

Wireless Modem

RMBLED

Document Information

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Author(s)	
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Approvals

Name	Date	Signature

Release History

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1.0	7/2019	Wang Kai	Initial draft

1. Overview

1.1 Modem Overview

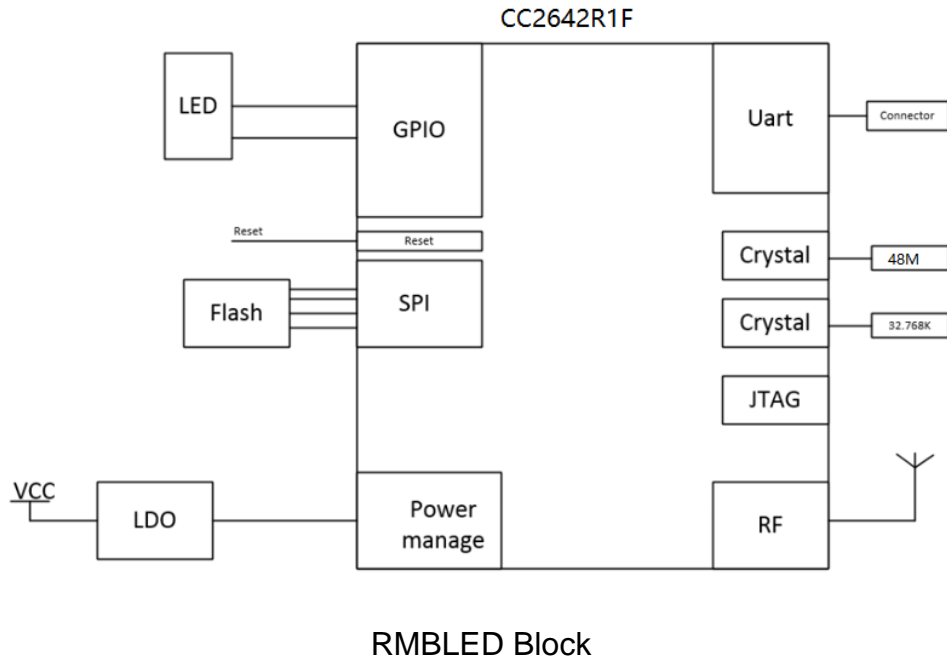
RMBLED modem is a highly-integrated Bluetooth low-energy (BLE) module, which offers a complete solution containing all hardware features necessary for development of wireless application. It enables our Gas detectors connected to wireless ecosystems. RMBLED is a M5 size form factor modem which directly uses TI BLE chipset CC2642R1F, it uses typical FGSK modulation method, which achieves very low active RF and MCU current and low-power mode current consumption. It supports BLE 5.0, which is also upward compatibility BLE 5.0. This modem also supports update firmware via OTA. We also defined a M3 form factor which mount RMBLED on its board, thus guarantee its mount robust on application.

1.2 Key Features

- Ultra-compact size (18.8mm X 13.5mm X3mm)
- BLE 5.0
- UART Interfaces
- Low power consumption
- Embedded antenna design
- FCC and CE compliant
- RoHS compliant, certified lead – and halogen-free
- BQB compliant

