

SS1801 WIFI+BT/BLE Combo Module Specification

Document history

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1. Brief

This module is a wireless module for the Internet of Things designed based on the embedded Wi-Fi/Bluetooth dual mode SoC chip W800. The module supports 2.4G IEEE802.11 b/g/n Wi-Fi protocol, with a complete TCP/IP protocol stack built in. In addition, the W0802P also supports Bluetooth/BLE 4.2 protocol, Bluetooth distribution network, and Bluetooth Mesh. The module is suitable for a wide range of Internet of Things fields such as smart appliances, smart homes, smart toys, medical monitoring, industrial control, and is an ideal solution for Internet of Things applications.

Module features an SMD package, stamp-hole interface, and PCB on board antenna. At the same time, the module enables rapid production of the product with standard SMT equipment, providing customers with highly reliable connectivity. This modern, automated, large-scale, low-cost production method facilitates the application of various IoT hardware terminals.

1.1. Functional Characteristics

Basic characteristics

- Integrated 32-bit RISC V processor, operating frequency 228MHz, built-in DSP, floating point arithmetic unit, and security engine
- Module size: 16mm*24mm*3mm, Pin distance 2mm
- Built-in 2MB Flash, 276KB RAM
- Integrated PSRAM interface, supporting up to 64MB external PSRAM memory
- Support SDIO2.0、SDHC、MMC4.2
- MCU built-in Tee security engine, code can distinguish between safe and unsafe regions
- Firmware encryption keys are distributed using asymmetric algorithms to enhance key security
- Hardware encryption module: RC4256、AES128、DES/3DES、SHA1/MD5、CRC32、2048 RSA True Random Number Generator

Wi-Fi Characteristics

- Support 802.11b/g/n、Support GB15629.11-2006 Wireless Standard
- Support frequency range 2.4GHz-2.4835GHz
- Support Wi-Fi WMM/WMM-PS/WPA/WPA2/WPS
- Support EDCA channel access mode
- Support STBC、GreenField、Short-GI、Supports reverse transmission

- Support AMPDU、AMSDU
- Support 20/40M bandwidth operation mode
- Support IEEE 802.11n MCS0-7 and MCS32 physical layer transmission rate ranges, with transmission rates up to 150Mbps
- Support Short Preamble when sending at a rate of 2/5.5/11Mbps
- Support HT-immediate Compressed Block Ack、Normal Ack、No Ack response method
- Support Station、Soft-AP、Soft-AP/Station function
- Support CTS to self
- In the BSS network, the module supports multiple multicast networks, and supports different encryption methods for each multicast network. It can support up to 32 multicast networks and network access STA encryption
- When the BSS network supports using as an AP, the total number of supported sites and groups is 32, and the IBSS network supports 16 sites

Bluetooth Characteristics

- Integrate Bluetooth baseband processor/protocol processor, supporting BT/BLE dual mode operation mode, and support BT/BLE4.2 protocol
- Support Bluetooth network configuration
- Support Bluetooth Mesh

Peripheral Interface

- Integrate 12×GPIO
- Integrate 3×UART interface, baud rate range 1200bps~2Mbps
- Integrate 1×I2S
- Integrate 1×I2C
- Integrate 1×SPI
- Integrate Wakeup interface
- With REST interface
- Integrate 5×PWM, with a maximum input and output frequency of 20MHz
- Integrate 2×12bit ADC
- Integrate 2×12bit SDADC with a maximum sampling rate of 1KHz

Other

- Support user programmable GPIO control
- Support AT+ instruction protocol based on ASCII encoding (UART interface)
- Support multiple network protocols: TCP/UDP/ICMP/DHCP/DNS/HTTP

- Support DHCP Server、DNS Server
- Support online firmware upgrade
- Working temperature: -40°C-85°C; Storage temperature: -45°C-105°C

