RF-BM-2652P3 Specification

Version 1.0

ShenZhen Rfstar Technology Co.,Ltd

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● Overview

➢ Brief introduction

RF-BM-2652P3 is a multi-protocol 2.4GHz high transmission power wireless module based on Texas Instruments CC2652P, which is independently developed by ShenZhen Rfstar Technology Co.,Ltd.

In addition to integrating a high-performance ARM Cortex-M4F processor responsible for application logic with an ARM Cortex-M0 processor dedicated to the RF core, the module also features a 16-bit low-power sensor processing core. It has 352 KB programmable flash memory and 80 KB ultra-low leak RAM(SRAM).Support THREAD, ZigBee, low-power Bluetooth 5.0, 6LoWPAN, Wi-Fi and other wireless communication protocols.

The module has integrated industrial 48 MHz crystal oscillator and 32.768 kHz low power clock crystal oscillator. Contains a variety of peripherals, such as: I2C, I2S, UART, SPI,ADC and GPIO.

Confidential

Figure 1. Diagram

➢ Application

RF-BM-2652P3 module can be widely used in a variety of occasions, such as：

• 2402 MHz to 2480 MHz ISM and SRD systems

- Receive bandwidth as low as 4 kHz

• Residential and building automation

- Building security systems: motion detectors, electronic door locks, door and window sensors, gateways

- HVAC: Thermostat, wireless environmental sensor, HVAC system controller

- Fire safety system: smoke detector, fire control panel

- Video surveillance: IP camera

- Garage door opener

- Lift and escalator controls

• Smart grid and automatic meter reading

- Water, gas and electricity meters

- Heat distribution meter

- the gateway

• Wireless sensor networks

- Remote sensor applications

• Asset tracking and management

• Factory automation

• Wireless healthcare applications

• Energy harvesting applications

• Electronic Shelf Labels (ESL), etc

● **Module parameters**

Table 1. parameters

Chip	CC2652P
Working voltage	1.8 ~ 3.8 V，3. 3V is recommended
Working frequency	2402 MHz ～ 2480 MHz
Receiving sensitivity	-100 dBm @ 802.15.4 (2.4 GHz) -105 dBm @ Bluetooth 125-kbps (LE Coded PHY)
SRAM	80 KB
FLASH	352 KB
GPIO	23 个
Power consumption	The current of receives：6.9 mA The current of transmit：7.3 mA @ 0 dBm 9.6 mA @ 5 dBm 22 mA @ 10 dBm 85 mA @ 20 dBm MCU 48 MHz (CoreMark)：3.4 mA (71 µA/MHz) Sensor Controller：30.8 µA @ Low Power-Mode, 2 MHz 808 µA @ Active-Mode, 24 MHz sleep mode：0.94 µA（RTC running, 80KB RAM and CPU maintained） shutdown：150 nA
Encapsulation	SMT
Interface	UART, I²S, I²C, SPI, ADC
Size	30 x 16.4 mm
Operating temperature	- 40 ℃ ～ + 85 ℃
Storage temperature	- 40 ℃ ～ + 125 ℃

● Module size and pin definition

UNIT:MM
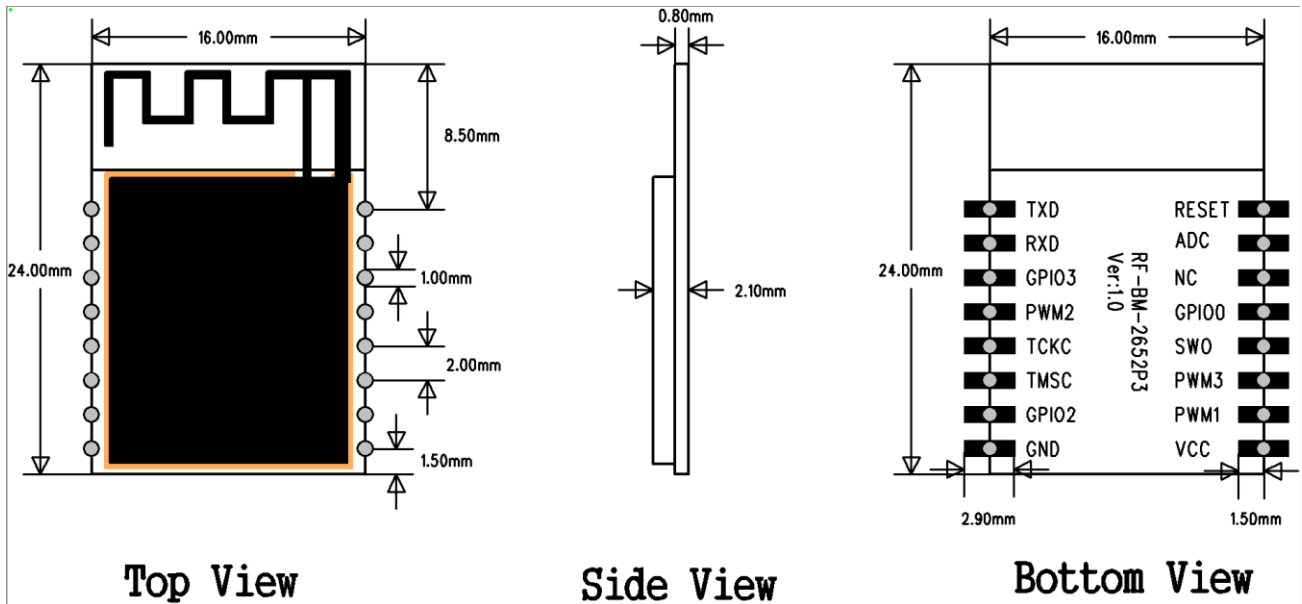
Figure 2. RF-BM-2652P2 尺寸图
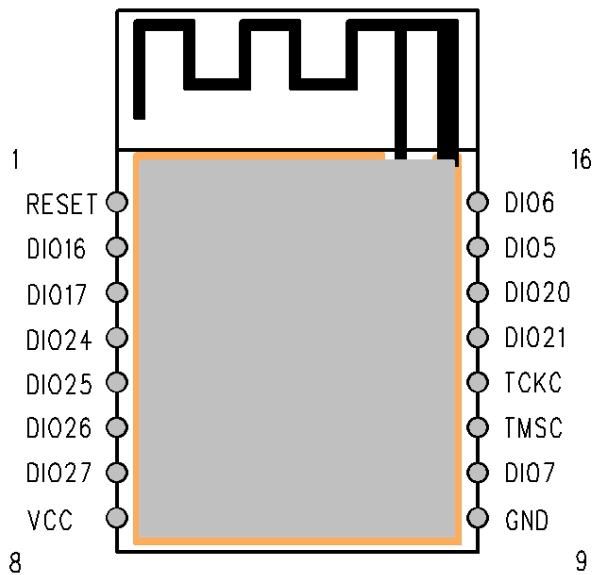
Figure 3. RF-BM-2652P2 引脚图