2. Modem Pin Definitions

2.1 Block diagram



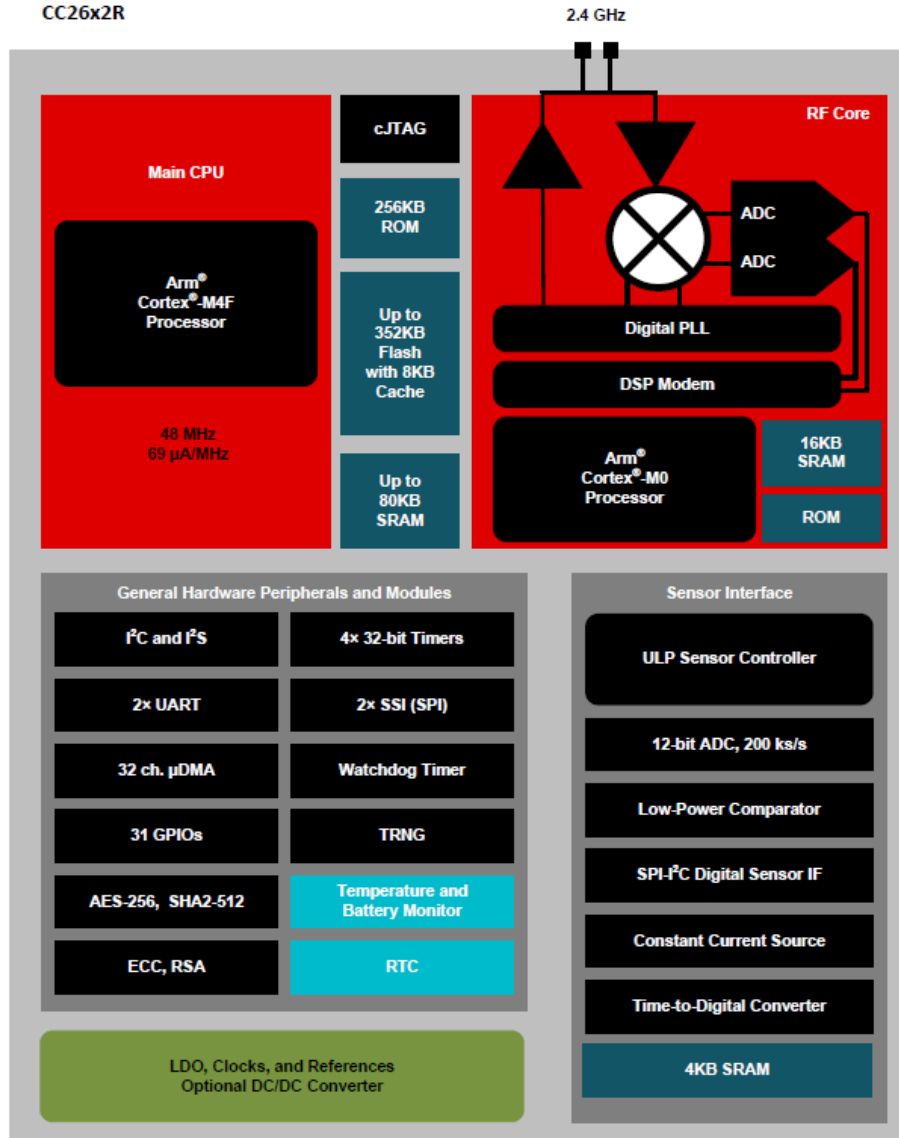


Figure 1-1. CC2642R Block Diagram

2.2 Pin Definition

Pin#	RMBLEB-M5 (TI)	Note	Pin#	RMBLEB-M5 (TI)	Note
1/2/3	NC		27	TDI	JTAG
4/5	NC		28	TDO	JTAG
6	LED_G	LED Green	29	TCK	JTAG
7	NC		30	NC	
8	RESET	Active low	31/32	ADC1/ADC2	Reserved
9	GND		33	NC	

10	NC		34	NC	Connect to VCC inside
11/12	NC		35	GND	Connect to GND inside
13	RXD	UART	36	LED_R	LED RED
14	TXD	UART	37	NC	
15	RTS	OUTPUT	38	BLEPRO	Pull up this pin and reset, enter bootloader mode.
16	CTS	INPUT/active low	39	NC	
17/18	NC		40	NC	
19	NC		41	GPIO	
20	NC		42	NC	
21	NC		43	MODE_EN	FW change this pin function, from wakeup to mode_en. Active low.
22/23	GND		44/46	GND	
24/25	VCC=3.3V		45	RFO	RF Out
26	TMS	JTAG	47/48	NC	

3. Specifications

3.1 Electric Characteristics

Test conditions (unless otherwise stated), Vcc=3.3V, Tamb=25°C.