1.2. Logic Block Diagram

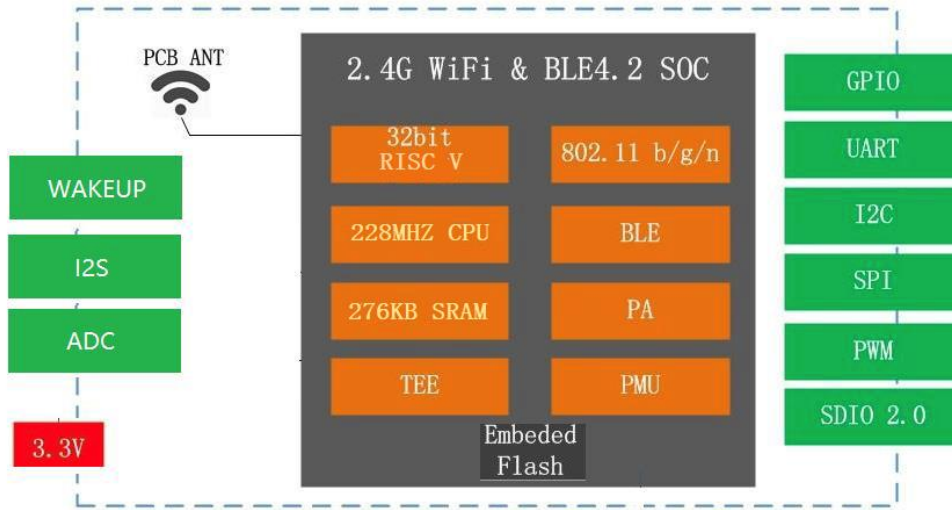


图 1-1 Logic Block Diagram

2. Outline Specification

2.1. PCB Size

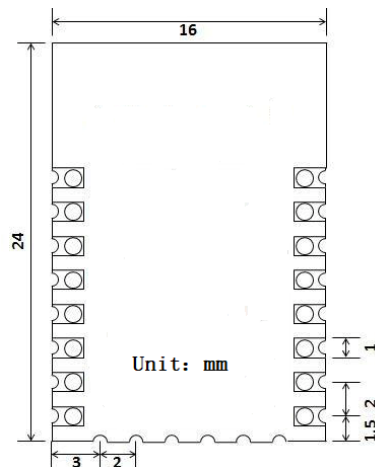


图 2-1 模块正视图/Front view of the module



图 2-2 Side view of a module

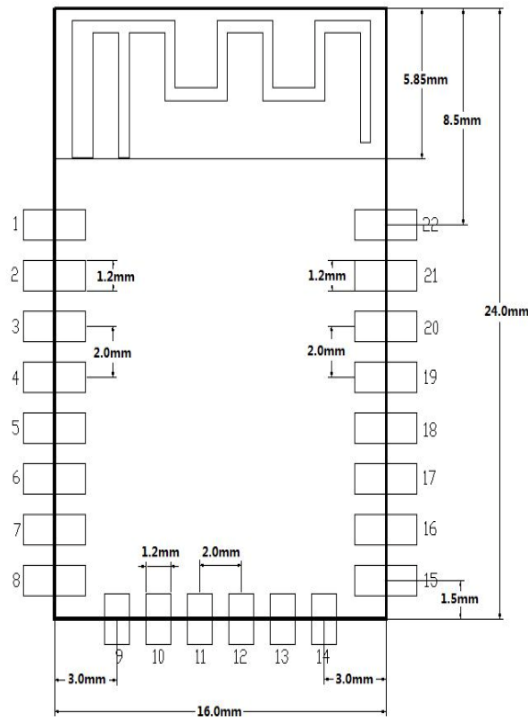


图 2-3 尺寸图/Dimension Diagram

2.2. Module Pin Description

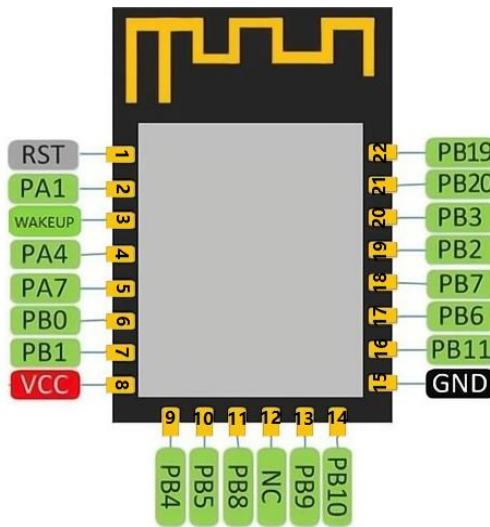


图 2-4 Pin Description

No.	Name	Type	Pin function after reset	Reuse function
1	/RST	I	RESET	Low level reset
2	PA1	I/O	JTAG_CK	JTAG_CK/I ² C_SCL/PWM3/I ² S_LRCK/ADC0
3	WAKEUP	I	WAKEUP	External wake-up pin
4	PA4	I/O	JTAG_SWO	JTAG_SWO/I ² C_SDA/PWM4/I ² S_BCK/ADC1

