

HY-234004PC

Bluetooth Module Specification

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The *Bluetooth* trademark is owned by the Bluetooth SIG Inc., USA

1. Module Overview

1.1. Description

HY-234004P is based on TI (Texas Instruments) CC2340 as the core design of a SimpleLink 2.4 GHz wireless module, Supports Bluetooth®5.3 Low Energy and proprietary protocols. Integrated high-performance ARM Cortex-M0+ processor with 512 KB Flash, 36 KB ultra-low leakage SRAM, and on-board industrial-grade 48 MHz crystal. The module supports high-speed mode (2Mbps PHY), long-distance broadcasting (LE Coded 125kbps and 500kbps PHY), and backward compatibility with key features of BLE 4.2 and earlier BLE specifications.

HY-234004P BLE module provides Bluetooth low power features: radio, Bluetooth protocol stack, profile and required space for customer applications. The module also provides a flexible hardware interface for connecting sensors. It can be powered directly using a standard 3V button battery or a pair of AAA batteries, and in the lowest power off mode, it consumes only 0.15uA and wakes up in a few microseconds. The transmission distance will vary according to the structure of the whole product, the material of the parts, the layout, the type of antenna, the placement position, and the surrounding environment. Bluetooth IC: CC2340R5 4*4*0.9mm QFN24.

1.2. Applications

• Medical

- Home healthcare – blood glucose monitors, blood pressure monitor, CPAP machine, electronic thermometer
- Patient monitoring & diagnostics – medical sensor patches
- Personal care & Fitness – electric toothbrush, wearable fitness & activity monitor

• Building automation

- Building security systems – motion detector, electronic smart lock, door and window sensor, garage door system, gateway
- HVAC – thermostat, wireless environmental sensor
- Fire safety system – smoke and heat detector
- Video surveillance – IP network camera

• Lighting

- LED luminaire
- Lighting Control – daylight sensor, lighting sensor, wireless control

• Factory automation and control

• Retail automation & payment

- Electronic shelf label

• Communication equipment

- Wired networking
- wireless LAN or Wi-Fi access points, edge router

• Personal electronics

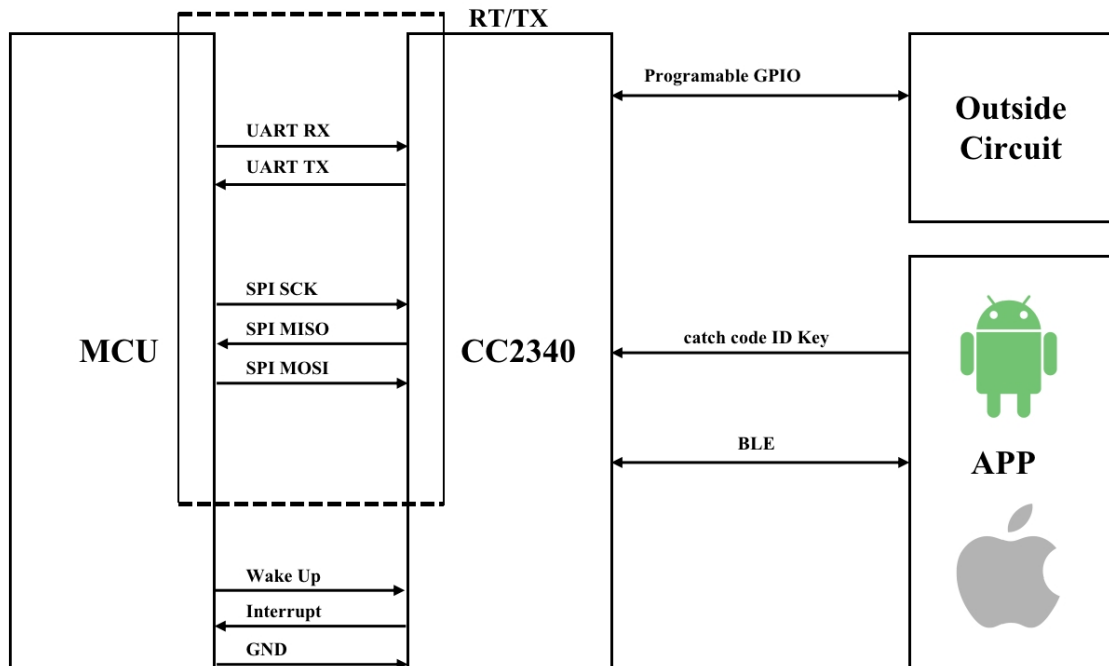
- Connected peripherals – consumer wireless module, pointing devices, keyboards and keypads, electronic and robotic toys
- Wearables (non-medical) – smart trackers, smart clothing

