

# Bluetooth Low Energy Module

## RMBLE-M5

### Document Information

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### Approvals

Name	Date	Signature
James Liu		
Zhao Pengjun		

**Release Histroy**

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1.0	February 26, 2015	Kong Juan	Initial draft
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# 1. Section1:

## 1.1 Summary:

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.

## 1.2 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
- FCC and CE compliant
- RoHS compliant, certified lead- and halogen-free
- BT4.1 compliant



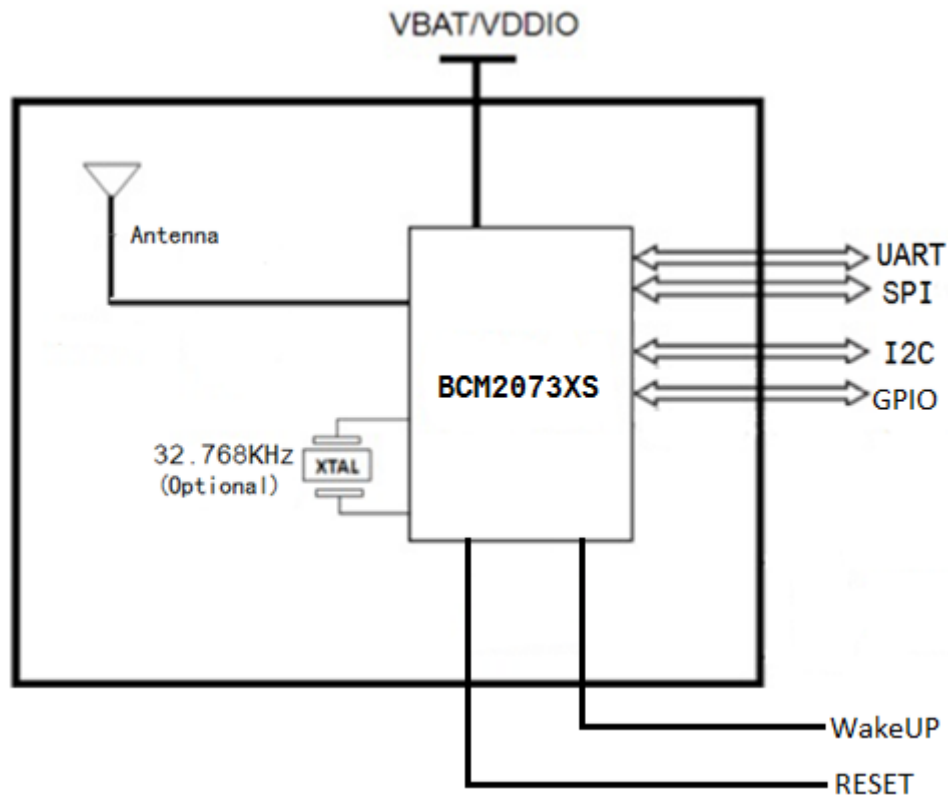
## 2. Section2:

### 2.1 Overview:

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 2MHz. The first channel starts at 2402 MHz and continues up to 2480 MHz. RMBLE can coexist with DSSS based Wi-Fi very well due to different transmit protocol.

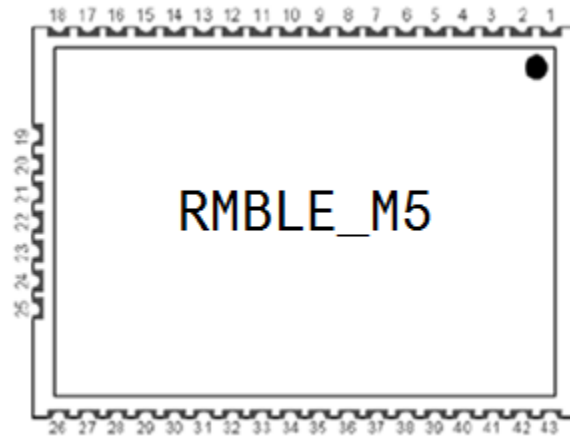
RMBLE-M5 offers superior radio performance, based on Broadcom BCM20732S/BCM20737S.