5	PA7	I/O	GPIO Input, High Impedance	PWM4/LSPI_MOSI/I ² S_MCK/I ² S_DI
6	PB0	I/O	GPIO Input, High Impedance	PWM0/LSPI_MISO/UART3_TX/PSRAM_CK
7	PB1	I/O	GPIO Input, High Impedance	PWM1/LSPI_CK/UART3_RX/PSRAM_CS
8	VCC	P	3.3V power supply	
9	PB4	I/O	GPIO Input, High Impedance	LSPI_CS/UART2_RTS/UART4_TX/PSRAM_D2
10	PB5	I/O	GPIO Input, High Impedance	LSPI_MOSI/UART2_CTS/UART4_RX/PSARM_D3
11	PB8	I/O	GPIO Input, High Impedance	I ² S_BCK/MMC_D0/PWM_BREAK/SDIO_D0
12	NC			
13	PB9	I/O	GPIO Input, High Impedance	I ² S_LRCK/MMC_D1/HSPI_CS/SDIO_D1
14	PB10	I/O	GPIO Input, High Impedance	I ² S_DI/MMC_D2/HSPI_DI/SDIO_D2
15	GND	P	GND	
16	PB11	I/O	GPIO Input, High Impedance	I ² S_DO/MMC_D3/HSPI_DO/SDIO_D3
17	PB6	I/O	GPIO Input, High Impedance	UART1_TX/MMC_CLK/HSPI_CK/SDIO_CK
18	PB7	I/O	GPIO Input, High Impedance	UART1_RX/MMC_CMD/HSPI_INT/SDIO_CMD
19	PB2	I/O	GPIO Input, High Impedance	PWM2/LSPI_CK/UART2_TX/PSRAM_D0
20	PB3	I/O	GPIO Input, High Impedance	PWM3/LSPI_MISO/UART2_RX/PSRAM_D1
21	PB20	I/O	UART_RX	UART0_RX/PWM1/UART1_CTS/I ² C_SCL
22	PB19	I/O	UART0_TX	UART0_TX/PWM0/UART1_RTS/I ² C_SDA

3. Electrical Characteristics

3.1. Electrical Specifications

Parameter		Condition	Min.	Type	Max.	Unit
Storage Temperature		-	-45	Normal	105	°C
Soldering peak temperature		IPC/JEDEC J-STD-020	-	-	250	°C
Working voltage		-	3.0	3.3	3.6	V
I/O	VIL/VIH	-	-/2.0	-	0.8/-	V
	VOL/VOH	-	-/2.4	-	0.4/-	
Electrostatic parameters (HMB)		TAMB=25°C	-	-	2	KV
ESD(HMB)		TAMB=25°C	-	-	0.5	KV

3.2. Power Consumption Specifications

1. 1.

Parameter	Min.	Type	Max.	Unit
TX @11b,1Mbps,19dBm		240		mA
TX @11b,11Mbps,19dBm		240		mA
TX @11g,54Mbps,15dBm		180		mA
RX @11b/g/n		95		mA

3.3. Wi-Fi RF Specifications

Parameter	Min.	Type	Max.	Unit
Working Frequency	2412	-	2484	MHz
Input Impedance	-	50	-	Ω
Tx Power				
11b, 11Mbps	-	19	-	dBm
11g, 54Mbps	-	15	-	dBm
11n MCS7 HT20	-	13	-	dBm
Receiver Sensitivity				
11b, 11Mbps	-	-96	-	dBm
11g, 54Mbps	-	-72	-	dBm
11n MCS7 HT20	-	-70	-	dBm
Adjacent Channel Rejection				
11b, 6Mbps	-	32	-	dB
11g, 54Mbps	-	16	-	dB
11n, HT20, MCS0	-	31	-	dB
11n, HT20, MCS7	-	12	-	dB

