900MHz Wireless Modem RM900A

1.1 Summary

RM900A is a high-tx power, high-sensitivity 868/915MHz IEEE 802.15.4 module, which offers a complete microcontroller/transceiver solution containing all hardware features necessary for development of wireless application.

Document Information

Info	Content
Author(s)	Kong Juan
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Distribution	Internal Use Only

1.2 Key Features

Approvals

Name	Date	Signature
Zhao Pengjun		
James Liu		

• **Frequency Band**	868-868.6MHz, 910-924MHz 11 channels
• **Power**	+3.3V ±0.3V from carrier board, 3.0V to 3.6V from battery pack
• **Interfaces**	40-pin surface-mount 2x20 1.27mm pitch
• **RF**	40kbps BPSK DSSS @915MHz 20kbps BPSK DSSS @868MHz
• **Dimensions**	46.5 mm x 26 mm x 10 mm
• **Antenna Interface**	50-Ohm MMCX female or UFL connector
• **Operating Temperature Range**	-40ºC to +85ºC
• **Indicators**	Two LEDs, one red, one yellow (DS1, DS2)
• **Current Consumption**	600µA Sleep 170mA TX @ Medium Level 25℃ 35mA RX/Ideal
• RF receive sensitivity	-100dBm at at 1% packet error rate for a 20 byte payload.
• **Output Power EIRP**	Up to 20dBm

1.3 Abbreviations and Acronyms

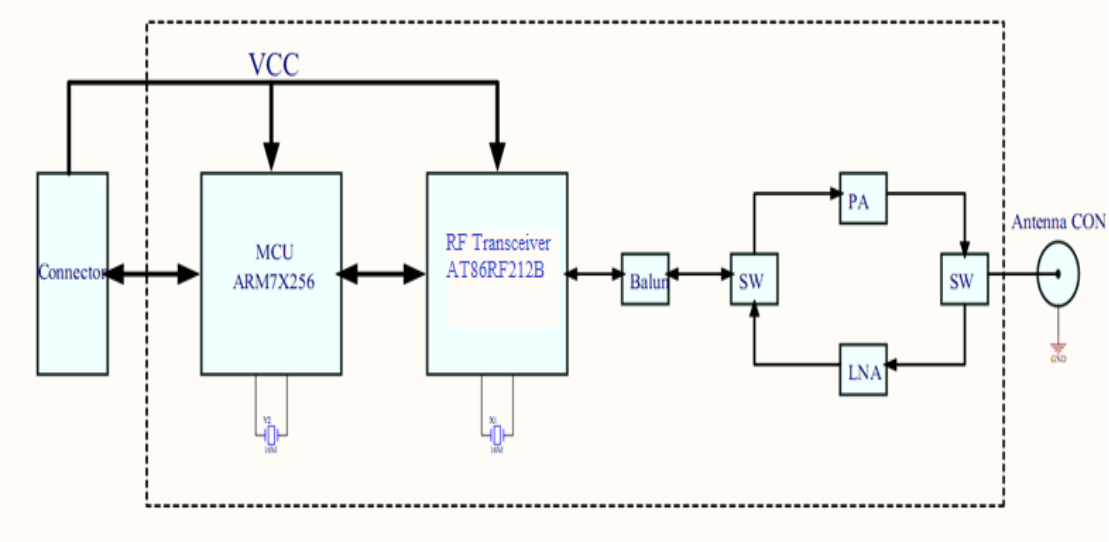
ADC Analog-to -Digital Converter
API Application Programming Interface
BPSK Binary Phase-Shift Keying modulation scheme
DC Direct Current
DTR Data Terminal Ready
EEPROM Electrically Erasable Programmable Read-Only Memory
ESD Electrostatic Discharge
GPIO General Purpose Input/Output
HVAC Heating, Ventilating and Air Conditioning
HW Hardware
I2C Inter-Integrated Circuit
IEEE Institute of Electrical and Electrionics Engineers
IRQ Interrupt Request
ISM Industrial, Scientific and Medical radio band
JTAG
Digital interface for debugging of embedded device, also known as IEEE 1149.1 standard interface
MAC Medium Access Control layer
MCU

Microcontroller Unit. In this document it also means the processor, which is the core of ZigBit
module
O-QPSK Offset Quadrature Phase-Shift Keying modulation scheme
OEM Original Equipment Manufacturer
OTA Over-The-Air upgrade
PCB Printed Circuit Board
PER Package Error Ratio
RAM Random Access Memory
RF Radio Frequency
RTS/CTS Request to Send/ Clear to Send
RX Receiver
SMA Surface Mount Assembly
SPI Serial Peripheral Interface
SW Software
TTM Time To Market
TX Transmitter
UART Universal Asynchronous Receiver/Transmitter
USART Universal Synchronous/Asynchronous Receiver/Transmitter
USB Universal Serial Bus
ZDK ZigBit Development Kit
ZigBee,
ZigBee PRO
Wireless networking standards targeted at low-power applications
802.15.4 The IEEE 802.15.4-2006 standard applicable to low-rate wireless Personal Area Network

2.1 Overview

RM900A works at 868MHz/910-924MHz, 11 channels, channel spacing 2MHz. You can change its TX power, working channel through com tool.

RM900A is a high Tx-power, high sensitivity IEEE 802.15.4/ZigBee module. Based on a combination of Atmel's latest MCU wireless hardware platform, power amplifier and low noise amplifier, the RM900A offers superior radio performance.



The module contains Atmel's AT91SAM7X256 Microcontroller, AT86RF212B RF transceiver, balun, two RF switches, power amplifier and low noise amplifier.

The balun transforms the differential radio transceiver RF signals (RFP/RFN) to a single ended RF signal. The RF switches separate between receive and transmit path. These switches are controlled by the RX/TX indicator.

During receive the RF signal, switch will send it to the low noise amplifier. The signal will be amplified by the low noise amplifier and fed to the radio transceiver AT86RF212B using the second RX/TX switch and balun.

During transmit, the AT86RF212B's TX signal is amplified using a power amplifier, and then fed to the antenna via the RF switch.

3.1 Modem Characteristics

3.1.1 Electric Characteristics

Test conditions (unless otherwise stated), Vcc=3V, Tamb=25° C

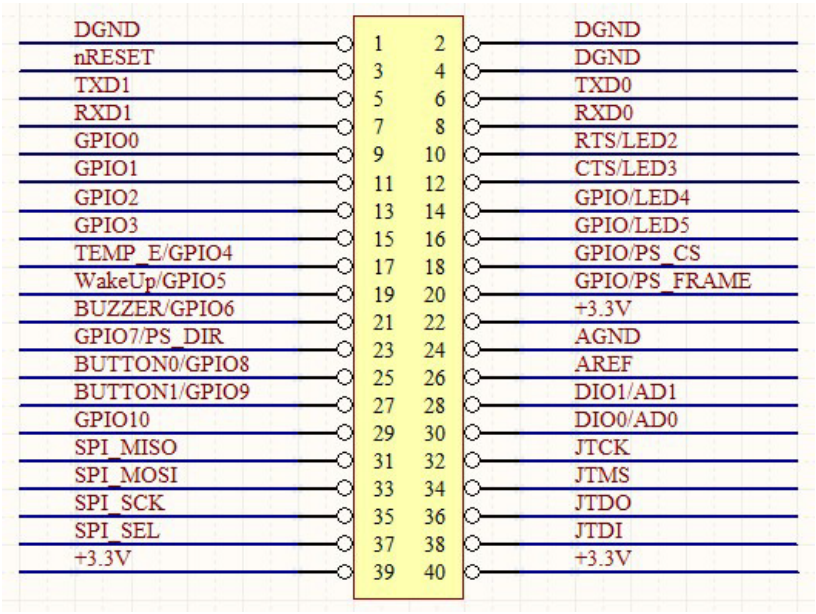
Parameters	Range	Unit	Condition
Supply Voltage (Vcc)	3 to 3.6	V	
Current Consumption: RX mode	40	mA	

Current Consumption: TX mode	170	mA	TX: Mid
Current Consumption: Sleep mode	600	uA	

3.1.2 RF Characteristics

Parameters	Range	Unit	Condition
Frequency Band	868-868.6/910-924	MHz	
Number of Channel	1/10		
Channel Spacing	2	MHz	
Transmitter Output Power	+20(max)	dBm	
Receiver Sensitivity	-105	dBm	
On-Air Data Rate	40(@915MHz) 20(@868MHz)	kbps	BPSK modulation DSSS
Tx output/Rx input Nominal Impedence	50	Ω	

