BL10

——2.4GHz Wi-Fi and BLE 5.0 Coexistence Module

Product Specification

Version: 2.0 Date: June.3, 2021

Features

- **General**
  - Chip: BL602
  - Module Size:16mm*20mm*3mm
- **Wireless**
  - 2.4GHz RF transceiver
  - Wi-Fi 802.11b/g/n
  - Bluetooth Low Energy 5.0
  - Wi-Fi 20 MHz bandwidth and 72.2 Mbps PHY rate
  - Wi-Fi Security WPS/WEP/WPA/WPA2
  - STA, Soft-AP and sniffer modes
  - Wi-Fi fast connection with BLE assistance
  - Wi-Fi and BLE coexistence
  - Integrated balun, PA/LNA
  - Power saving mechanism
- **MCU**
  - 32-bit RISC CPU with FPU
  - Level-1 cache
  - Four DMA channels
  - One RTC timer update to one year
  - DFS from 1 MHz to 192 MHz
- **Peripheral Interfaces**
  - GPIO * 16;
  - UART * 2;
  - IIC * 1;
  - SPI * 1;
  - EN * 1;
  - PWM * 5;
  - 10-bit DAC * 1;
  - 12-bit ADC * 1
  - SDIO 2.0 * 1;
  - IR * 1;
  - PIR * 1;
- **Working temperature:** -20℃-85℃

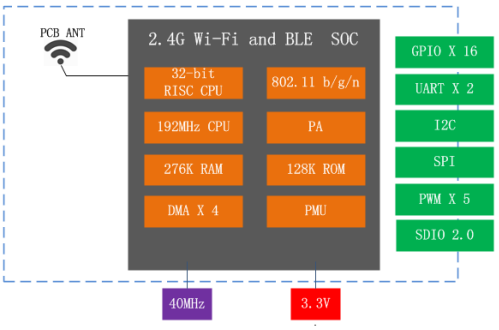
Applications

- Serial transparent transmission;
- Wi-Fi prober;
- Smart power plug/Smart LED light;
- Mesh networks;
- Sensor networks;
- Wireless location recognition;
- Wireless location system beacon;
- Industrial wireless control;

Module Type

Name	Antenna Type
BL10	PCB ANT

Module Structure



Update Record

Date	Version	Update
2020-8-25	V1.0	First released
2021-6-3	V2.0	Pins definition revised

Table of Contents

1. Introduction

BL10 Wi-Fi and BLE coexistence Module is a highly integrated single-chip low power 802.11 Wireless LAN (WLAN) network controller. It combines an RISC CPU, WLAN MAC, a 1T1R capable WLAN baseband, RF, and Bluetooth in a single chip. It also provides a bunch of configurable GPIO, which are configured as digital peripherals for different applications and control usage.

BL10 Wi-Fi Module use BL602 as Wi-Fi and BLE coexistence SOC chip.

BL10 Wi-Fi Module integrates internal memories for complete WI-FI protocol functions. The embedded memory configuration also provides simple application developments.

BL10 Wi-Fi module supports the standard IEEE 802.11 b/g/n/e/i protocol and the complete TCP/IP protocol stack. User can use it to add the Wi-Fi function for the installed devices, and also can be viewed as an independent network controller. Anyway, BL10 Wi-Fi module provides many probabilities with the best price.

