1. Product Overview

BW16 is a dual-band Wi-Fi+Bluetooth SoC module developed based on RTL8720DN. BW16 supports dual-band (2.4GHz or 5GHz) WLAN and Bluetooth low energy 5.0; it integrates ARM V8 (cortex-M4F compatible) high-performance MCU, ARM V8M

(Cortex-M0 compatible) low-power MCU, WLAN (802.11 a / b / g / n), MAC, Bluetooth baseband and RF baseband, and provides a set of configurable GPIO ports for the control of different peripheral devices.

BW16 also integrates internal memory, supports simple application development, and can implement complete Wi-Fi and BT

5.0 Protocol function.
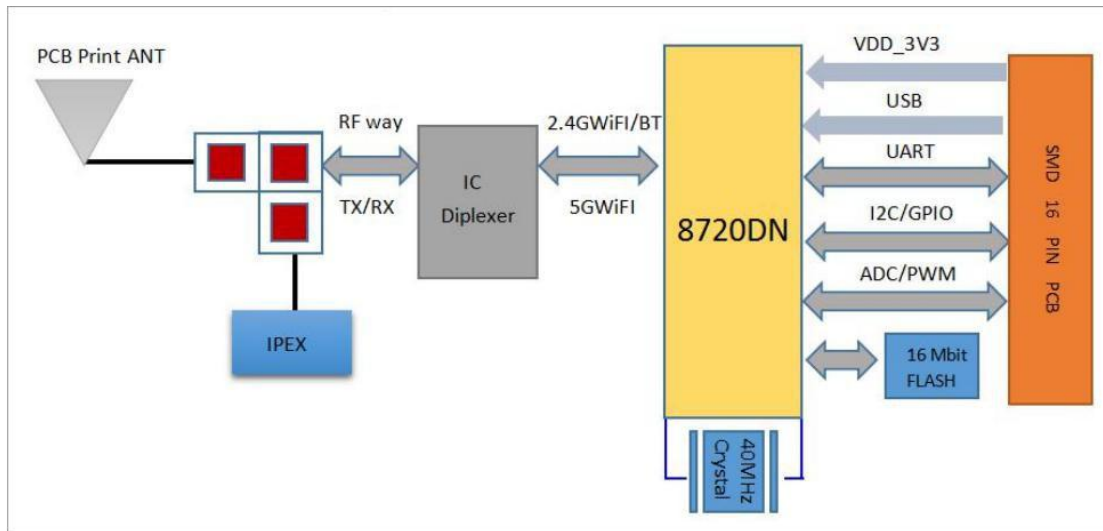
2. Feature:

Support 802.11a/b/g/n 1×1, 2.4GHz or 5GHz

Support HT20/HT40 mode

Support low-power beacon monitoring mode, low-power receiving mode, low-power suspend mode

Built-in AES/DES/SHA hardware engine

Support TrustZone-M, support safe boot

Support SWD debug port access protection and prohibited mode

Support BLE and BT5.0

Bluetooth supports high power mode (7dBm, sharing the same PA with Wi-Fi)

Wi-Fi and BT share the same antenna

Support STA/AP/STA+AP working mode

Support Simple Config (APP) / AirKiss (WeChat) one-click distribution network for Android and IOS

Support serial local upgrade and remote firmware upgrade (FOTA)

Size	24 x 16 x 3($\pm$0.2)mm
Antenna form	Onboard PCB antenna or IPEX antenna
Spectrum range	2400-2483.5MHz or 5180-5825MHz

Bluetooth	BT5.0
Bluetooth frequency range	2.402 GHz-2.480 GHz
Support interface	UART/GPIO/ADC/PWM/IIC/SPI/SWD
Power supply range	Power supply voltage 3.0V-3.6V, typical value 3.3V, power supply current >450mA
Operating temperature	-20°C~70°C
Storage environment	-40°C~125°C, <90%RH

3. Electrical characteristics

Prompt:
The BW16 module is an electrostatic sensitive device that requires special ESD precautions. Generally, ESD protection devices should be added during use. The correct ESD handling and packaging methods must be used during the transportation, operation, and use of the BW16 module. Do not touch the module with your hands or use a non-anti-static soldering iron to avoid damage to the module.

