# TTCIOTSDK

HY-254104 Bluetooth BLE v4.0 UART Module Specifications

(7 pin)

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Version：V2.2

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1.Description

HY-254104 Bluetooth low energy UART protocol module is a single mode device targeted for low power sensors and accessories.

HY-254104 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-254104 can be powered directly with a standard 3V 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.

HY-254104 transmission distance of 50 meter. (At face to face, free space, 1.2 Meter high from Ground for testing).

Bluetooth IC：TTC2541 6*6*0.9mm 40pin IC / use TI CC2541 IC dice

1-1.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

1-2.KEY FEATURES:

- Bluetooth BLE v.4.0 single mode compliant
- Supports master,slave nd master/slave modes
- Integrated Bluetooth low energy stack
- GAP, GATT, L2CAP, SMP Bluetooth low energy profiles
- Compliance: BQB BLE4.0, FCC, IC(Canada), CE ETSI RED…etc. worldwide RF Regulations.
- Transmit power :+0dBm typical
- Receiver sensitivity: -94dBm typical
- In-System-Programmable Flash 256KB    SRAM 8KB
- Low current consumption :Shutdown. No clocks running, no retention: 0.5uA(Typical)
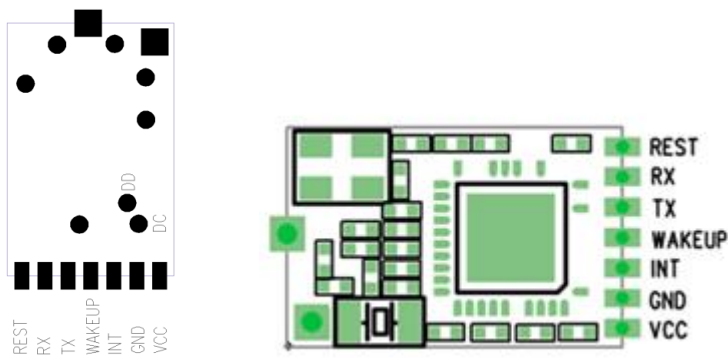
## 2. WMD410004SR6A0 (HY-254104) Metal wire Antenna PCBA dimension size and picture

(PCBA dimension size : 15.2*25.3*2.0 mm).

PCBA SIZE：
9.2*14.1*2.0 mm
Pin Quantity：7pin
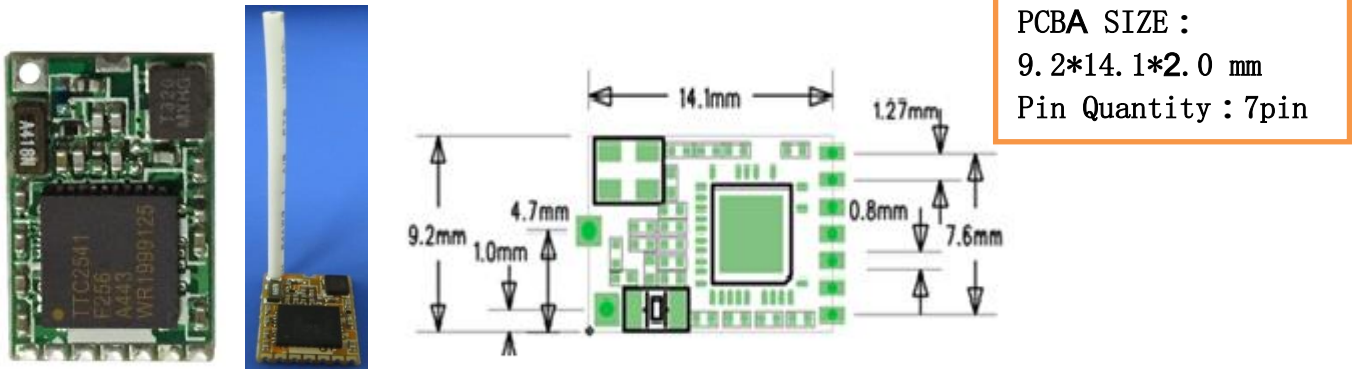
## 3.Module pin definition and description of input and output ports

（3-1）HY-254104（Metal wire Antenna）PCBA pin map

（3-2）Pin function table

| pin No. | Function Descrip. | Function corresponds |
|---------|-------------------|----------------------|
| 1 | REST | BLE hardware reset pin (Low: reset) |
| 2 | RX | UART Serial data bus input |
| 3 | TX | UART Serial data bus output |
| 4 | WAKEUP | BLE wake up pin: Low/ wake up, High / BLE module automatically sleep |
| 5 | INT | Interrupt output pin |
| 6 | GND | BLE module grounding pin |
| 7 | VCC | BLE module power supply pin, voltage range of 2.0 ~ 3.6V |

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a. UART: serial bus, the default baud rate 115200bps, a single packet transmission
   is less than 17 bytes, package transmission intervals greater than 20ms.
b. WAKEUP: BLE wake up pin, Low _wake up, High/ BLE module automatically sleep.
c. RESET: BLE hardware reset pin, Low level reset.
d. VCC: BLE module power supply pin voltage range DC 2.0~3.6V.
e. GND: BLE module ground pin.


4. Electrical Characteristics

4-1: General Characteristics

(With Ta = 25 ℃, VDD = 3.0V, standard measure:1Mbps , 250KHz GFSK   modulation , Bluetooth Low energy mode.)

1. Modulation Mode: GFSK;
2. Frequency range: 2402~2480MHZ (2.4G ISM band);
3.Transmit power setting Range: -20 ~ +0 dBm typical ( differential mode o/p point characteristics ; programmable by software)
4. Operating ambient temperature range: -40 ℃ ~ + 125 ℃;
5. The storage temperature range: -40 ℃ ~ + 85 ℃;
6. The power supply voltage: 2.0 ~ 3.6VDC;
7. Receiver sensitivity: - 94dBm typical( direct test from IC RF out differential mode o/p point characteristics)
8. Receiving mode current (high gain setting): 20.02 mA (typical);
9. Transmit mode current ( at 0dBm output setting ): 18.2 mA (typical);
10. MCU law active current (only 32MHz operation of X-tal OSC): 6.7 mA (typ);
11. Power mode 1: The current consumption: (under MCU standby mode,
    the wake-up time = 4uS); I= 270uA (Typical);
12. Power mode 2: THE current consumption in sleep mode.
    timer activate / enable, wake-up time can by the programming   software setting): I = 1uA (typ);
13. Power mode 3: The current consumption :( Low power deep sleep mode,
    via the hardware initiative wake ): I = 0.5uA(Typical);

4-2. Absolute Maximum Ratings

Note: These are absolute maximum ratings beyond which the module can be permanently damaged, these are not Maximum operating conditions, the maximum recommended operating conditions are in the table 4-4.

| Rating | Min | Max | Unit |
|---|---|---|---|
| VDDS | -0.3 | 3.9 | V |
| Other Terminal Voltages | VSS-0.3 | VDDS+0.3 | V |
| Storage Temperature | -40 | +125 | °C |

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating*

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*Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## 4-3. ESD Ratings

| | | | Value | Unit |
|---|---|---|---|---|
| V<sub>ESD</sub>Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDECJS001 | All pins | ±2000 | V |
| | Charged device model (CDM), per JESD22-C101 | RF pins | ±750 | |
| | | Non-RFpins | ±750 | |

 (2) CAUTION: ESD sensitive device. Precautions should be used when handing the device in order to prevent permanent damage.

## 4-4. Recommended Operating Conditions

Supply voltage noise should be less than 10mVpp. Excessive noise at the supply voltage will reduce the RF performance.

| Rating | Min | Max | Unit |
|---|---|---|---|
| VDD ( when BlueTooth Active) | 2.0 | 3.6 | V |
| VDD( when flash programming) | 2.4 | 3.3 | V |
| Operating Temperature Range | -40 | +85 | °C |

Note:

(1).VDD power supply recommended voltage : 2.7~3.3V

(2).When programming firm ware , the VDD supply voltage must in DC 2.4~3.3V,

   To avoid programming has not completely, or abnormal status occur..