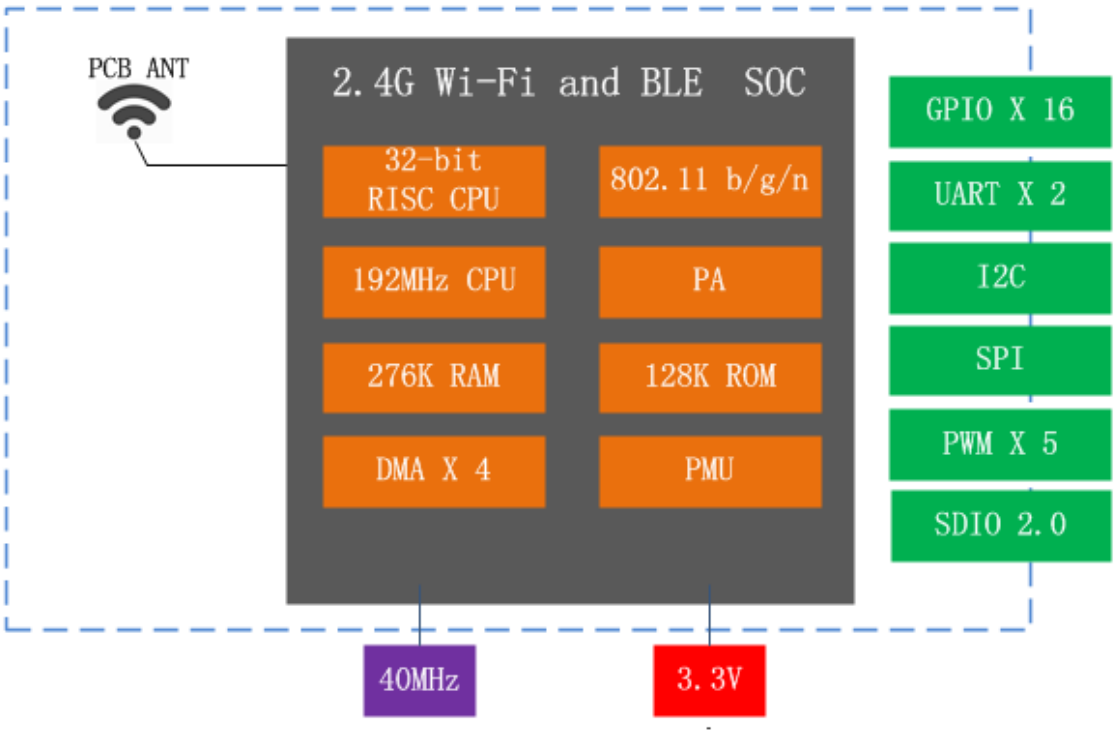


Fig.1.1 BL10 Module Structure

Technical parameters for BL10 are listed as follows.

Table 1.1 BL10 Parameters

Types	Items	Parameters
Wi-Fi	Frequency	2.4G~2.5G(2400M~2483.5M)
	Transmit power	802.11b: +19 dBm
		802.11g: +18 dBm
		802.11n: +17 dBm
	Receiver sensitivity	802.11b: -91 dBm (11Mbps)
		802.11g: -77 dBm（54Mbps）
		802.11n: -73 dBm（MCS7）
	EVM	<-28dB @802.11g
		<-28dB @802.11n
	Antenna	PCB antenna
Hardware	CPU	32-bit RISC CPU
	Interface	UART/SDIO/SPI/I2C/GPIO/PWM
	Working voltage	3.0V ~ 3.6V
	Working current	Deep Sleep Mode:15uA
		Deep Standby Mode:2mA
		Average: 120mA
	Working temperature	-20 ℃ ~85 ℃
	Environment temperature	-30 ℃ ~ 105 ℃
	Shape	16mm x 20mm x 3mm
Software	Wi-Fi working mode	STA, Soft-AP and sniffer modes
	Security mode	WPS / WEP / WPA / WPA2 / WPA3
	Encryption type	AES
	Update firmware	UART Download
	Software develop	SDK
	Network protocol	IPv4, TCP/UDP/HTTP/FTP/MQTT