Table 2. pin definition

Pin number	Name	Function	Note
1	RESET	Reset	Reset, active low level
2	DIO16	GPIO	
3	DIO17	GPIO	
4	DIO24	GPIO	

5	DIO25	GPIO	
6	DIO26	GPIO	
7	DIO27	GPIO	
8	VCC	Supply	The supply of module: 1.8V ~ 3.8V, 3.3V is recommended
9	GND	GND	
10	DIO7	GPIO	
11	TMSC	JTAG_TMSC	
12	TCKC	JTAG_TCKC	
13	DIO21	GPIO	
14	DIO20	GPIO	
15	DIO5	GPIO	
16	DIO6	GPIO	

● The considerations hardware design

● 1. It is recommended to use a DC regulated power supply to power the module. The ripple coefficient of the power supply should be as small as possible and the module should be reliably grounded. Please pay attention to the correct connection of the positive and negative poles of the power supply, such as the reverse connection may cause permanent damage to the module;

● 2. Please check the power supply to ensure that the module will be permanently damaged if the maximum power supply voltage is exceeded; Please check the stability of the power supply. The voltage cannot fluctuate greatly and frequently.

● 3. When designing the power supply circuit for the module, it is often recommended to keep more than 30% allowance, which is conducive to the long-term and stable work of the whole machine; The module should be as far away from the power supply, transformers, high-frequency wiring and other parts of large electromagnetic interference;

● 4. High-frequency digital wiring, high-frequency analog wiring and power wiring must avoid the lower part of the module. If it is really necessary to pass through the lower part of the module, assume that the module is welded on the Top Layer, and the Top Layer of the contact part of the module is covered with copper (all copper and well grounded).Must be close to the digital part of the module and routed in the Bottom Layer.

● 5. Assuming that the module is welded or placed in the Top Layer, it is also wrong to run wires randomly in the Bottom Layer or other layers, which will affect the stray and reception sensitivity of the module to varying degrees;

- 6. If there are devices with large electromagnetic interference around the module, it will also greatly affect the performance of the module. According to the intensity of the interference, it is recommended to stay away from the module appropriately.

- 7. Assuming that there are wiring (high-frequency digital, high-frequency analog, power wiring) with large electromagnetic interference around the module, it will also greatly affect the performance of the module. According to the intensity of the interference, it is recommended to keep away from the module appropriately.

- 8. If the communication line uses 5V level, the level conversion circuit must be used.

- 9. try to stay away from part of the physical layer is also 2.4GHz TTL protocol, such as: USB3.0;

FCC Statement
FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

PCB antenna , Antenna gain 0dBi
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.
Any Changes or modifications not expressly approved by the party responsible for compliance could void
the user's authority to operate the equipment.
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.

FCC Radiation Exposure Statement
This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 Transmitter Module FCC ID:
2ABN2-2652P3 Or Contains FCC ID: 2ABN2-2652P3"

When the module is installed inside another device, the user manual of the host must contain below warning
statements;
1. 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;
(2) This device must accept any interference received, including interference that may cause undesired
operation.
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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with modular approval should perform the test of radiated & conducted emission and spurious emission, etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally.