

RAEMesh Sub 1G wireless modem RM900B_M1

Document Information

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1. Section1:

1.1 Summary:

RM900B_M1 is a high-sensitivity Sub 1GHz IEEE 802.15.4 module, which offers a complete microcontroller/transceiver solution containing all hardware features necessary for development of wireless application. It integrated RM900B_M5 and RF Front END chips, such as LNA, PA, SAW Filter and so on in order to enhance TX power and Receive Sensitivity.

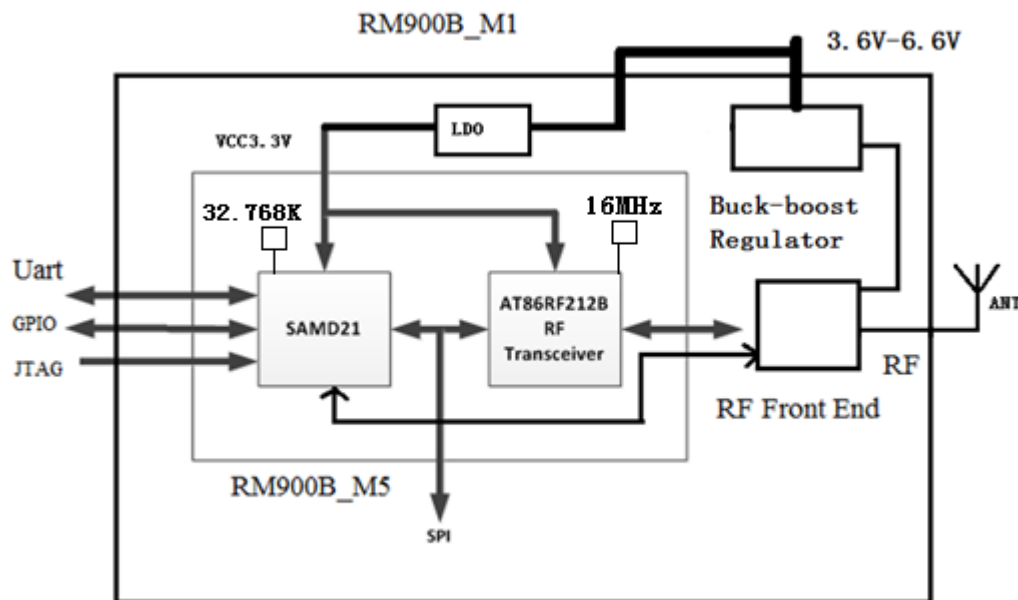
1.2 Key Features:

- Frequency Band 902~928MHz
- Power 3.6 ~ 6.6V (A01-1117-000)
3.6V~7.2V (A01-1117-001)
- Interfaces 10-pin
- RF 40kbps BPSK in 902~928MHz
- Dimensions 69.85 x 61.85 x 13.0 mm
- Antenna Interface MMCX
- Operating Temperature Range -40°C to +60°C
- Indicators Two LEDs, one red, one yellow (RED1, RED2)
- Current Consumption idle current < 9mA
TX mode @ 25dBm < 300mA
RX mode 25mA (typical)
- RF receive sensitivity -105dBm at 1% packet error rate for a payload of 20 bytes.
- FCC and CE compliant
- RoHS compliant

2. Section2:

2.1 Technical Description:

RM900B_M1 can work from 863~870MHz. Typical frequency is 865.6MHz, 866.4MHz, 868.3MHz and 869.0MHz. It can also work at 902 ~ 924MHz, 10 channels, channel spacing 2MHz. Users can change its TX power, working channel through com tool. RM900B_M1 is a high sensitivity IEEE 802.15.4/ZigBee module. RM900B_M1 integrates RM900B_M5 modem which is a combination of Atmel's MCU SMD21 and RF transceiver AT86RF212B, the RM900B_M1 offers superior radio performance.



The sub module RM900B_M5 contains Atmel's SAMD21 Cortex-M0 Microcontroller, AT86RF212B RF transceiver. The module can be easily mounted on RM900B_M1 PCB with a minimum of required external connection. Neither via-holes nor wires are allowed on the PCB upper layer in area occupied by the module. As a critical requirement, RF_GND pins should be grounded via several holes to be located right next to the pins thus minimizing inductance and preventing both mismatch and losses.