2. Interface Definition

BL10 module interface definition is shown as below。

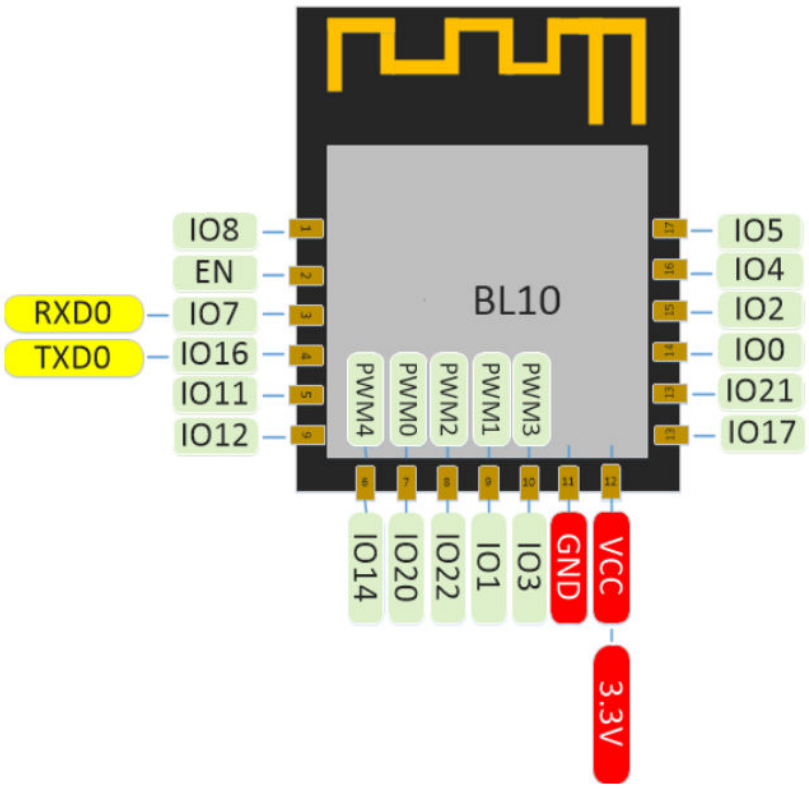


Fig.2.1 BL10 Pins Definition

Working mode and pins function are shown in Table 2.1.

Table.2.1 Working mode

Mode	GPIO8
UART Download Mode	High
Flash Boot Mode	Low(default)

Table.2.2 Pins Function Definition

Num.	Pin Name	Type	Function
1	GPIO8	I/O	SPI, I2C, UART, PWM, AUXADC, GPIO.
2	EN	I/O	Chip enable
3	GPIO7	I/O	SPI, I2C, UART, PWM, GPIO
4	GPIO16	I/O	SPI, I2C, UART, PWM, GPIO

5	GPIO11	I/O	SPI, I2C, UART, PWM, AUXADC, GPIO, Low-High when Reset
6	GPIO12	I/O	SPI, I2C, UART, PWM, AUXADC, GPIO
7	GPIO14	I/O	SPI, I2C, UART, PWM, AUXADC, GPIO
8	GPIO20	I/O	SFLASH, SPI, I2C, UART, PWM, GPIO
9	GPIO22	I/O	SFLASH, SPI, I2C, UART, PWM, GPIO
10	GPIO1	I/O	SDIO, SFLASH, SPI, I2C, UART, PWM, GPIO
11	GPIO3	I/O	SDIO, SPI, I2C, UART, PWM, GPIO
12	GND	P	Power
13	VDD33	P	Power
14	GPIO17	I/O	SFLASH, SPI, I2C, UART, PWM, GPIO
15	GPIO21	I/O	SFLASH, SPI, I2C, UART, PWM, GPIO
16	GPIO0	I/O	SDIO, SFLASH, SPI, I2C, UART, PWM, GPIO
17	GPIO2	I/O	SDIO, SFLASH, SPI, I2C, UART, PWM, GPIO
18	GPIO4	I/O	SDIO, SPI, I2C, UART, PWM, GPIO
19	GPIO5	I/O	SDIO, SPI, I2C, UART, PWM, GPIO

3. Size and Layout

Size for BL10 can be shown as follows.