(3).For smaller coin cell batteries, with high worst-case end-of-life equivalent source resistance, a 22-μF VDDS input capacitor must be used to ensure compliance with this slew rate(6-6 timing req.).
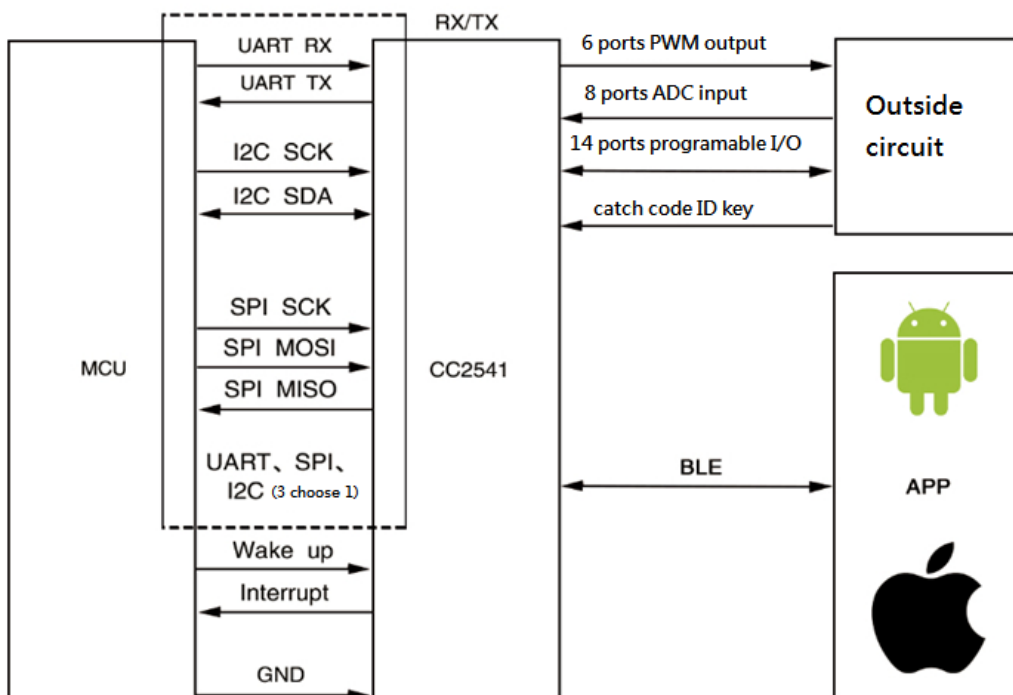
## 5. Block Diagram
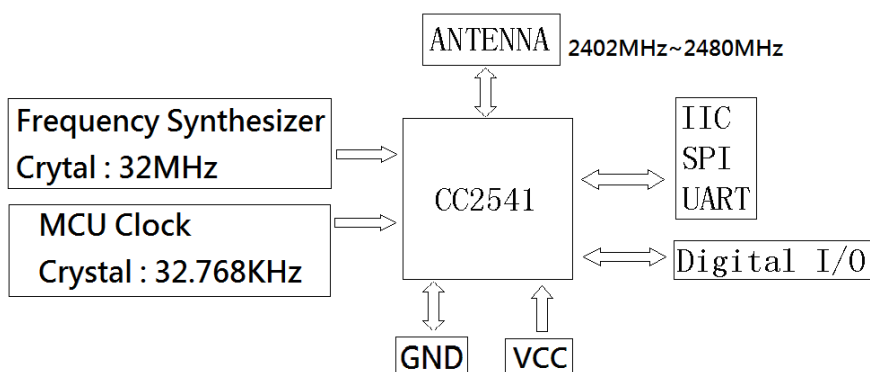
# 6. Functional Block Diagram
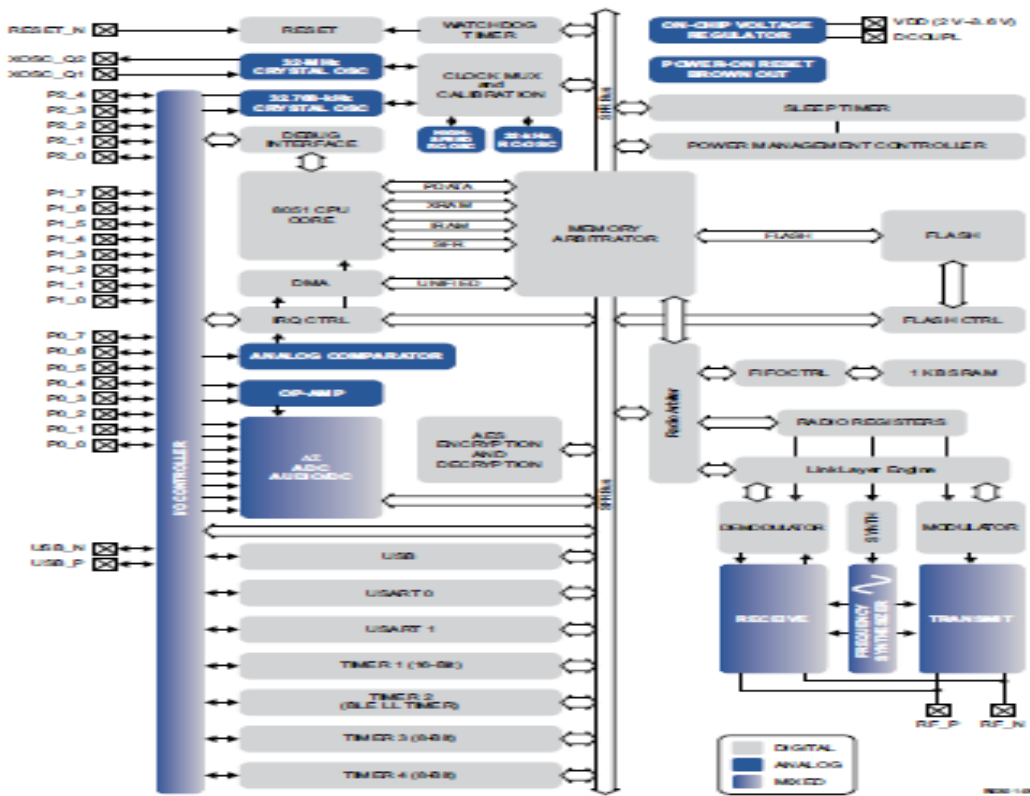


