

RAEMesh Sub 1G wireless modem RM900

Document Information

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Approvals

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1. Section1:

1.1 Summary:

RM900 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 It will replace old Atmel RM900, which is obsolete now.

1.2 Key Features:

- Frequency Band 779 to 787MHz, 863 to 870MHz, 902 to 928MHz
- Power 1.8 ~ 3.6V, typical 3.3V
- Interfaces 48-pin
- RF 20kbps BPSK/OQPSK in 868MHz, 40kbps BPSK/OQPSK in 915MHz
- Dimensions 18.8 x 13.5 x 3.0 mm
- Antenna Interface 100-Ohm for balanced output
- Operating Temperature Range -40°C to +60°C
- Indicators Two LEDs, one red, one yellow (DS1, DS2)
- Current Consumption Sleep current < 40uA
50mA TX @ 10dBm 8MHz Crystal @ 25°C
15mA RX @ 8MHz Crystal

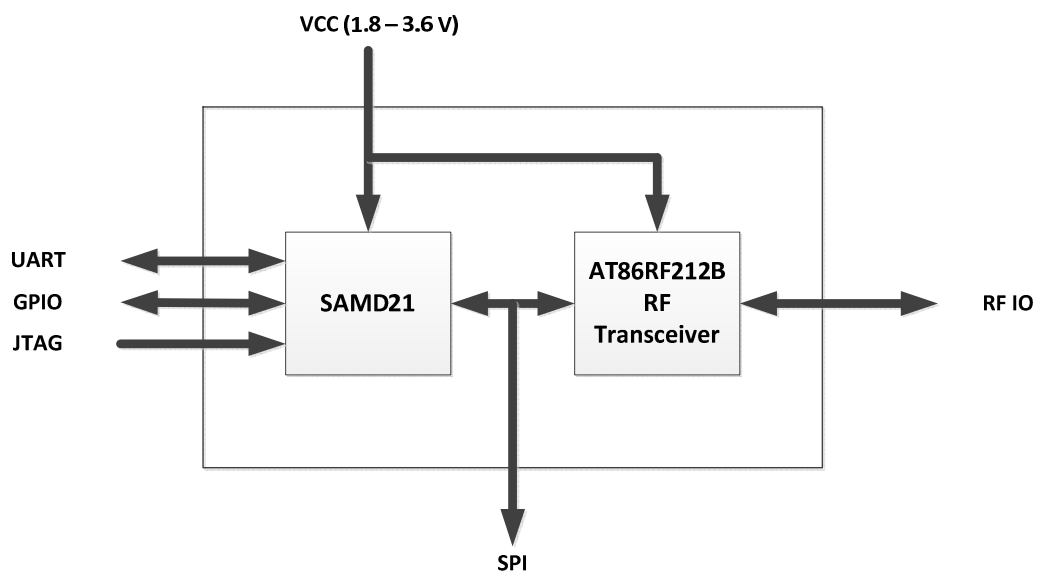
- RF receive sensitivity -102dBm at 1% packet error rate for a payload of 20 bytes.

- FCC and CE compliant
- RoHS compliant

2. Section2:

2.1 Technical Description:

RM900 can work at 868MHz, 1 channel, channel spacing 2MHz. It can also work at 902 ~ 924MHz, 10 channels, channel spacing 2MHz. Users can change its TX power, working channel through com tool. RM900 is a high sensitivity IEEE 802.15.4/ZigBee module. A combination of Atmel's MCU SMD21 and RF transceiver AT86RF212B, the RM900 offers superior radio performance.



The module contains Atmel's SAMD21 Cortex-M0 Microcontroller, AT86RF212B RF transceiver. The module can be easily mounted on a simple 2-layer 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), Vcc=3.3V, Tamb=25°C

Parameters	Range	Unit	Condition
VCC	1.8 ~ 3.6	V	
Current Consumption: RX mode	15	mA	@8MHz
Current Consumption: TX mode	50	mA	@10dBm 8MHz
Current Consumption: Sleep mode	30	uA	