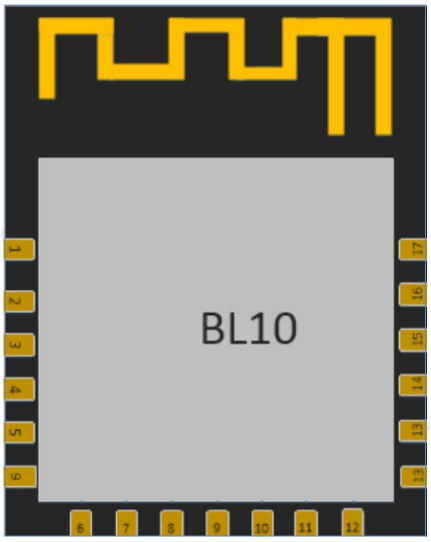
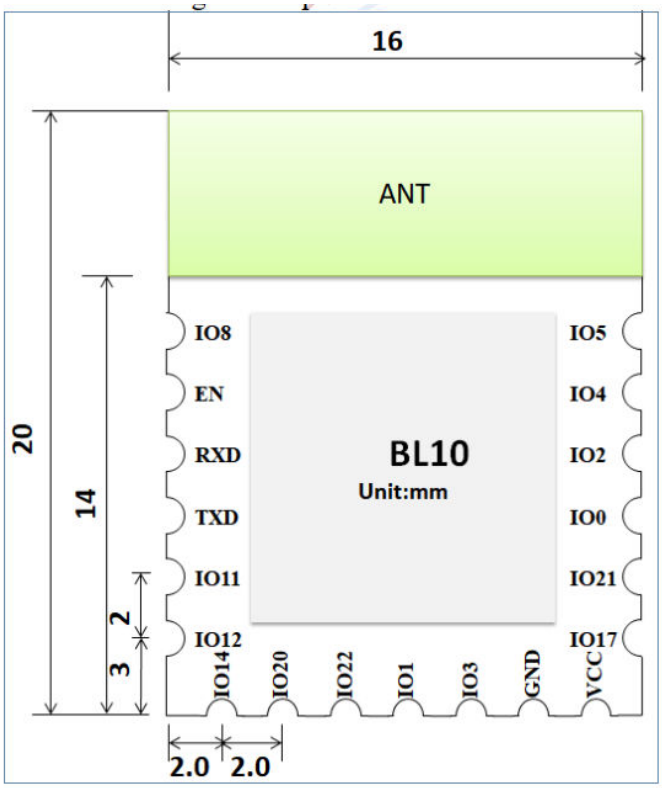


