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1 Overview

RMBLE-M5 is a highly-integrated Bluetooth low-energy (BLE) module, which offers a complete solution containing all hardware features necessary for development of wireless application.

Key Features:

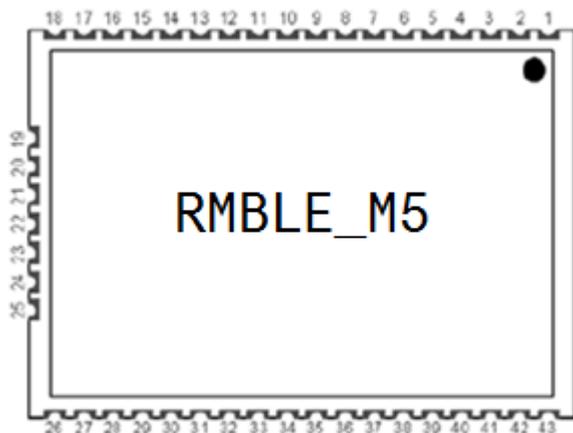
- Ultra compact size (18.8 X 13.5 mm)
- Embedded 512 Kb EEPROM
- I2C, SPI, and UART interfaces
- Low power consumption
- Embedded antenna design
- RoHS compliant, certified lead-and halogen-free
- BT4.1 Compliant



RMBLE-M5 uses a radio technology called frequency-hopping spread spectrum (FHSS). The transmitted data are divided into packets and each packet is transmitted on one of the 40 channels, channel spacing 2 MHz. The first channel starts at 2402 MHz and continues up to 2480 MHz. RMBLE-M5 can coexist with DSSS based Wi-Fi very well due to different transmit protocol.

RMBLE-M5 offers superior radio performance, based on Broadcom BCM20737S.

2 Pin Definition



Connector Pin	Pin Name	Description	I/O
1	SPI_CLK	Master SPI clock line, reserved	O
2	SPI_MISO	Master SPI master slave out line, reserved	I
3	SPI_MOSI	Master SPI master out slave in line, reserved	O
4-7	NA	No connection	
8	RESET	Active-low system reset	I/O
9	GND	Ground	
10	NA	No connection	
11	I2C_CLK	PU clock signal for an external I2C device	I/O
12	I2C_DATA	PU data signal for an external I2C device	I/O
13	BL_UART_RX	Peripheral UART RX	I
14	BL_UART_TX	Peripheral UART TX	O
15, 16	NA	No connection	
17	GPIO	General Purpose Digital Input/Output	
18, 19	NA	No connection	
20	GPIO/LED	Status indicate: output continuous 0/1 signal when not sleep. Output 0 when in sleep	O
21	SPI_CS	Master SPI chip select line, reserved	
22	GND	Ground	
23	GND	Ground	
24	VCC	Digital supply voltage	I
25	VCC	Digital supply voltage	I
26-30	NA	No connection	
31, 32	ADC	ADC Input, reserved	
33	NA	No connection	
34	VCC	Digital supply voltage or no connection	
35	GND	Ground	
36	GPIO	General Purpose Digital Input/Output	
37	NA	No Connection	
38	PRGM_UART_RX	HCI, PRGM_UART RX	I
39	PRGM_UART_TX	HCI, PRGM_UART TX	O
40	NA	No connection	
41-42	GPIO	General Purpose Digital Input/Output	
43	WakeUp	WakeUp the Module, Active low	I

3 Specification

3.1. Voltage

Power supply for the RMBLE-M5 module is provided by the host power pins:

Symbol	Min	Typ	Max	Unit
VCC	1.62	3.3	3.63	V

3.2. Digital Levels

Power supply for the RMBLE-M5 module is provided by the host power pins:

Symbol	Min	Typ	Max	Unit
VIH	0.75		VCC	V
VIL	0		0.4	V
VOH	VCC-0.4		VCC	V
VOL	0		0.4	V

3.3. Current Consumption

Condition: 25 °C, the default voltage is 3.3 V

Item	Condition	Min	Nom	Max	Unit
Receive	Receiver and baseband are both operating, 100 %		25		mA
Transmit	Transmitter and baseband are both operating, 100 %, Tx power setting: 3 dBm		26		mA
Normal	Normal current (Average)		5		mA
Sleep			300		uA