3. Section3:

3.1 Modem Characteristics:

3.1.1 Electric Characteristics

Test conditions (unless otherwise stated), VDD=5V, Tamb=25°C

Parameters	Range	Unit	Condition
VDD	3.3 ~ 6.6	V	A01-1117-000
VDD	3.3 ~ 7.2	V	A01-1117-001(HOST)
Current Consumption: RX mode	25	mA	typical
Current Consumption: TX mode	240	mA	@25dBm,916MHz
Current Consumption: TX mode	220	mA	@23dBm,916MHz
Current Consumption: TX mode	180	mA	@21dBm,916MHz
Current Consumption: Normal	12	mA	
Current Consumption: idle current	9	mA	

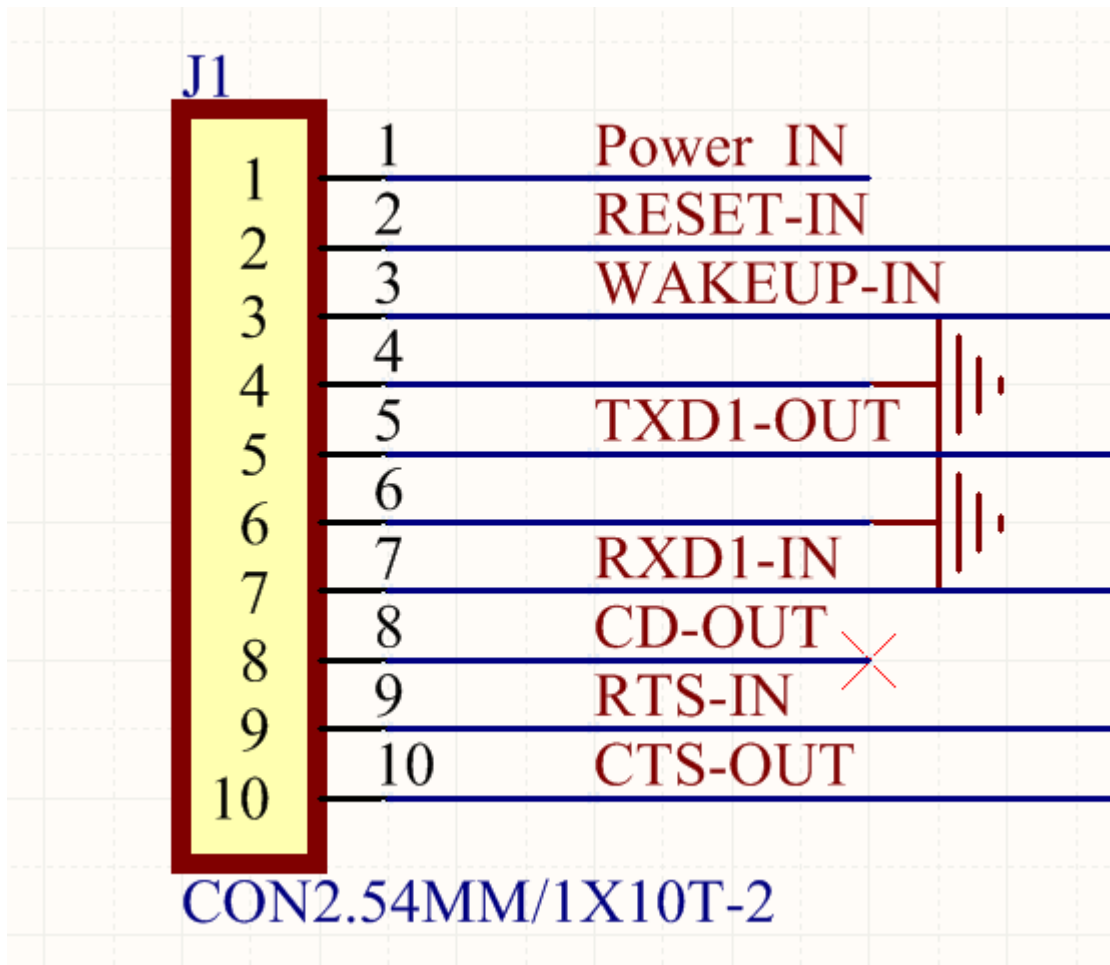
3.1.2 RF Characteristics:

Parameters	Range	Unit	Condition
Frequency Range	906~924	MHz	NA Version Firmware
Number of Channel	10		
Channel Spacing	2	MHz	
Transmitter Output Power	+18.5±0.5	dBm	
Receiver Sensitivity	-105	dBm	PER=1%, PSDU=20 byte
On-Air Data Rate	40	kbps	BPSK
TX output/RX input Nominal Impedance	50	Ω	

3.1.3 Module Interfaces characteristics

Parameters	Range	Unit	Condition
UART Maximum Baud Rate	38.4	kbps	
GPIO Output Voltage (VOH/VOL)	0.7VCC/ 0.2VCC	V	-10/ 5mA VCC = 3.3V
GPIO Input Voltage (VIH/VIL)	0.7VCC/0.2VCC	V	
Real Time Oscillator Frequency	32.768	kHz	

3.2 PIN Description:



PIN description:

PIN	Pin Name	Description	I/O
1	VDD	Range 3.3V~6.6V for RFD Range 3.3V~7.2V for HOST	
2	Reset	Active Low	Input
3	Wakeup	Active Low	Input
4	DGND	Ground	
5	UART_TXD1	UART transmit output	Output
6	GND	GND	
7	UART_RXD1	UART receive input	Input
8	CD	NA	Output
9	RTS	NA	I/O
10	CTS	NA	I/O

3.3 900MHz Antenna Specifications

Antenna 1:

Parameters	Range	Unit	Condition
Frequency Band	902-928	MHz	
Bandwidth (typ.)	30	MHz	
Peak Gain (typ.)	2.5	dBi	
VSWR	2.5 (max)		
Polarization	Linear		
Pattern	Omni-directional		
Impedance	50	Ω	
Dimensions	135mm	mm	
Connector	SMA		

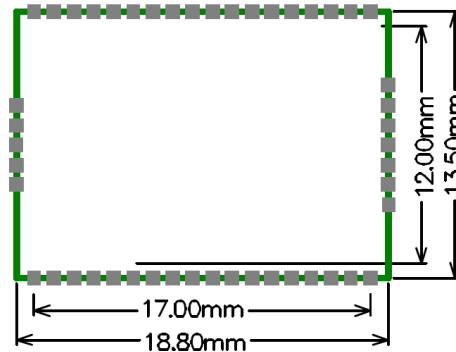
Antenna 2:

Parameters	Range	Unit	Condition
Frequency Band	902-928	MHz	
Bandwidth (typ.)	30	MHz	
Peak Gain (typ.)	3	dBi	
VSWR	2.5 (max)		
Polarization	Linear		
Pattern	Omni-directional		
Impedance	50	Ω	
Dimensions	190mm	mm	
Connector	TNC		



4.2 Mounting Information

The below diagram shows the recommended PCB layout for RM900B_M5 module.



5. Section5

5.1 Certification information:

FCCID	SU3RM900B-M1	Pending
IC	20969-RM900BM1	Pending
RED		
Intrinsic Safety Design		

5.2 Modem information

Name	Model Number	P/N	Description
RM900B_M1	RM900B_M1	A01-1117-000	PCB ASSY,900MHZ M1 SIZE WIRELESS MODEM BOARD, RM900B-M1
RM900B_M1	RM900B_M1	A01-1117-001	PCB ASSY,900MHZ M1 WIRELESS MODEM ADAPTOR BOARD, HOST

6. Section6

6.1 FCC & IC application:

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.

Information for the OEM Integrators

This device is intended for OEM integrators only. Please see the full grant of equipment document for 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: SU3RM900B-M1 and IC: 20969-RM900BM1”.

Antenna caution

This radio transmitter IC:20969-RM900BM1 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Gain of antenna: 3dBi max.

Type of antenna: 50ohm, Pole, Monopole

Le présent émetteur radio IC:20969-RM900BM1 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

Gain d'antenne: 3dBi maximal

Professional installation instruction**Installation personal**

The device is sold to ONLY OEM and can only be installed by hired installers trained by the OEMS.

The general public and consumers do not have access to this device. It is designed for industrial and commercial use.

Installation is controlled. The hardware is not readily available to average consumer. This Device use TNC and SMA connectors so it requires to be installed by a professional installer. The professional installers are provided with the proper instructions for output power/cable/antenna configurations that meet the FCC rules. These instructions are not given to the end user, and in no case can the end user still have controls to adjust power.

External Antenna

Use only the antennas which have been approved by the applicant. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC/ISED limit and is prohibited.