Fig.3.1 Shape for BL10



(a) Vertical View

(b) Side View

Fig.3.2 Size for XT-BL10

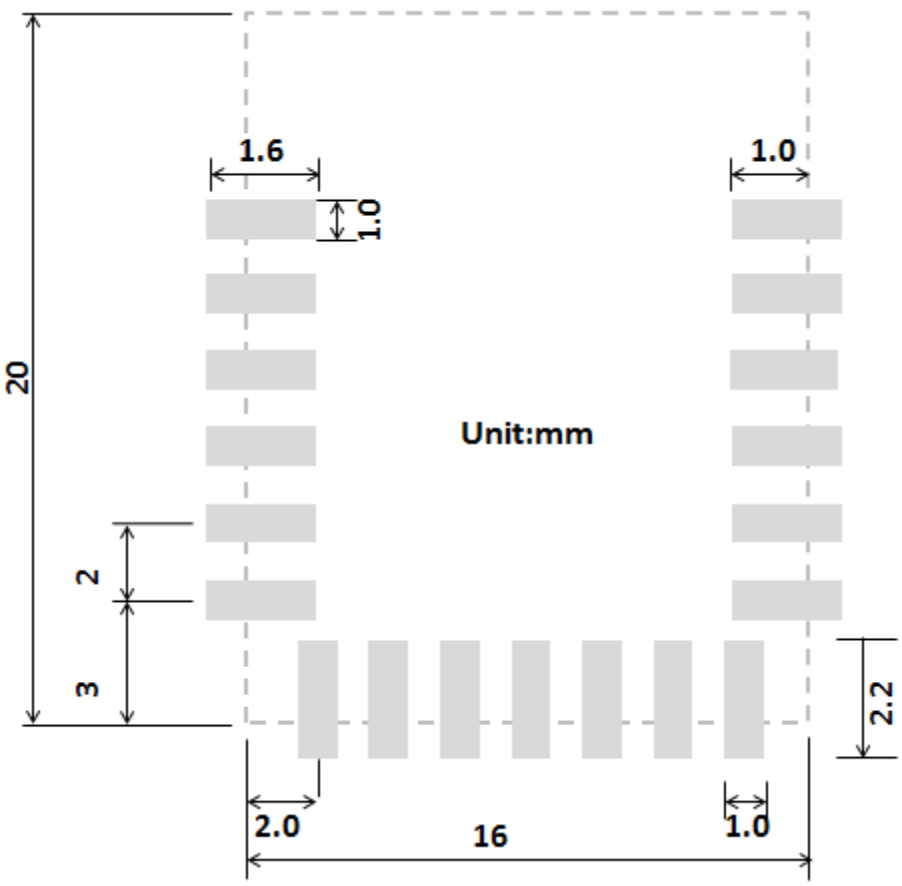


Fig.3.3 PCB Layout for BL10

4. Electronica Characteristics

Table.4.1 Electronica Characteristics

Parameters		Condition	Min	Classical	Max	Unit
Store Temperature		-	-30	Normal	155	℃
Sold Temperature		IPC/JEDEC J-STD-020	-	-	260	℃
Working Voltage		-	2.5	3.3	3.6	V
I/O	V_{IL}/V_{IH}	-	-/2.0	-	0.8/-	V
	V_{OL}/V_{OH}	-	-/2.4	-	0.4/-	
Electrostatic release quantity (Human model)		TAMB=25℃	-	-	2	KV

Electrostatic release quantity (Machine model)	TAMB=25℃	-	-	0.5	KV

5. Power Consumption

Table.5.1 Power Consumption

Parameters	Min	Classical	Max	Unit
RX 11b	-	35	-	mA
RX 11g		39		mA
RX 11n	-	39	-	mA
TX (11b - 11Mbps @20dBm)	-	310	-	mA
TX (11g - 54Mbps@18dBm)	-	230	-	mA
TX (11n - MCS7@17dBm)	-	215	-	mA
MCU (Run Freq. @ 192MHz)	-	22	-	mA
MCU (Standby Freq.@<10MHz)	-	2	-	mA

6. RF Characteristics

The data in the following Table is gotten when voltage is 3.3V in the indoor temperature environment.

Table.6.1 Wi-Fi RF Characteristics

Parameters	Min	Classical	Max	Unit
Input frequency	2412	-	2484	MHz
Input impedance	-	50	-	Ω
Input reflection	-	-	-10	dB
At 11b mode, output power consumption	-	20	-	dBm
At 11g mode, output power consumption	-	18	-	dBm
At 11n mode, output power consumption	-	17	-	dBm
Sensibility				
802.11b, 1Mbps	-	-98	-	dBm
802.11g, 64Mbps	-	-93	-	dBm
802.11n, MCS7	-	-73	-	dBm