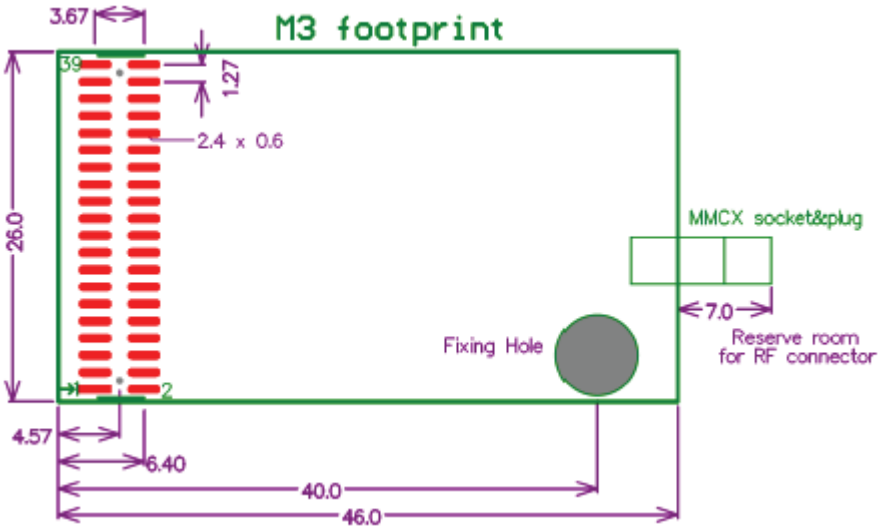
3.2 Pin Configuration



Pin	Description	Pin	Description
1	DGND	2	DGND
3	nRESET	4	DGND
5	TXD1	6	TXD0
7	RXD1	8	RXD0
9	GPIO0	10	RTS/LED2
11	GPIO1	12	CTS/LED3
13	GPIO2	14	GPIO/LED4
15	GPIO3	16	GPIO/LED5
17	TEMP_E/GPIO4	18	GPIO/PS_CS
19	WakeUp/GPIO5	20	GPIO/PS_FRAME
21	BUZZER/GPIO6	22	+3.3V
23	GPIO7/PS_DIR	24	AGND
25	BUTTON0/GPIO8	26	AREF
27	BUTTON1/GPIO9	28	DIO1/AD1
29	GPIO10	30	DIO0/AD0
31	SPI_MISO	32	JTCK
33	SPI_MOSI	34	JTMS
35	SPI_SCK	36	JTDO
37	SPI_SEL	38	JTDI
39	+3.3V	40	+3.3V

3.3 Physical Characteristics

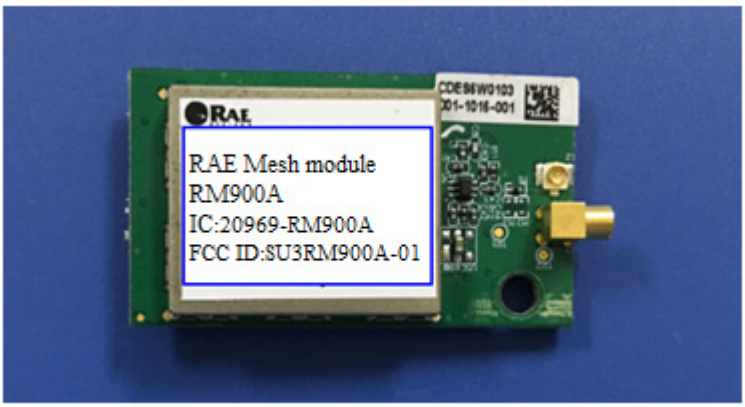
Parameters	Range	Unit	Condition
Size	46×26×7	mm	
Operation Temmperature Range	-40 to +55	℃	
Operation Relative Humidity Range	No more than 80%		



3.4 Antenna Reference

- Suggest antenna:868MHz/910~924MHz antenna
- MMCX connector on board, need a RF cable to antenna, such as MMCX to SMA RF cable.
- Reserved UFL connector on board.

3.5 Label



Caution:

This device complies with Part 15 of the FCC Rules / Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power
(e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut
fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de

brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

MPE Reminding

To satisfy FCC / IC RF exposure requirements, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation.
To ensure compliance, operations at closer than this distance is not recommended.

Les antennes installées doivent être situées de facon à ce que la population ne puisse y être exposée à une distance de moin de 20 cm. Installer les antennes de facon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l' antenne.
La FCC des éltats-unis stipule que cet appareil doit être en tout temps éloigné d'au moins 20 cm des personnes pendant son functionnement.

Information for the OEM Integrators
This device is intended for OEM integrators only. Please see the full grant of equipment document for restrictions.

Ce dispositif est destiné aux équipementiers et intégrateurs. S'il vous plaît voir la pleine subvention du document de l'équipement pour les restrictions.

Label Information to the End User by the OEM or Integrators
If the FCC ID of this module is not visible when it is installed inside another device, then the outside of the device into which the module is installed must be label with "Contains FCC ID: SU3RM900A-01 and Contains IC: 20969-RM900A".

Si l'ID FCC de ce module est pas visible quand il est installé dans un autre appareil, puis l'extérieur du dispositif dans lequel le module est installé doit être étiquette avec"Contient FCC ID: SU3RM900A-01 et Contient IC: 20969-RM900A".