# 7. Working mode schematic :

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## 8.Metal wire antenna characteristics:

Antenna Gain : 2.657dB at 2440MHz

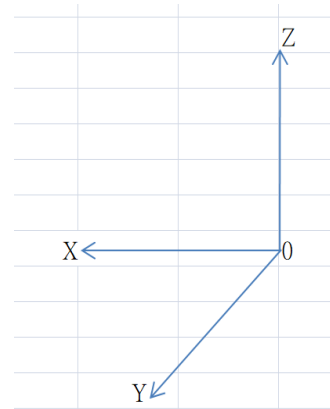| Synthetizer: Set Frequency | Gain . dBi | Efficiency(%) | Efficiency(dB) |
|---|---|---|---|
| 2402 | 2.44 | 54.50% | -2.636 |
| 2440 | 2.65 | 54.38% | -2.646 |
| 2480 | 2.46 | 49.10% | -3.089 |

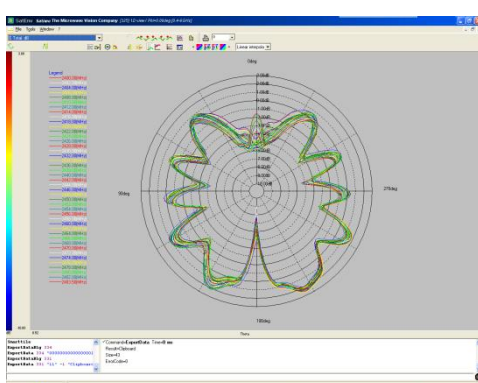8-1  Antenna size          8-2. 3D Radiation Pattern          8-3.   X / Y / Z coordinate
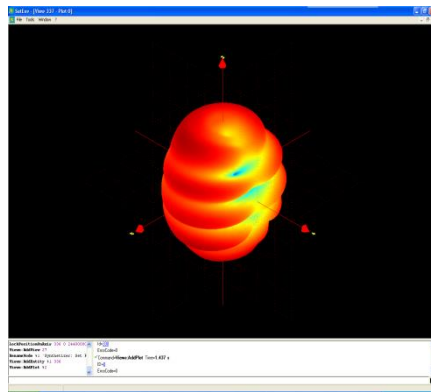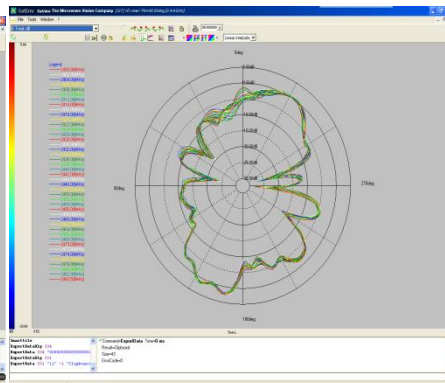




8-4. Phi   = 0 degree pattern      8-5.   Phi = 90 degree pattern      8-6. Theda = 90 degree pattern

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