HY-254101 Bluetooth BLE Module Specifications (User manual)

1. Description

HY-254101 Bluetooth low energy module is a single mode device targeted for low power sensors and accessories.

HY-254101 offers all Bluetooth low energy features: radio, stack, profiles and application space for customer applications. The module also provides flexible hardware interfaces to connect sensors.

HY-254101 can be powered directly with a standard coin cell batteries or pair of AAA batteries. in lowest power shutdown mode it consumes only 0.5 uA and will wake up in few microseconds.
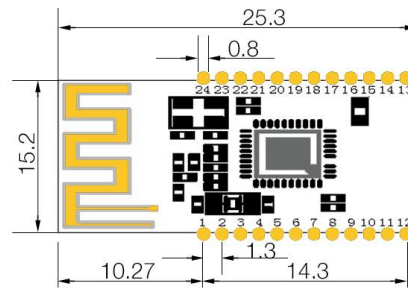
Bluetooth IC: TTC2541 6*6 40pin IC / use TI CC2541 IC dice

2. APPLICATIONS:

        Heart rate sensors
        Pedometers
        Watches
        Blood pressure and glucose meters
        Weight scales
        Key fobs
        Households sensors and collector devices
        Security tags
        Wireless keys (keyless go)
        Proximity sensors
        Indoor GPS broadcasting devices

3. KEY FEATURES:

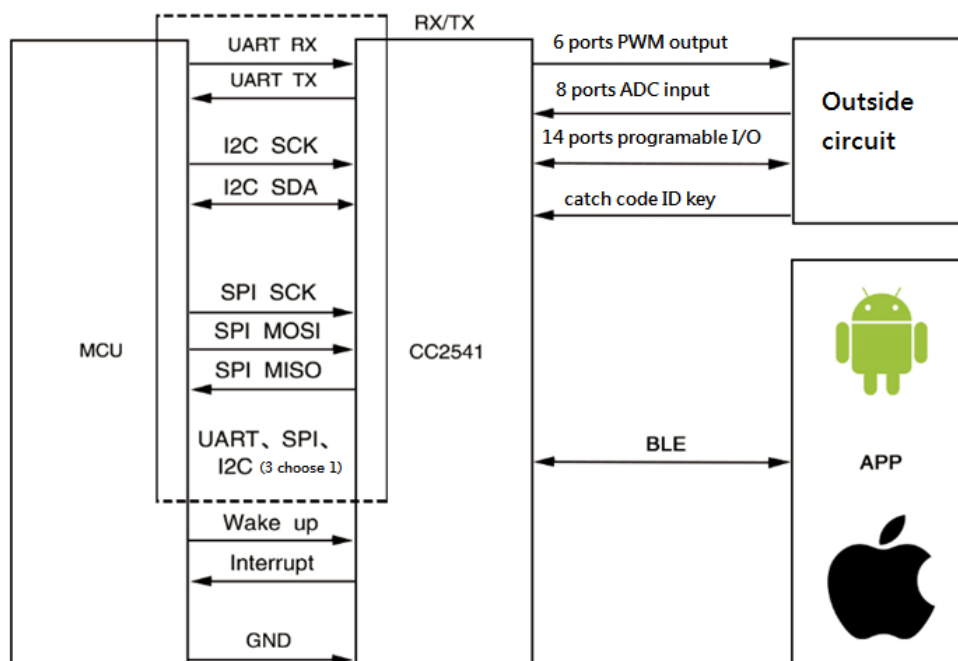- Bluetooth BLE 5.0 single mode RF physics charactics compliant
- Supports master,slave and master/slave modes
- Integrated Bluetooth low energy stack
- GAP, GATT, L2CAP, SMP Bluetooth low energy profiles
- Compliance: BQB , FCC, IC(Canada), CE ETSI RED···etc. worldwide RF Regulations.
- In-System-Programmable Flash 256KB SRAM 8KB
- Low current consumption :Shutdown. No clocks running, no retention: 0.5uA(Typical)

(4). Dimensions Size and FCC ID/ IC ID print word:

PCBA SIZE：
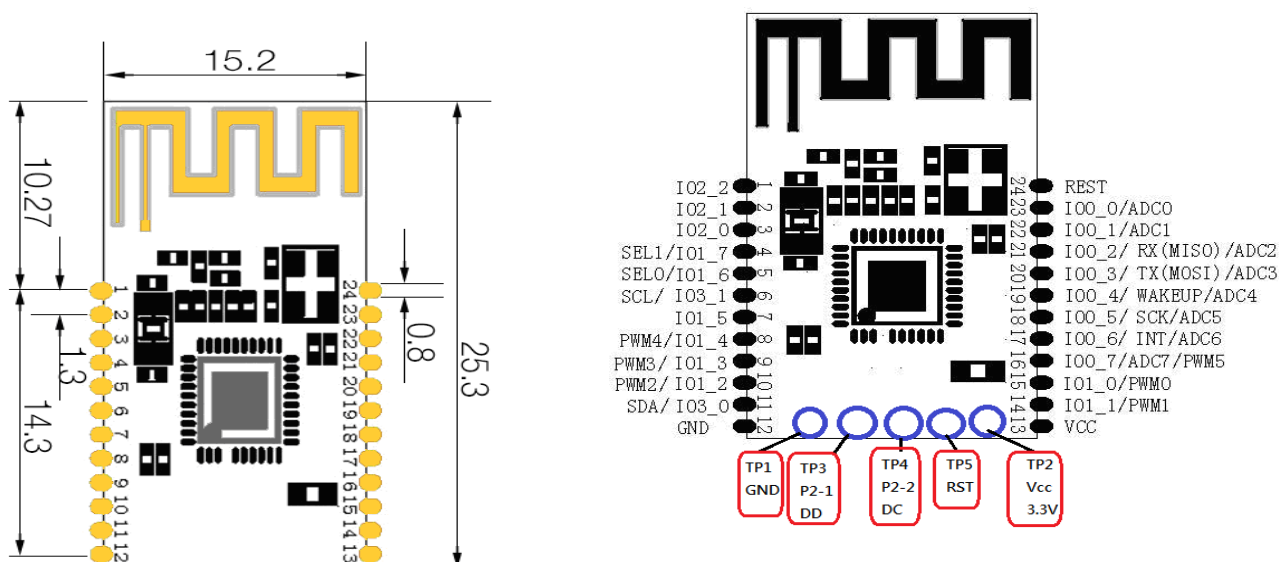15.2＊25.3＊2.5 mm

(5)、HY-254101 Module Working mode schematic :

(6). Electrical characteristics
(With Ta = 25 ℃, VDD = 3.3V, standard measure: 1Mbps , 250KHz GFSK modulation , Bluetooth Low energy mode.)
1. Modulation Mode: GFSK;
2. Frequency range: 2402~2480MHZ (2.4G ISM band);
3. Operating ambient temperature range: -40 ℃ ~ + 85 ℃;
4. The storage temperature range: -40 ℃ ~ + 125;
5. Receiving mode current (high gain setting): 20.02 mA (typical);
6. Transmit mode current (at 0dBm output setting): 18.2 mA (typical);
7. MCU law active current (only 32MHz operation of X-tal OSC):6.7 mA (typ);
8. Power mode 1: The current consumption: (under MCU standby mode, the wake-up time = 4uS); I= 270uA (Typical);
9. Power mode 2: THE current consumption in sleep mode.timer activate / enable,

wake-up time can by the programming software setting): I = 1uA (typ);
10. Power mode 3: The current consumption :(Low power deep sleep mode,
    by the hardware initiative wake): I = 0.5uA(Typical);

(6-1）HY-254101（ PCB Antenna）pin map

(6-2) Pin function table (Not shown in the I/O pin functions ,Please see
       (6-3) input and output ports description)

PinNo.	Function	Function Description
1	IO2_2 / DC	Digital I/O port 2_2 / Debug clock
2	IO2_1 / DD	Digital I/O port 2_1 / Debug data
3	IO2_0	Digital I/O port 2_0
4	IO1_7 / SEL1	Digital I/O port 1_7 MCU communication mode select, See table(5-3) Communication protcol mode selection, I/O setting Table
5	IO1_6 / SEL0	Digital I/O port 1_6 MCU communication mode select, See table(5-3) Communication protcol mode selection, I/O setting Table
6	IO3_1 / I2C SCL	Digital I/O port 3_1 IIC serial Clock (SCL) can be used as I2C clock pin or digital I/O. Leave floating if not used. If grounded disable pull up
7	IO1_5	Digital I/O port 1_5
8	IO1_4 / PWM4	Digital I/O port 1_4 / PWM port 4
9	IO1_3 / PWM3	Digital I/O port 1_3 / PWM port 3

