

FCC ID: Q2N-M02

Ultra Range ZigBee Wireless Module (2.4GHz ZigBee / 802.15.4)

User Manual

Integrations made easy, fast and effective

V1.05

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The Federal Communication Commission Statement

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 instruction, may cause harmful interference to radio communication. 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 of 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.**

Use only shielded cables to connect I/O devices to this equipment. You are cautioned that change or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

THIS DEVICE COMPLIES WITH PART 15 OF 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.

The antenna used for this transmitter must not be collocated or operation in conjunction with any other antenna or transmitter.

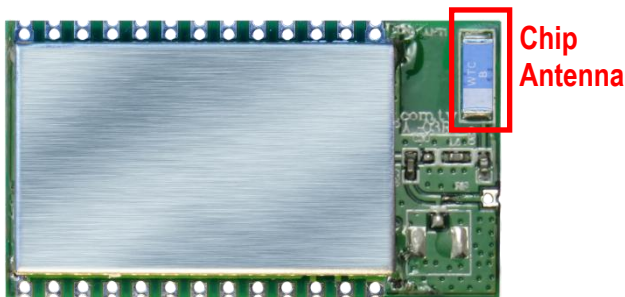
Notice : The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, no change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

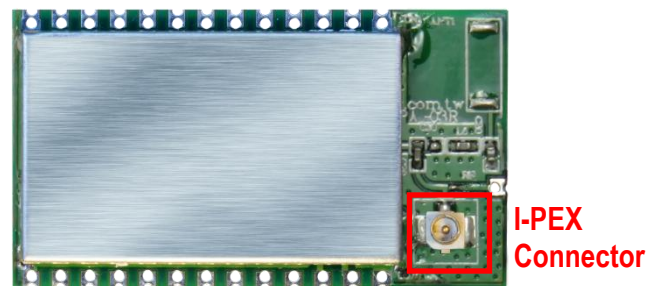
1. Overview

The ultra wide range M02 ZigBee module, equipped with Texas Instrument CC2530 chipset, is stamp-type PCB which allows an easy integration into your embedded systems – with selectable OTA (over-the-air) firmware upgrade option. The module has an I-PEX connector reserved for applications which need a broader coverage and better antenna pattern. And it is also particularly applicable for devices using 20 GPIO for UART, SPI, I2C, AI, DI and DO for building IEEE 802.15.4 compatible ZigBee Wireless networks lowering R&D costs and greatly reducing development schedules. The M02 ZigBee module with power amplifier can be used as end device, router or coordinator. Nietzsche's M02 ZigBee module with power amplifier can be used in a variety of networking applications such as IoT(Internet of Things) home automation, health care, assisting living, smart agriculture, industrial automated monitoring and control, and energy efficiency systems.

2. Installation



M02 Module with Chip Antenna



M02 Module with I-PEX Antenna connector



A Stamp Hole installation example of M02 Module with I-PEX Connector

1. Design and manufacture your system board so that it matches M02 module's electrical and physical characteristics and makes the best use of M02 module (please refer to "**Features and Specifications**" and "**Electrical and Physical Characteristics**" sections).
2. Stamp Hole Installation: Solder and install M02 module onto your system board (please refer to relevant equipment's technical documentation).
3. If your M02 module features an I-PEX connector, connect an I-PEX antenna to the I-PEX connector (please refer to your antenna's technical documentation for more details).

3. Features and Specifications

Transmitting Protocol	ZigBee: HA profile or Standard Modbus RTU
Addressing	Depends on customer (default: MAC address)
Wireless Protocol	IEEE 802.15.4 ZigBee2007/PRO
Transmission Range	Chip antenna: Up to 100 meters / 328 feet I-PEX antenna: Depends on designated antenna's performance
Operating Frequency	2.4GHz ISM Band
RF Output Power	16 dBm
Receiver Sensitivity	-95 dBm
Power Consumption	TX: 180mA / RX: 35mA
Antenna	I-PEX or Chip Antenna
I/O Port	20 x GPIO
Chipset	TI CC2530
Front End Module	TI CC2592
Firmware Upgrade	OTA (Over the Air) or CC Debugger
Network Topology	Star/ Tree/ Mesh
Power Supply	DC 3.3V typical (range: DC 2.2 ~ 3.6V)
Operating Environment	-20 ~ +85°C/ -4 ~ +185°F, 0~95% RH
Dimensions	34(L) x 19(W) x 2.25(H) mm
Weight	3g / 0.1oz
Certifications	CE/ FCC / NCC