1.3. Key Features

- Bluetooth 5.3, single-mode compatible.
- Support master mode, slave mode, master-slave mode.

- Integrated Bluetooth low power stack.
- GAP, GATT, L2CAP, SMP Bluetooth low power profile.
- Ultra-low current power consumption.
- Standby state: 0.7uA(RTC running and RAM/CPU holding,LFXT DCDC charging current setting: ipeak=7).
- Shutdown status: 150nA (no clock running, no retention).
- Programmable ARM Cortex-M0+ processor for embedding complete applications.

1.4. Working Mode Schematic



2. Electrical Characteristic

(Test conditions: Ta = 25 °C, VDD =3.0V internal DC-DC regulator, test standard :1Mbps GFSK modulation,FRF = 2440MHz BLE mode.)

2.1. Radio Characteristics And Current Consumption:

- Modulation mode: GFSK.
- Frequency range: 2400 ~ 2483.5MHz(2.4G ISM Frequency band).
- IC Transmitting power range: -21 ~ +8dBm typical(Controlled by software programming).
- RF transmit power at antenna feed: +6 dBm typical.: +6 dBm typical. (RF TX Set at +8dBm maximum feature).
- RF receiving sensitivity of antenna feeder: -93dBm typical (In PER <30.8% characteristic).
- Frequency offset :RF ± 60ppm, MCU clock 32.768KHz ± 350ppm (using crystal mode).
- Ultra-low current consumption:
 - RF TX Current: 5mA (0dBm).
 - RF TX current: <12mA (8dBm).

- RF RX current: 5.3mA.
- Idle state current: 56uA (support system and RAM power supply).
- Standby state current: 0.7uA (RTC run and RAM/CPU hold).
- Shutdown state current: 150nA (no clock running, no storage).

2.2. Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

Rated value	MIN	MAX	Unit
VDDS	-0.3	4.1	V
Other terminal voltage	VSS-0.3	VDDS+0.3	V
Storage temperature	-40	+150	°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 Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) All voltage values are with respect to ground, unless otherwise noted.

2. 3. ESD Ratings

			Rating	Unit
V _{ESD} Electrostatic discharge	Human body model (HBM) , BasisANSI/ESDA/JEDEC/JS001	ALL PIN	±2000	V
		RF PIN	±500	
	Charging device mode, Basis JESD22-C101	NOT RF PIN	±500	

2.4. Recommended Operating Conditions

Power supply voltage noise should be less than 10mVpp, too large power supply noise, will reduce the RF performance.

Rated value	MIN	MAX	Unit
VDD(Bluetooth operating time)	2.2	3.8	V
VDD (Flash memory burning program firmware)	2.4	3.6	V
Operating temperature	-40	+125	°C

Notes:

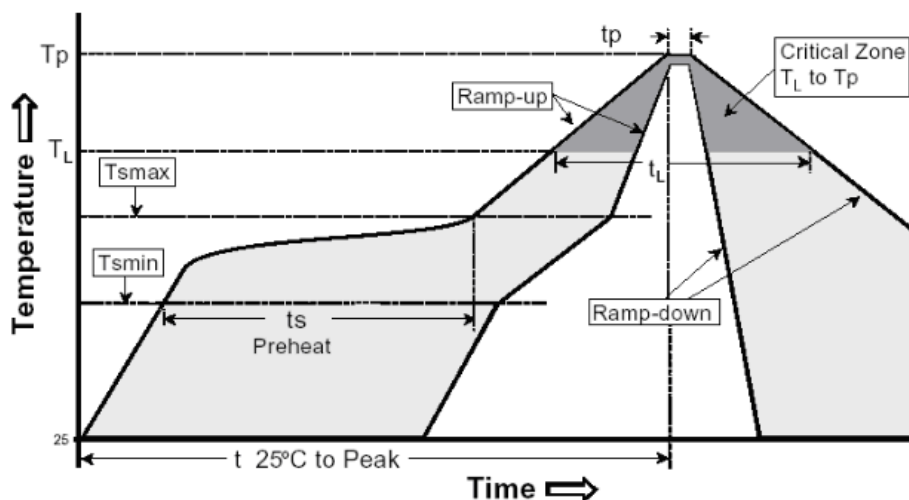
- (1).VDD DC power supply recommended voltage: 2.7~3.3V DC.
- (2).When the module flash memory is burning the program firmware, the VDDS DC power supply voltage should be between 2.4 and 3.6V to avoid incomplete or abnormal conditions when burning.
- (3).In the worst case, the battery equivalent source resistance will cause a power supply voltage drop, and the VDDS must use a 22μF input capacitor to strengthen the power supply capacity to ensure that the conversion rate (3-6 timing requirements) is met.

3. Recommended Reflow Curve

Profile Feature	Pb-Free Assembly	
	Large Body	Small Body
Average ramp-up rate(T_L to T_P)	3°C/second max	
Preheat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max)(t_s)	150°C 200°C 60-180 seconds	
T_{smax} to T_L -Ramp-up Rate	3°C/second max	
Time maintained above -Temperature (T_L)-Time (t_L)	217°C 60-150 seconds	
Peak Temperature (T_P)	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature (t_p)	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max	
Time 25°C to Peak Temperature	8 minutes max	

Notes:

- 1、lead-free solder paste: Sn 96.5%, Ag 3%, Cu 0.5%);
- 2、The furnace temperature curve is for reference only, please adjust according to the actual effect;



FCC regulatory compliance statement

§15.19 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.

§15.21 Information to user

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

- List of applicable FCC rules:

47 CFR Part 15, Subpart C 15.203
47 CFR Part 15, Subpart C 15.205
47 CFR Part 15, Subpart C 15.207
47 CFR Part 15, Subpart C 15.209
47 CFR Part 15, Subpart C 15.247
47 CFR Part 2.1091

- Summarize the specific operational use conditions

This module can be used in IOT devices, the input voltage to the module is nominally **DC 3.3V**

- Limited module procedures

This module is not a limited module.

- Trace antenna designs

The antenna is not a trace antenna.

- RF exposure considerations

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

- Antennas

If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

- Label and compliance information

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: **"Contains FCC ID: 2ADXEHY-234004PC"** any similar wording that expresses the same meaning may be used.

§ 15.19 Labelling requirements shall be complied on end user device.

Labelling rules for special device, please refer to §2.925, § 15.19 (a)(5) and relevant KDB publications. For E-label, please refer to §2.935.

- Information on test modes and additional testing requirements

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

The module is limited to installation in mobile application, a separate approval is required for all other operating configurations, including portable configurations with respect to §2.1093 and difference antenna configurations.

Test software access to different test modes: AB1562E Airoha_Tool V3.2.2
Testing item, Frequencies, Transmit Power, Modulation Type can be selected on the test script instructions.



● FCC other Parts, Part 15B Compliance Requirements for Host product manufacturer

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, 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.

Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.

Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in §15.105 *Information to the user* or such similar statement and place it in a prominent location in the text of host product manual. Original texts as following:

For Class B

Note: 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.*

For Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.