology
Maximum Over-the-Air Data Rate	300 kbps (FSK), 12,500 bps (LoRa)
Interface	UART
Sensitivity	-146 dBm
Range	> 15 km (suburban)
Certification	United States FCC, Canada IC
Size	17.8 × 26.7 × 3 mm
Package	Surface-mount modem
Temperature Range	-40°C to +85°C

## Development Tools

### RN2903 PICTail™/PICTail Plus Daughter Board (RN-2903-PICTAIL)



The RN2903 PICTail/PICTail Plus Daughter Board is a development tool for prototyping new designs using Microchip's RN2903 LoRa modem. It includes a USB interface for convenient demo and experimentation and the PICTail and PICTail Plus interfaces for connecting to Microchip development boards.

### RN2903 Mote Development Board (DM164139)



This board is a LoRaWAN Class A end device based on the the RN2903 LoRa modem. As a standalone battery-powered node, the mote provides a convenient platform to quickly demonstrate the long-range capabilities of the modem, as well as to verify inter-operability when connecting to LoRaWAN1.0-compliant gateways and infrastructure.



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