3.4. RF Specification

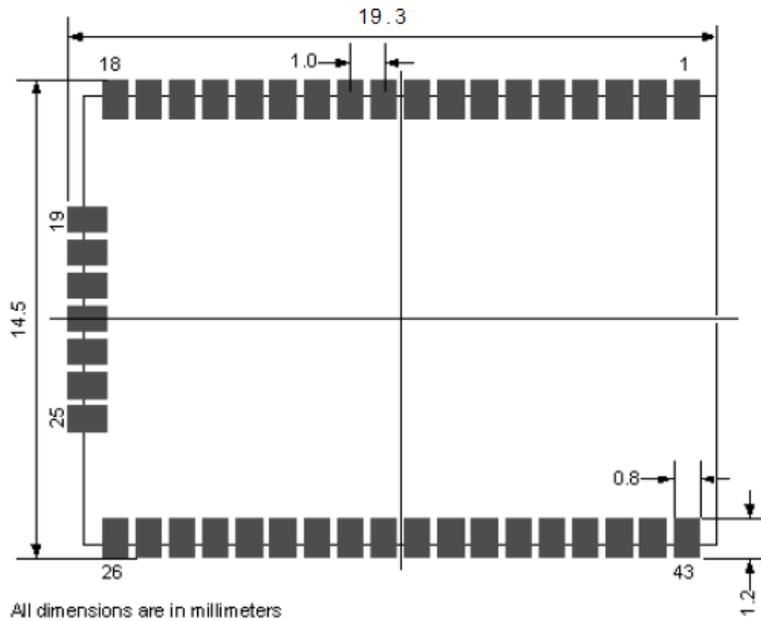
The RF performance of RMBLE-M5 is given as follows. The default voltage is 3.3 V

Item	Condition	Min	Nom	Max	Unit
Frequency		2402		2480	MHz
Channel space			2		MHz
Rx sensitivity	Packet: 200, Payload, PRBS9 Length: 37 Bytes, Dirty Transmitter: off PER 30.8 %		-94(1)		dBm
Max input			-10		dBm
Tx Power (BCM20737S)		-20		4	dBm
Tx Power (RMBLE-M5)				-14	dBm
Distance	Communicate with Iphone5, LOS, 1.5 m height		20		m

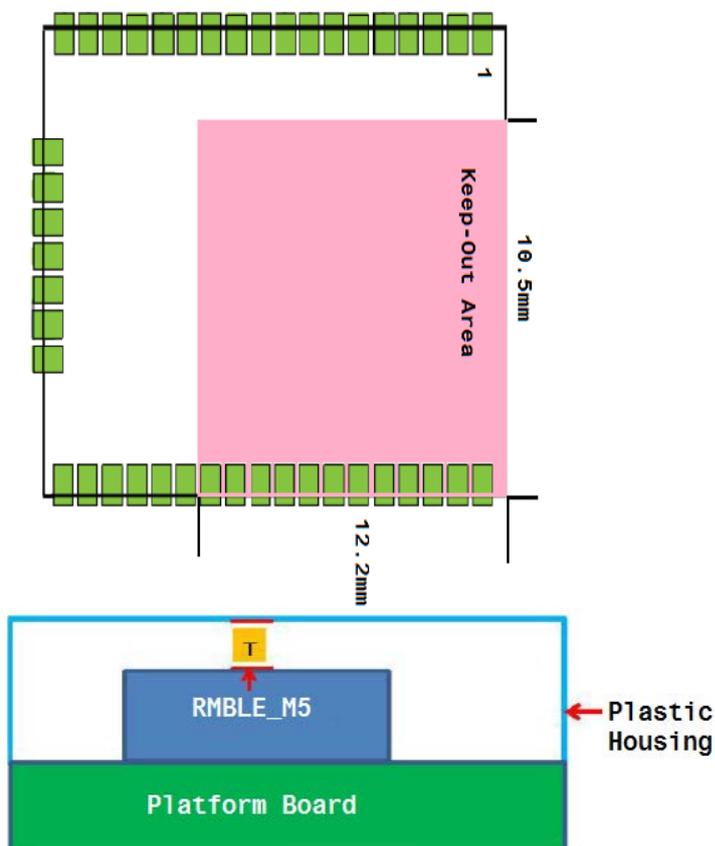
Note (1): Rx sensitivity and Tx power is specification of BCM20737S chip