10	IO1_2 / PWM2	Digital I/O port 1_2 / PWM port 2
11	IO3_0 / I2C SDA	Digital I/O port 3_0 I2C serial Data (SDA) Can be used as I2C data pin or digital I/O. Leave floating if not used. If grounded disable pull up
12	GND	BLE module grounding pin
13	VCC	BLE module power supply pin, voltage range of 2.0 ~ 3.6V
14	IO1_1 / PWM1	Digital I/O port 1_1 20mA drive capability / PWM port 1
15	IO1_0 / PWM0	Digital I/O port 1_0 20mA drive capability / PWM port 0
16	IO0_7	Digital I/O port 0_7
	ADC7	ADC port 7
	PWM5	PWM port 5
17	IO0_6	Digital I/O port 0_6
	INT	Interrupt output pin
	ADC 6	ADC port 6
18	IO0_5	Digital I/O port 0_5
	SPI SCK	SPI Bus clock signal
	ADC 5	ADC port
19	IO0_4	Digital I/O port 0_4
	WAKEUP	BLE wake up pin, Low/ wake up, High / BLE module automatically sleep
	ADC4	ADC port 4
20	IO0_3	Digital I/O port 0_3
	UART TX	UART Serial data bus output
	SPI MOSI	SPI Master Out , Slave input
	ADC3	ADC port 3
21	IO0_2	Digital I/O port 0_2
	UART RX	UART Serial data bus input
	SPI MISO	SPI Master input , Slave output
	ADC2	ADC port 2
22	IO0_1 / ADC1	Digital I/O port 0_1 / ADC PORT 1

| 23 | IOO_0 / ADC0 | Digital I/O port 0_0 / ADC PORT 0 |
| 24 | Reset | BLE hardware reset pin (Low: reset) |

Pin Function Description (The module following collectively "BLE"):

a. UART: serial bus, the default baud rate 9600bps, a single packet transmission is less than 17 bytes, package transmission intervals greater than 20ms.

b. SPI: SPI bus interface, support for less than 2M / S data transmission rate, a single packet transmission is less than 17 bytes, package transmission intervals greater than 20ms.

c. IIC: IIC bus interface, support more than 22K / S, less than 400K / S data transmission rate, a single packet transmission is less than 8 bytes, package transmission intervals greater than 20ms.

d. RX: serial bus data input.

e. MOSI: Master output, Slave input.

f. MISO: Master input, Slave output.

g. SCK: SPI bus clock signal.

h. SDA: IIC data.

i. SCL: IIC clock.

j. WAKEUP: BLE wake up pin, Low _wake up, High/ BLE module automatically sleep.

k. SEL0 ~ SEL1: MCU and BLE communication mode selection pin. Specific details, see "(7-3) communication protocol mode selection, I/O setting table ".

l. REST: BLE hardware reset pin, Low_reset.

m. VCC: BLE module power supply pin voltage range DC 2.0~3.6V.

n. GND: BLE module ground pin.

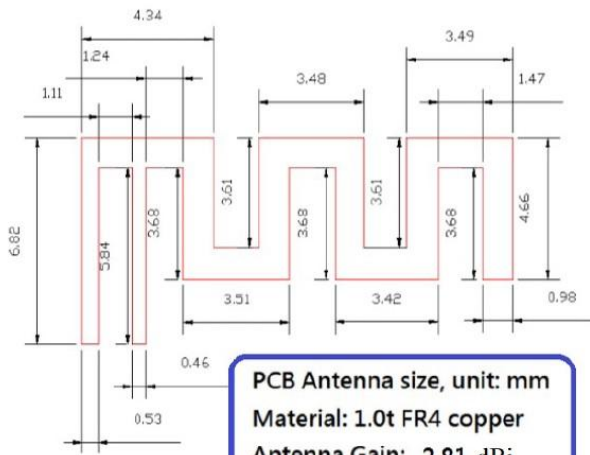(6-4). Communication protocol mode selection, I/O setting Table

No.	Channel Select PIN status		Communication interface state			Remark
	SEL1	SEL0	UART	SPI	IIC	1. Command mode Please contact the Vendor. 2. Description: 0 is Low, 1 is high
1	0	0	OK	X	X	
2	0	1	OK	X	X	
3	1	0	X	OK	X	
4	1	1	X	X	OK	
5	X	X	OK	X	X	