Parameter condition	Minimum	Typical	Maximum	Unit
DC 3.3V (with internal voltage regulator and integrated CMOS PA)	3	3.3	3.6	V
Digital I/O supply voltage	1.76	1.8-3.3	3.3	mA
DC_IO_33 (3.3V I/O rated current)			50	mA
Electrostatic protection (VESD)			2000	V

RF performance

Description	Typical value	Unit
Working frequency	2400-2483.5 or 5180-5825	MHz
Output Power		
In 11a mode, the PA output power is	14±2	dBm
In 11n mode, the PA output power is	14±2	dBm
In 11g mode, the PA output power is	15±2	dBm
In 11b mode, PA output power	16±2	dBm
Bluetooth output power	7±2	dBm
Receive sensitivity		
CCK, 1 Mbps	<=-90	dBm
CCK, 11 Mbps	<=-85	dBm
6 Mbps (1/2 BPSK)	<=-88	dBm
54 Mbps (3/4 64-QAM)	<=-70	dBm

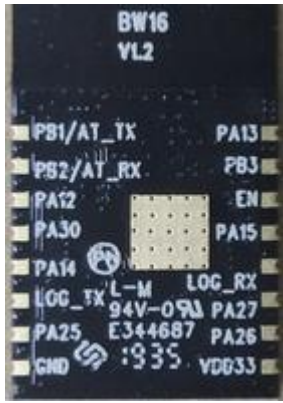| HT20 (MCS7)	<=-67	dBm
Bluetooth sensitivity	<=-92	dBm