### 2.2 Block Diagram:



Note1: 32.768 KHz is an optional crystal. Not mounted on RMBLE-M5.

## 2.3 Pin Definition:



Connector Pin	Pin Name	Description	I/O
1	SPI_CLK	Master SPI clock line, reserved	O
2	SPI_MISO	Master SPI master in 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

Note: All pins not used above, leave them no connection.

## 3. Section3:

### 3.1 Voltage:

Power supply for the RMBLE-M5 module will be provided by the host power pins.

Symbol	Min	Typ	Max	Unit
VCC	1.62	3.3	3.63	V

### 3.2 Digital Levels:

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

### 3.3 Current Consumption:

Condition: 25deg.C. The default voltage is 3.3V.

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: 3dBm <b>Single carrier</b>		26		mA
Normal	Normal current (Average)		5		mA
Sleep			300		uA

### 3.4 RF Specification:

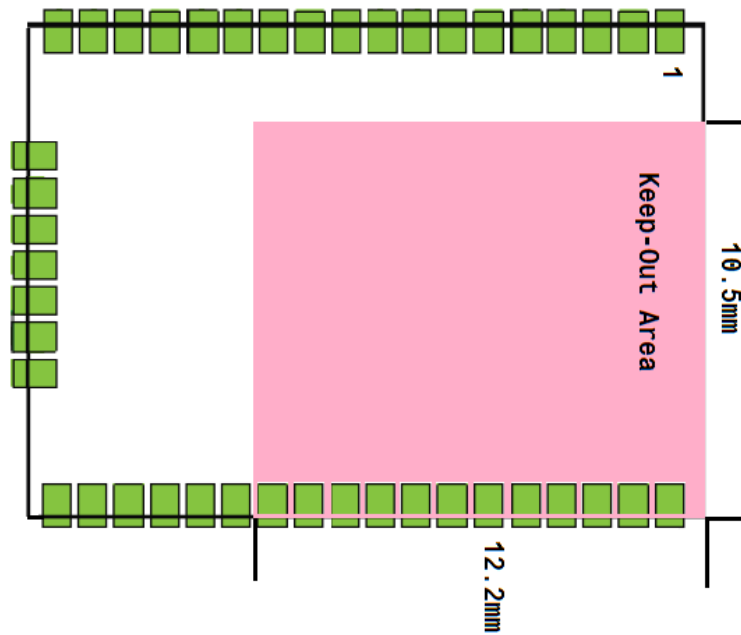
The RF performance of RMBLE-M5 is given as follows. The default voltage is 3.3V.

Parameter	Condition	Min	Nom	Max	Unit
Frequency Range		2402		2480	MHz
Channel Space			2		MHz
RX sensitivity	Packet: 200, Payload, PRBS9 Length: 37 Bytes, Dirty Transmitter: off. PER 30.8%		-94 <sup>(1)</sup>		dBm
MAX Input			-10		dBm
TX Power (BCM20737S)		-20		4	dBm
TX Power (RMBLE-M5)				-11	dBm
Distance	Communicate with Iphone5, LOS, 1.5m high		20		m