3.4. BT Specifications

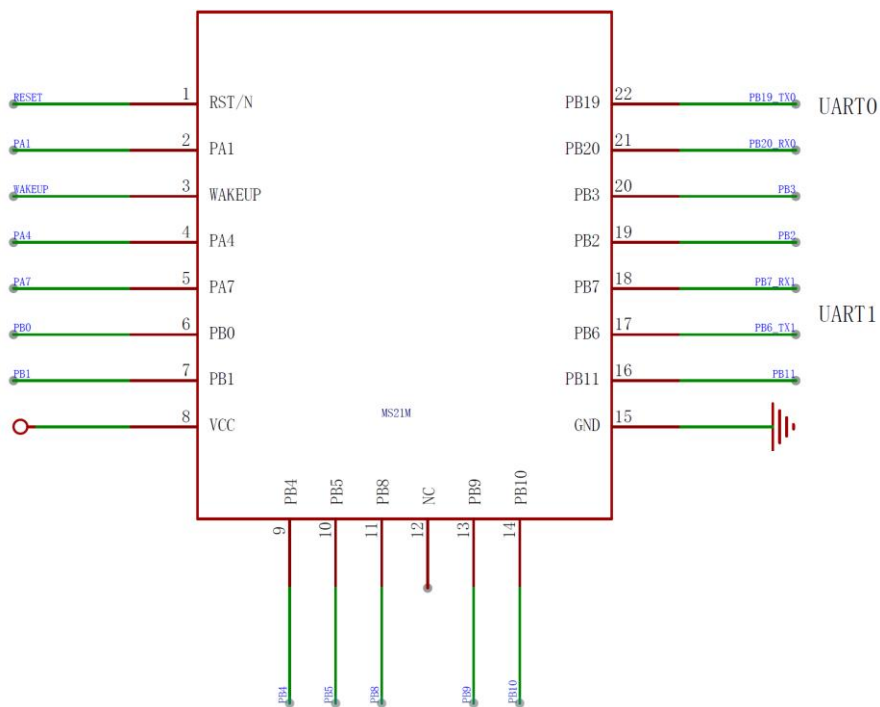
	Min.	Type	Max.	Unit
@0.1% BER Sensitivity	-	-91	-	dBm
@0.1% BER Maximum Received Signal	-	0	-	dBm
Common Channel Rejection Ratio	-	9	-	dB

@30MHz~2000MHz Out-of-Band Blocking	-	-10	-	dBm
@2000MHz~3000MHz Out-of-Band Blocking	-	-27	-	dBm
@3000MHz~12.5GHz Out-of-Band Blocking	-	-10	-	dBm
Intermodulation	-	-39	-	dB
Tx Power	-	6	-	dBm
Gain Control Step Size	-	3	-	dB
Δf_{1avg}	-	159.8	-	-
Δf_{2max}	-	142.8	-	-
Drift Rate	-2.25	-2.08	2.23	KHz
Drift DH1	-4	-	-1	KHz

4. Hardware Reference Design

4.1 Schematic Reference Design

The module works on a 3.3V power supply and has the following minimum system connections:



4-1 Minimum System Schematic Diagram

Note:

- Module supply voltage is 3.3V DC, it is recommended to place a 47uf capacitor on the power supply pin
- Module IO maximum output current 12mA
- Module RESET pin low level active
- Module external communication interface RX refers to the RX port of the module, which needs to be connected to the TX of the external MCU, and conversely the TX port of the module needs to be connected to the RX of the external MCU

4.2 Module Layout

Module is equipped with an onboard antenna and can be directly welded to the user PCB for use. In order to achieve the best RF performance of the terminal product, the following methods are recommended for module design and placement.

Scheme 1 (Preferred): Module is placed against the edge of the board, and the antenna all protrudes out of the base plate, and there is no metal material around the antenna, including wires, metal shells, etc., the scheme is in Figure 4-2:

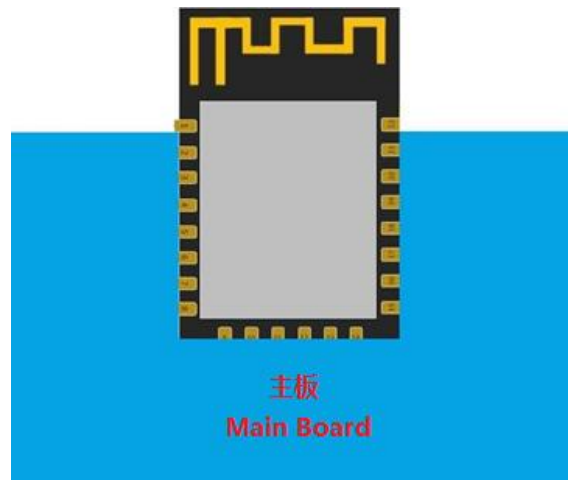


Figure 4-2

Scheme 2 (Sub-optimal): Module is placed near the edge of the board, the antenna is hollow below and no less than 5mm gap is reserved between the antenna and the surrounding PCB, and there is no metal material around the antenna, including wire and metal shell, the scheme is in Figure 4-3:

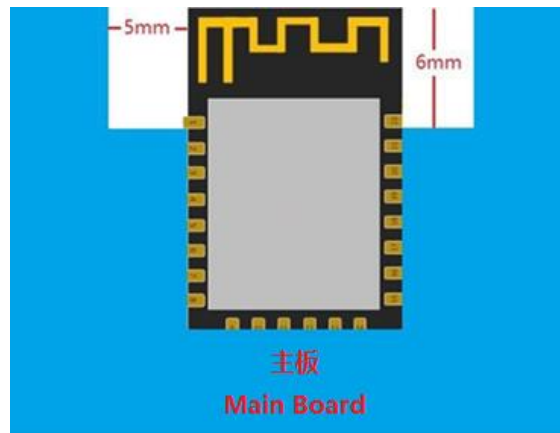


Figure 4-3

Scheme 3 (General): Module is placed near the edge of the board, PCB is not hollowed out, PCB area under the antenna is cleared, and copper is not allowed in the 5mm range around the antenna and the bottom area of the antenna, the scheme is in Figure 4-4:

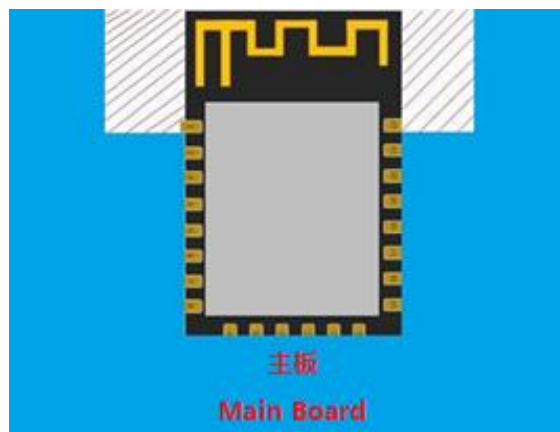


Figure 4-4

4.3 Peripheral Circuit Recommendation

Module integrate high-speed GPIO and peripheral interfaces. If there are high requirements for power consumption and EMI performance during use, it is recommended to string a 10 to 100 ohm resistor on the IO port line, which can make the signal more stable and also prevent electrostatic discharge to a certain extent.

4.4 Product structure design

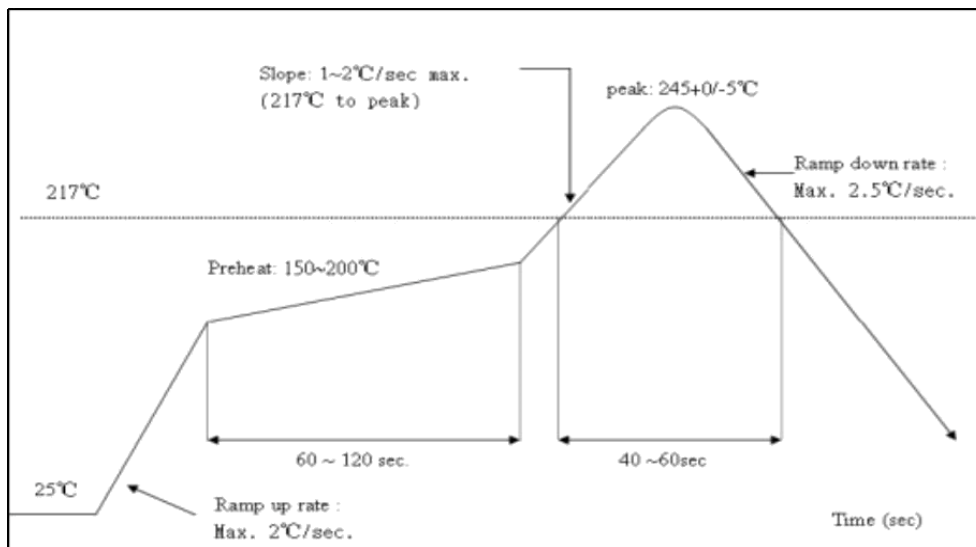
The following points should be noted when placing the main board with this module in the product structure:

- Due to the strong shielding effect of metal plates and metal surfaces on wireless

signals, the side of the WIFI module PCB antenna must face the outside of the product in the placement of the product structure.

- It is prohibited to face the side of the WIFI module PCB antenna towards the direction of the PCB board, battery, etc. that has a shielding effect on wireless signals.
- When installing the actual product board, the position of the WIFI module PCB antenna needs to be vertically upwards.
- The WIFI module should be as far away from metals, such as transformers, motors, and other strong magnetic field equipment in actual product structures as possible; In structural design, special attention should be paid to avoiding metal screw pillars around the WIFI module PCB antenna position. When the screws are screwed in, it is actually equivalent to placing a metal pillar next to the WIFI module PCB antenna.
- After determining the actual product structure, it is recommended to conduct antenna matching tests on the entire machine in order to achieve optimal antenna performance.

5. Reflow Soldering



6. Module Certification

- SRRC
- CE
- FCC
- ROHS