3.2 RMBLED power consumption

Parameters	Range	Unit	Condition
VCC	1.8 ~ 3.6	V	
Current Consumption: RX mode	15	mA	typical
Current Consumption: TX mode	18	mA	Continuous Transmit
Current Consumption: Sleep mode	3	uA	Base line

3.3 RF characteristics

Parameters	Range	Unit	Condition
Frequency Band	2402 ~ 2480	MHz	
Channel Spacing	2	MHz	

Transmitter Output Power	4.35 ± 0.5	dBm	RBW=1M, VBW=3M, REG=5
Receiver Sensitivity	-91	dBm	PER=1%, PSDU=20 byte
Spurious	40	dBc	Conductive Test

3.4 Module Interfaces characteristics

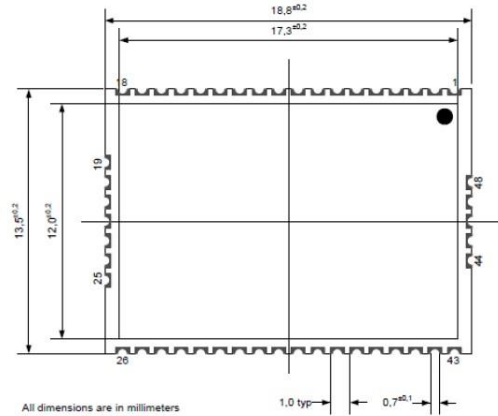
Parameters	Range		Condition
UART Maximum Baud Rate	115200	kbps	
GPIO Output Voltage (VOH/VOL)	0.7VCC/ 0.2VCC	V	-10/ 5mA VCC = 3.3V
GPIO Input Voltage (VIH/VIL)	0.7VCC/0.2VCC	V	
Real Time Oscillator Frequency	32.768	kHz	

4. Physical & Mounting

Physical Characteristics

Parameter	Range	Unit	Condition
Size	18.8x13.5	mm	M5 form factor
Operation Temperature Range	-40 to +60	°C	
Operation Relative Humidity Range	No more than 80%		

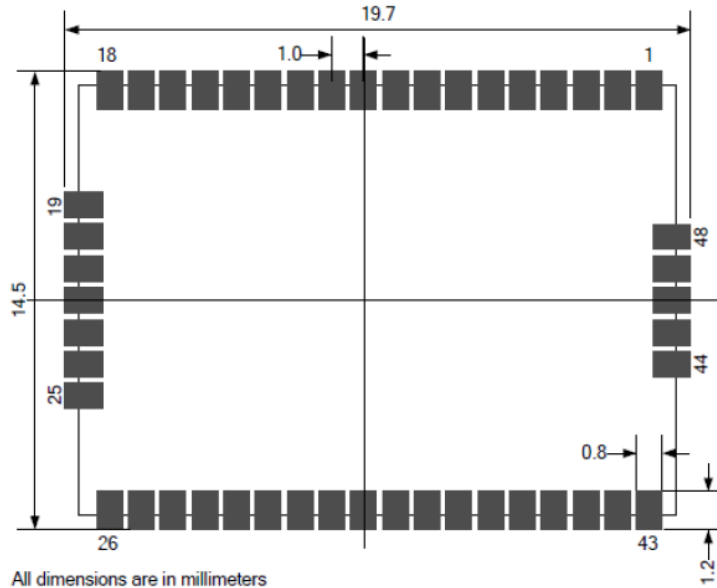
Mechanical drawing, Unit:mm



RMBLEB/C/D/E-M5 size

a. Mounting information

The below diagram shows the recommended PCB layout for RMBLEB/C/D/E-M3 module.



RMBLEB/C/D/E-M3 Mounting drawing

b. Design note for antenna:

Keep at least 5 mm clearance for RMBLED modem.

5. Regulatory

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 satisfaisa