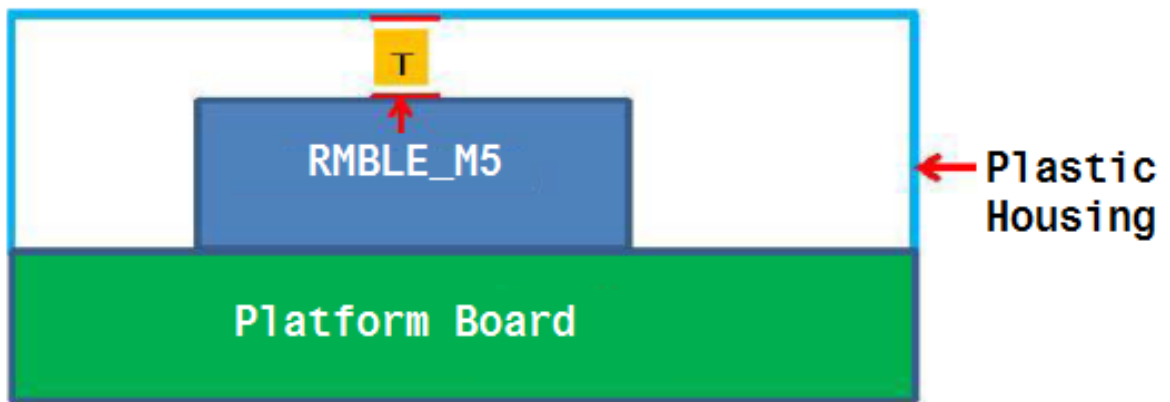
Note (1): Rx sensitivity and Tx power is specification of BCM20737S chip<sup>(1)</sup>





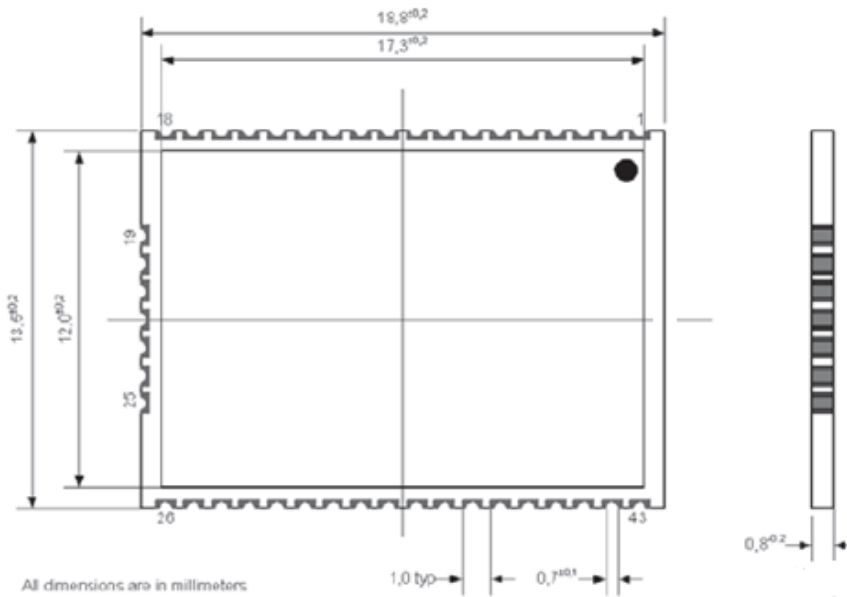


Please don't place GND plane in the keep-out area, and minimize the area metal traces occupied in the area.  
 It is recommended to have a 0.4 mm gap (T) between the module's upper surface and the plastic housing.



### 4.3 Physical/Environmental Characteristics:

Parameters	Value	Comments
Size	18.8x13.6x2.0 mm	
Operating Temperature	-40~+60 °C	
Operating Humidity	No more than 80%	



### 4.4 Ordering Information:

Part Number	Part Name	Description
A01-1110-000	RMBLE-M5	Bluetooth Low Energy Module

## 5. Section5:

### 5.1 Intrinsic Safety design:

RMBLE-M5 module is designed following intrinsic safety: Ex ia IIC T4/ CID1 grade A, B, C, D T4

- Total capacitance  $C_{max}=1.5\mu F$
- Total inductance  $L_{max}=0nH$
- No voltage boosters and no un-encapsulated fuses shall be used.
- If resistors are used, each resistor shall have value of 1K ohm minimum, and package of 0402 minimum.

## Reference

- (1) MMP20732S-TRM105-R/20737S-DS100-R
- (2) 904-E800-139 RAE BLE communication Protocol.doc
- (3) How to upgrade firmware for BLE module.pdf
- (4) How to use HON own android app to test BLE module.pdf
- (5) More detail please visit the teamroom :  
<http://teams.honeywell.com/sites/HARAEWireless/SitePages/Home.aspx>