4. Appearance
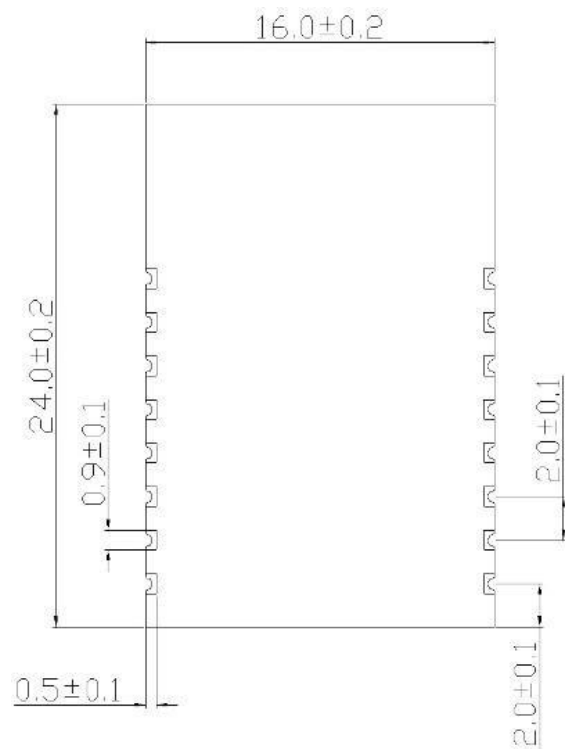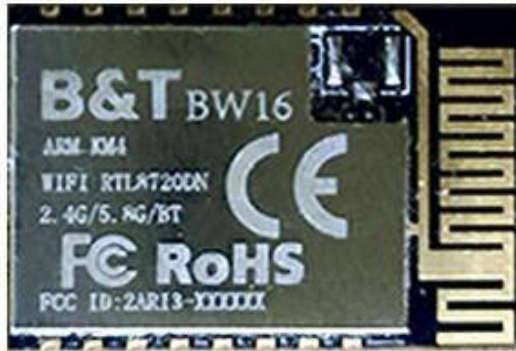

Front side
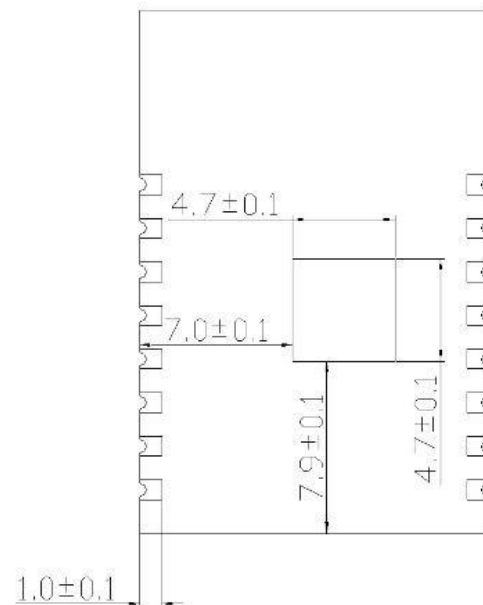
Back side

5. Pin definition

The BW16 module has a total of 16 interfaces, as shown in the pin diagram, the pin function definition table is the interface definition

BW16 pin diagram

PIN	NAME	Function
1	PA13	LP_PWM1/SPI1_MISO
2	PB3	ADC/SWD_CLK
3	CHIP_EN	Chip enable
4	PA15	SPI1_CS
5	PA8	UART_LOG_RXD
6	PA27	SWD_DATA
7	PA26	LP_I2C_SDA/LP_PWM5
8	VDD_3V3	3.3V power supply (VDD); maximum 450mA
9	GND	Ground
10	PA25	LP_I2C_SCL/LP_PWM4
11	PA7	UART_LOG_TXD
12	PA14	SPI1_CLK
13	PA30	LP_PWM1
14	PA12	SPI1_MOSI/LP_PWM0
15	PB2	LP_UART_RXD
16	PB1	LP_UART_TXD