3.5. PCB layout footprint

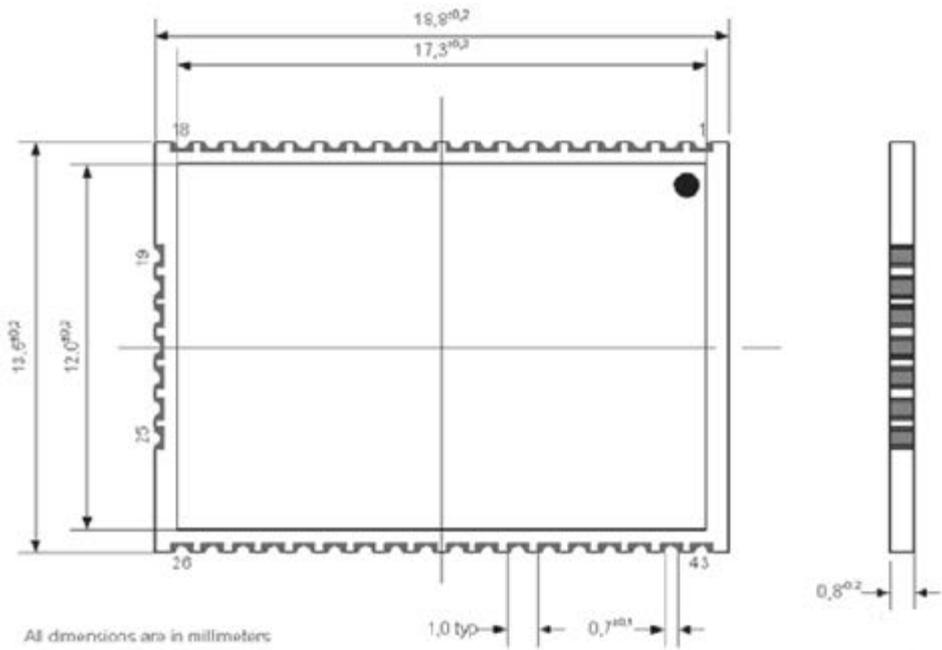
The below diagram shows the PCB layout recommended for RMBLE-M5 module:



Please don't place GND plane in the keep-out area, and minimize the area metal traces occupied in the area. It is recommended to have a 0.4 mm gap (T) between the module's upper surface and the plastic housing.



3.6. Physical/Environmental Specification



Parameters	Value	Comments
Size	18.8 X 13.6 X 2.0 mm	
Operating Temperature	-40 ~ +60 °C	
Operating Humidity	No more than 80%	

4 Wireless Certification Information

- CE0984
- FCC ID: 2AISERMBLEM5
- IC ID: 21613-RMBLEM5
- Model: RMBLE-M5
- Manufacturer: Honeywell Analytics Asia Pacific, Co., Ltd. 7F SangAm IT Tower, 434 Worldcup Buk-ro, Seoul 03922, Korea
- Frequency range: 2402 – 2480 MHz
- Maximum Tx Power: -14 dBm
Note: The host units Tx power can be lower or host units maximum Tx power can be varied per host units PCB, enclosure and etc. It is host manufacturer's responsibility to ensure Tx power is close to the maximum
- This device complies with part 15 of the FCC Rules. 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
- FCC CAUTION
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- RF exposure information
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated keeping the radiator at least 20cm or more away from person's body.

5 Regulatory Statements

- OEM integrators must ensure that its product is electrically identical to RMBLE-M5's reference designs. Any modifications to RMBLE-M5's reference designs may invalidate regulatory approvals in relation to the product, or may necessitate notifications to the relevant regulatory authorities.

- OEM integrators are responsible for regression testing to accommodate changes to designs, new antennas, and host and submit for C2PC filings.

Colocation with other transmitter modules will be addressed through filings for those co-located transmitters when necessary or that colocation of other transmitters will be according to applicable KDB guidelines including those for RF exposure

-The final system integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter

- Appropriate labels must be affixed to the product that complies with applicable regulations in all respects. The regulatory label on the final system must include the statement: "Contains FCC ID: 2AISERM5 and/or IC: 21613-RMBLE-M5".

- A user's manual or instruction manual must be included with the product that contains the text as required by applicable law shall be provided to OEM integrators.

- RF Exposure or EMC test might need to be evaluated against the host again.

5.1 USA—Federal Communications Commission (FCC)

FCC COMPLIANCE STATEMENT:

This device complies with part 15 of the FCC Rules. 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.

INFORMATION TO USER:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna

-Increase the distance between the equipment and the receiver.

-Connect the equipment to outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

Caution: Exposure to Radio Frequency Radiation.

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be collocated or operating in conjunction with any other antenna or transmitter.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

The final host manual shall include the following regulatory statement:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the distance between the equipment and the receiver.
- Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. 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.

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be collocated or operating in conjunction with any other antenna or transmitter.

5.2. Canada - Industry Canada (IC)

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

Cet appareil est conforme avec Industrie Canada exempts de licence standard RSS (s). L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes : (1) il ne doit pas produire de brouillage et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

Caution:

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.

En vertu de la réglementation de l'industrie du Canada, cet émetteur de radio ne peuvent fonctionner en utilisant une antenne d'un type et maximum (ou moins) Gain approuvé pour l'émetteur par Industrie Canada. pour réduire risque d'interférence aux autres utilisateurs, le type d'antenne et son gain doivent être choisis de sorte que la puissance isotrope rayonnée équivalente (PIRE) ne dépasse pas ce qui est nécessaire pour la réussite de communication.

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