4. Electrical and Physical Characteristics

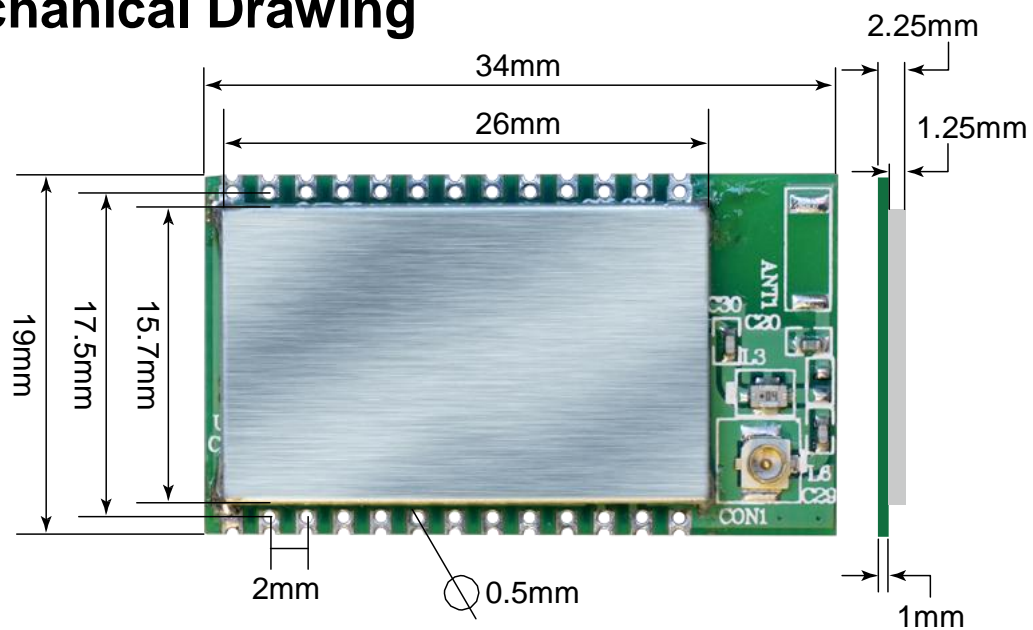
4.1 Electrical and RF Characteristics

Rating	Value	Units
All Input/Output Pins	-0.3 to +3.6	V
Non-Operating Ambient Temperature Range	-40 to +85	°C

Characteristics	Sym	Notes	Minimum	Typical	Maximum	Units
ADC Input Range			0		3.3	V
ADC Input Resolution			7		12	bits
ADC Input Impedance			55			MΩ
PWM Output Resolution					12	bits
UART Baud Rate			1.2		115.2	Kb/s
Digital I/O:						
Logic Low Input Level			-0.3		0.5	V
Logic High Input Level			2.5		3.6	V
Logic Input Internal Pull-up /Pull-down Resistor			20			KΩ
GPIO Drive Capability				4mA X 18	20mA X 2	mA
Power Supply Voltage Range	Vcc		+2.2	+3.3	+3.6	Vdc
Receive Mode Current				35		mA
Transmit Mode Current				180		mA
Sleep Mode Current					5	μA
Operating Temperature Range			-20		85	°C
Operating Frequency Range			2400		2483.5	MHz
Operating Frequency Tolerance			-150		+150	ppm
Spread Spectrum Method			Direct Sequence			
Modulation Type			O-QPSK			