6. Schematic diagram
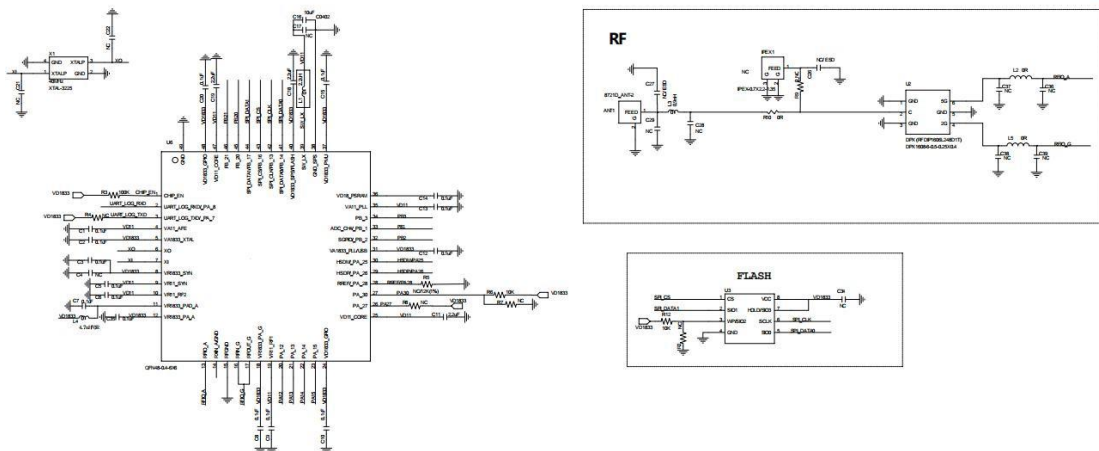
7. Design guidance

7.1 Application circuit
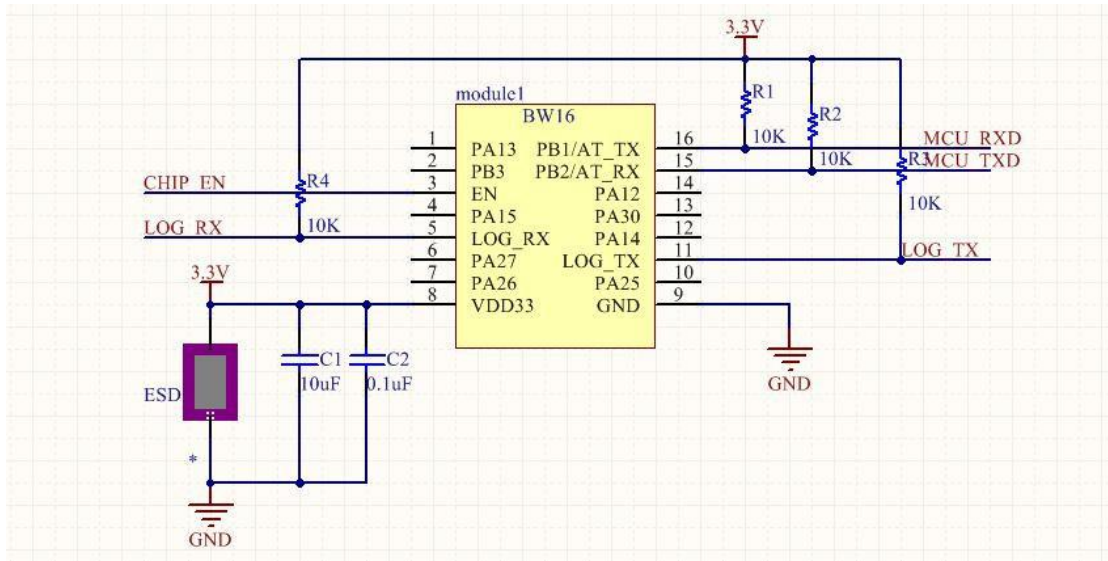
7.2. Antenna layout requirements

(1) The following two methods are recommended for the installation location on the motherboard:

Option 1: Place the module on the edge of the main board, and the antenna area protrudes from the edge of the main board.

Option 2: Place the module on the edge of the motherboard, and the edge of the motherboard digs out an area at the position of the antenna.

(2) In order to meet the performance of the onboard antenna, it is forbidden to place metal parts around the antenna, away from high-frequency devices.
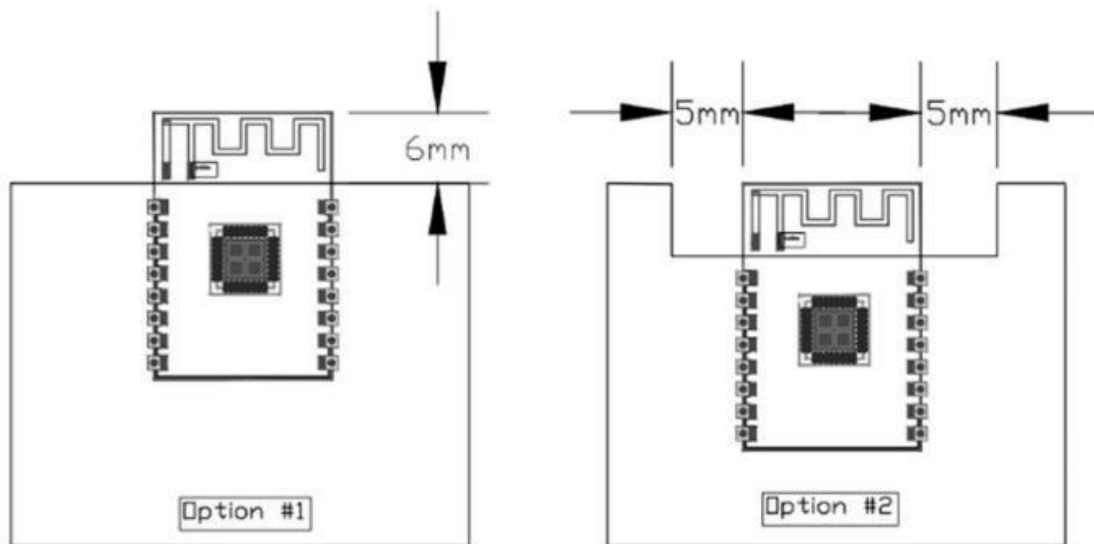
7.3 Power supply