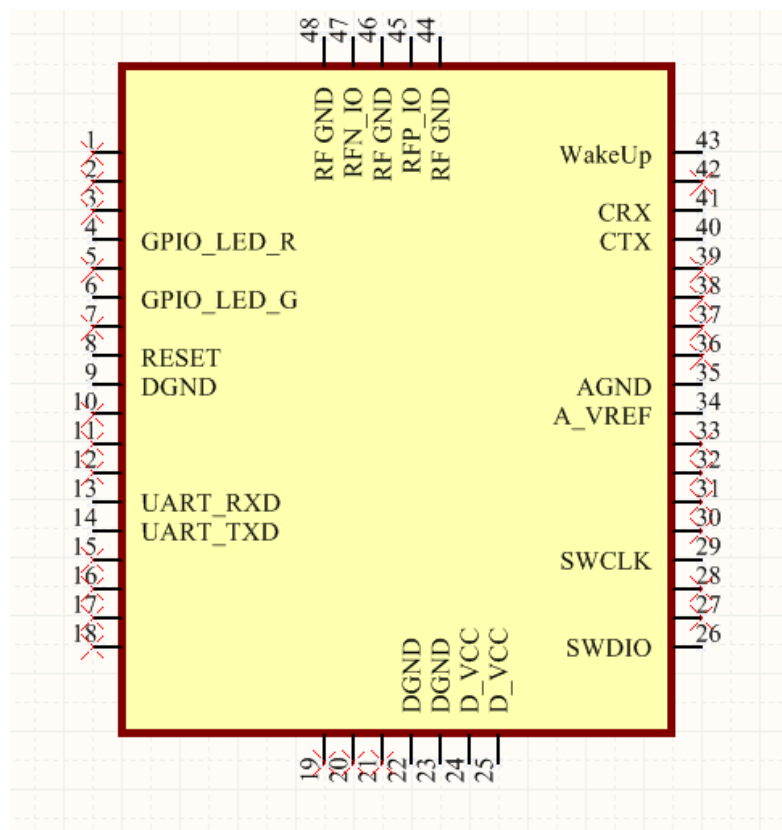
3.1.2 RF Characteristics:

Parameters	Range	Unit	Condition
Frequency Band	868/902~924	MHz	
Number of Channel	1/10		
Channel Spacing	2	MHz	
Transmitter Output Power	+10 +6 +0	dBm	High Medium Low
Receiver Sensitivity	-102	dBm	PER=1%, PSDU=20 byte
On-Air Data Rate	20/40	kbps	O-QPSK
TX output/RX input Nominal Impedance	100	Ω	Balanced output
PCB antenna	0	dBi	Gain
Omni antenna	3	dBi	Gain

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:



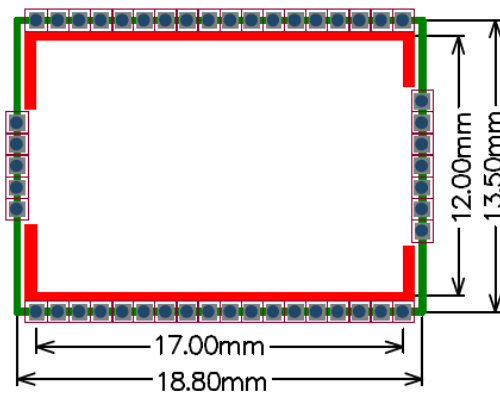
PIN description:

PIN	Pin Name	Description	I/O
4	GPIO_LED_R	General Purpose Digital Output	O
6	GPIO_LED_G	General Purpose Digital Output	O
8	RESET	Reset Input (active low)	
9,22,23	DGND	Digital Ground	
13	UART_RXD	UART receive input	I
14	UART_TXD	UART transmit output	O
24,25	D_VCC	Digital Supply Voltage (Vcc)	
26	SWDIO	JTAG Serial Wire Debug Interface	I/O
29	SWCLK	JTAG Serial Wire Debug Interface	I/O
34	A_VREF	Input/Output reference voltage for ADC	I/O
35	A_GND	Analog ground	
40	CTX	RF RX/TX Indication to control an external RF front-end	O
41	CRX	RF RX/TX Indication to control an external RF front-end	O
43	WakeUp	Wake Up Input(active low)	I
44,46,48	RF_GND	RF Analog Ground	
45	RFP_IO	Differential RF Input/Output	I/O
47	RFN_IO	Differential RF Input/Output	I/O
Others pins	Reserved		

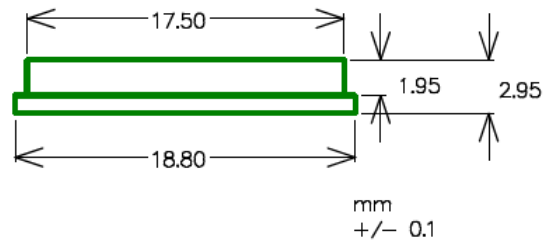
3.3 Physical Characteristics

Parameter	Range	Unit	Condition
Size	18.8 x 13.5 x 3	mm	
Operation Temperature Range	-40 to +60	□	
Operation Relative Humidity Range	No more than 80%		