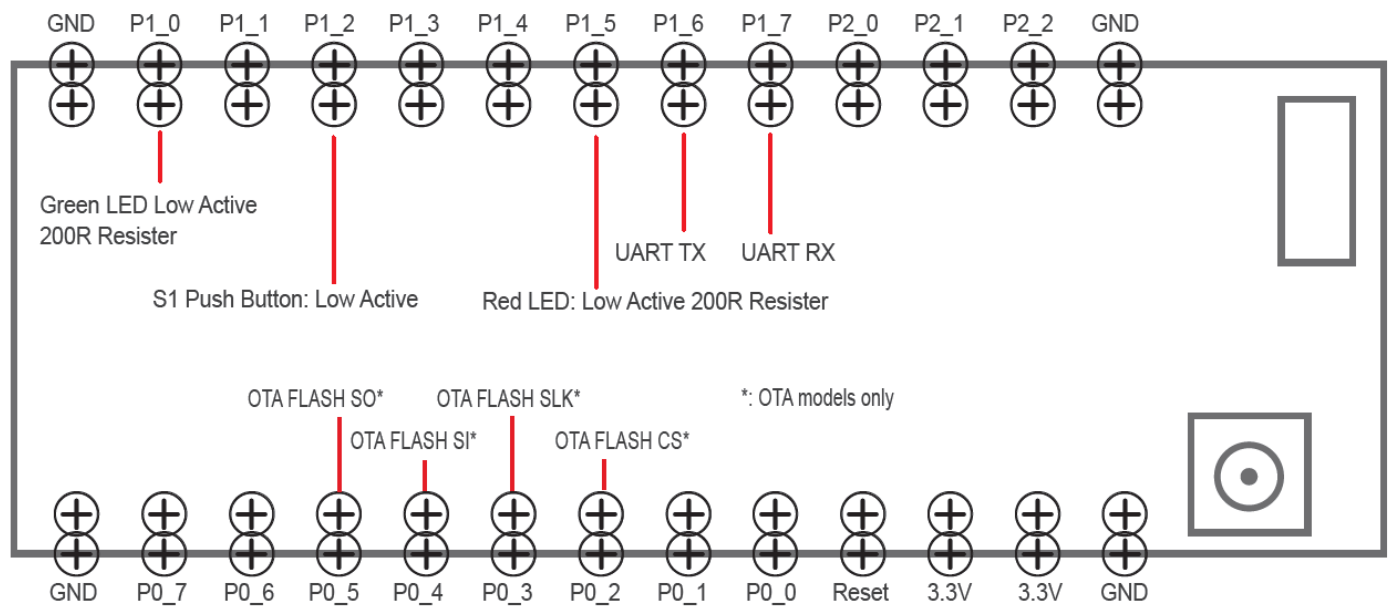
Number of RF Channels				16		
RF Data Transmission Rate					250	Kbps
Symbol Rate Tolerance			-1000		+1000	ppm
RF Channel Spacing				5		MHz
Receiver Sensitivity, @1% PER				-95		dBm
Interference Rejection, ± 5 MHz				35.5		dB
Interference Rejection, ± 10 MHz				45.5		dB
Interference Rejection, ± 20 MHz				48.8		dB
Maximum RF Transmit Power					19	dBm
Optimum Antenna Impedance				50		Ω

4.2 Mechanical Drawing



4.3 Pin I/O Assignment and Description

4.3.1 GPIO Pin Assignments



4.3.2 Pin Description (for Reference)

PIN NO.	PIN NAME	PIN TYPE	DESCRIPTION
1	GND	GND	Power supply and signal ground
2	P2_2	Digital I/O	Debug CLK
3	P2_1	Digital I/O	Debug DAT
4	P2_0	Digital I/O	Reserved (Programmable)
5	P1_7	Digital I/O	Serial data input RXD UART
6	P1_6	Digital I/O	Serial data output TXD UART
7	P1_5	Digital I/O	LED2 indicator, active-low (ref. Red LED)
8	P1_4	Digital I/O	LNA-EN, for PA RX (Default)
9	P1_3	Digital I/O	Reserved (Programmable)
10	P1_2	Digital I/O	Tack SW for join, active-low
11	P1_1	Digital I/O	PA-EN for PA TX (Default)
12	P1_0	Digital I/O	LED1 indicator, active-low (ref. Green LED)
13	GND	GND	Power supply and signal ground
14	GND	GND	Power supply and signal ground
15	P0_7	Digital I/O	Reserved (Programmable)
16	P0_6	Digital I/O	Reserved (Programmable)
17	P0_5	Digital I/O	OTA FLASH SO (Default)
18	P0_4	Digital I/O	OTA FLASH SI (Default)
19	P0_3	Digital I/O	OTA FLASH SLK (Default)
20	P0_2	Digital I/O	OTA FLASH CS (Default)
21	P0_1	Digital I/O	Reserved (Programmable)
22	P0_0	Digital I/O	Reserved (Programmable)
23	RESET_N	Digital Input	Hardware reset, active-low
24	VCC3V3	Power	ZigBee power supply input, 2.2 to 3.6 Vdc
25	VPA3V3	Power	PA power supply input, 2.2 to 3.6 Vdc
26	GND	GND	Power supply and signal ground

5. Regulatory Information

5.1 FCC ID and FCC Statement

FCC ID: Q2N-M02

FCC 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.

6. More Detailed Technical Information

For more detailed technical information regarding the M02 module, please refer to “M02 Module Application Note” on the Sentrol Cloud documentation website:

<http://www.sentrolcloud.com/nhr/view/front/download.php>

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NOTE: Contents of this document are subject to change without notice.