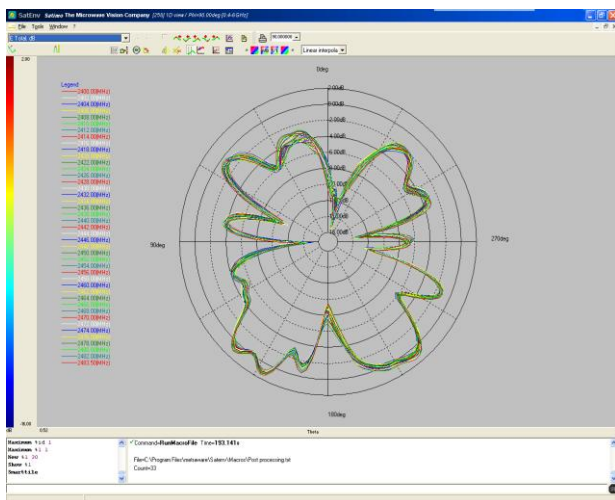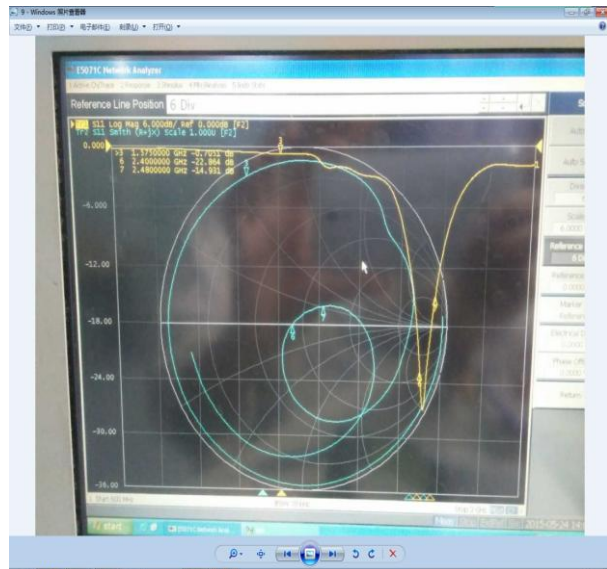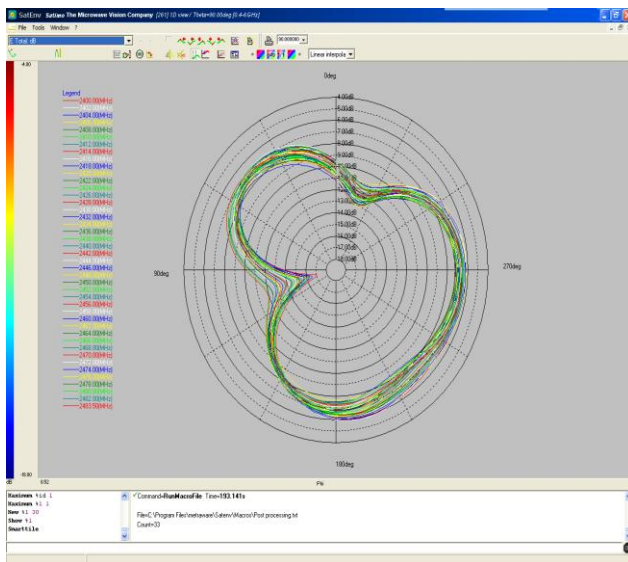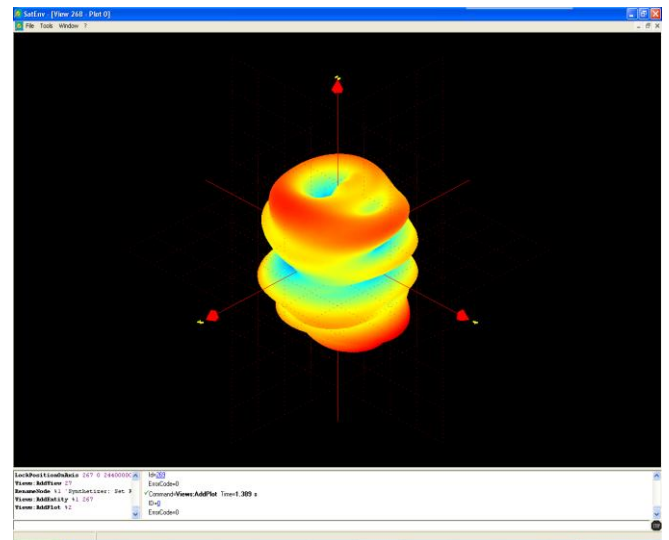UART mode: SEL1=0, SEL0=0 or SEL1=0, SEL0=1 or SEL0, SEL1 floating.

SPI mode: SEL1=1, SEL0=0

IIC mode: SEL1=1, SEL0=1

(7). Antenna size and data: (Frequency Range: 2.4~2.48GHz)

PCB Antenna size, unit: mm
Material: 1.0t FR4 copper
Antenna Gain: 2.81 dBi
at 2440MHZ

（8）. **FCC Caution:**

Any Changes or modifications not expressly approved by the party responsible for

compliance could void the user's authority to operate the equipment.

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 RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment.
3. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Host product manufacturers that they need to provide a physical or e-label stating

Contains FCC ID" with their finished product.

Only those antennas with same type and lesser gain filed under this FCC ID can be used with this device.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The final host integrator must ensure there is no instruction provided in the user manual or customer documentation indicating how to install or remove the transmitter module except such device has implemented two-ways authentication between module and the host system.

The final host manual shall include the following regulatory statement:This equipment has been tested and found to comply with the limits for a 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.