(1), 3.3V voltage is recommended, peak current is more than 500mA

(2) It is recommended to use LDO for power supply; if using DC-DC, it is recommended to control the ripple within 30mV.

(3) It is recommended to reserve the position of the dynamic response capacitor in the DC-DC power supply circuit, which can optimize the output ripple when the load changes greatly.

(4) 3.3V power interface is recommended to add ESD device.

12V--->3V3 2A   预留位置

VCC_3V3

VCC_IN_12V

FP2 10R
FP1 10R

UP2 SY8120

CP3 CP4 CP5
10uF 16V NC 100nF

RP7 NC

RP2 100K

RP8 NC
CP10 NC
NC

5 IN   BS 1   RP3 0R CP1   LP2
4 EN   LX 6   100nF   4.7uH 3.0A
2 GND   FB 3

CP2
22pF

RP5
100K 1%

RP6 0R

RP9
22.1K 1%

RP1 0R
RP4 0R

CP6 CP7
22uF 6.3V 22uF 6.3V

CP8
100nF
CP9 NC

POWER_ENB
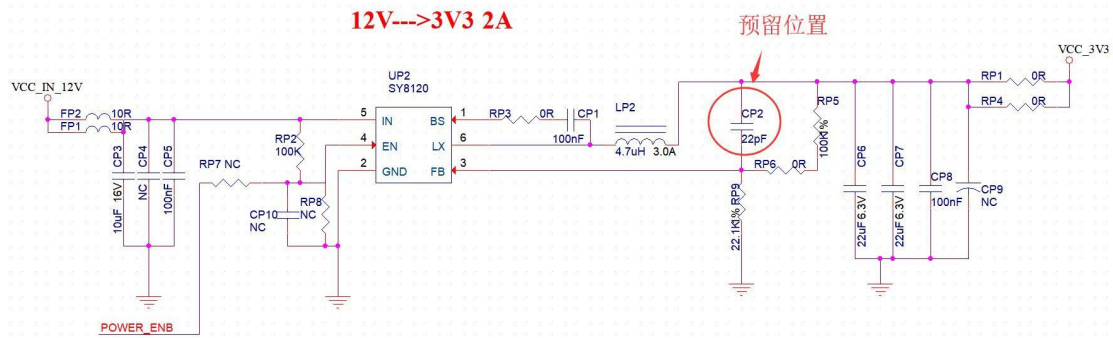
7.4. Use of GPIO port

(1) Some GPIO ports are led out of the periphery of the module. If you need to use a 10-100 ohm resistor in series with the IO port is recommended. This can suppress overshoot, and the level on both sides is more stable. Helps both EMI and ESD.

(2) For the up and down of the special IO port, please refer to the instruction manual of the specification, which will affect the startup configuration of the module.

(3) The IO port of the module is 3.3V. If the IO level of the main control and the module does not match, a level conversion circuit needs to be added.

(4) If the IO port is directly connected to the peripheral interface, or the pin header and other terminals, it is recommended to reserve ESD devices near the terminal of the IO trace.

VCC_3.3V   VCC_5V   VCC_5V   VCC_3.3V

R1 2K   R2 4.7K   R3 2K   R4 4.7K

Q1   Q2
TXD 3.3V   RXD 5V   TXD 5V   RXD 3.3V
8050   8050