Mechanical drawing, unit: mm



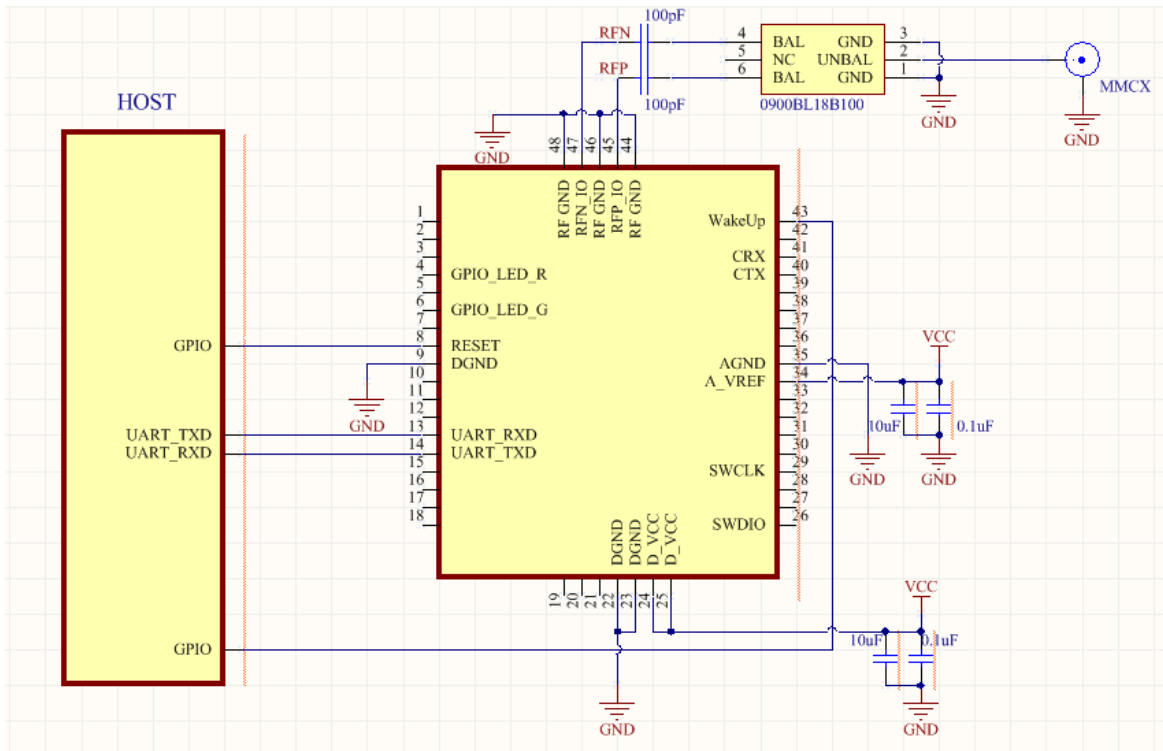
Top View



Side View

4. Section4

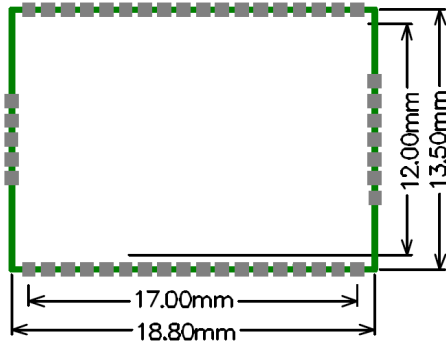
4.1 Typical Application diagram



PIN	PIN Name	Definition	I/O
8	RESET	Reset pin, low active	Input
13	UART_RXD	UART TXD pin	Output
14	UART_TXD	UART RXD pin	Input
43	WakeUp	Low level wake-up High level to sleep	Input
24/25	VCC		
9/22/23	GND		

4.2 Mounting Information

The below diagram shows the recommended PCB layout for RM900 module.



5. Section5

5.1 Certification information:

FCC	FCC Part15C	FCCID: SU3RM900-01
R&TTE	R&TTE , CE-EMC	Refer INTERTEK report
IC		IC ID:20969-RM900
Intrinsic Safety Design	No on-board voltage enhancement circuits Value of the total capacitance $C_i \leq 10\mu\text{F}$ Value of the total inductance $L_i \leq 5\mu\text{H}$	

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 façon à ce que la population ne puisse y être exposée à une distance de moins de 20 cm. Installer les antennes de façon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l'antenne.

La FCC des états-unis stipule que cet appareil doit être en tout temps éloigné d'au moins 20 cm des personnes pendant son fonctionnement.

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: SU3RM900-01 and Contains IC: 20969-RM900”.

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: SU3RM900-01 et Contient IC: 20969-RM900".