7. The Recommended Sold Temperature Curve

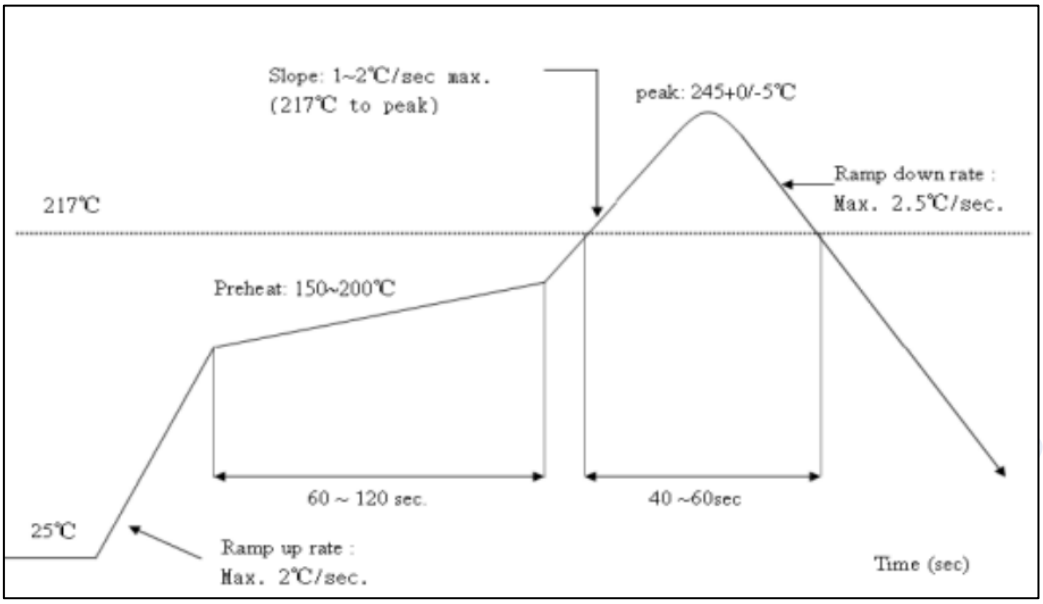


Fig.7.1 Temperature Curve when Sold

8. Minimum User System

This module can work just at 3.3V working voltage:

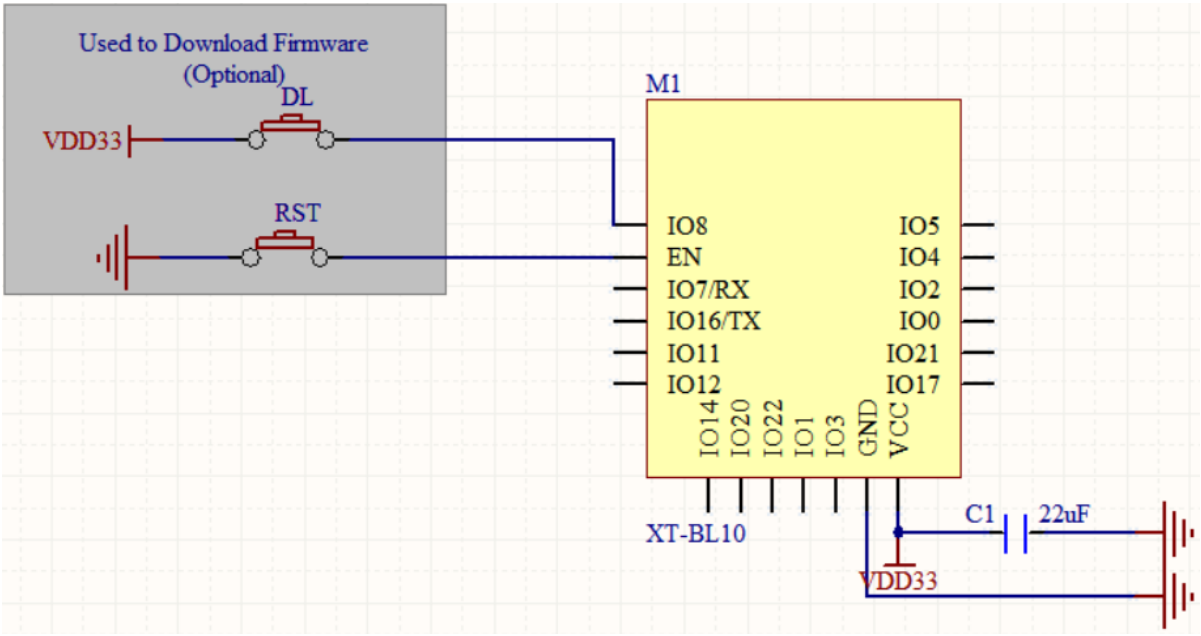


Fig.8.1 Minimum System

Note

(1) The working voltage for module is DC 3.3V;

(2) The max current from IO of this module is 12mA;

(3) Wi-Fi module is at download mode: D8 are High level, then module reset to power;

(4) Wi-Fi module is connected to RXD of the other MCU, and TXD is connected to RXD of the other MCU.

9. The Recommended PCB Design

XT-BL10 Wi-Fi module can be sold on PCB board directly. For the high RF performance for the device, please notice the placement of the module. There are three ways to use the module for Wi-Fi Module with PCB antenna.

Solution 1: optical solution. The Wi-Fi module is placed on the side of the board, and the antennas are all exposed, and there is no metal material around the antenna, including wires, metal casings, weight plates, and the like.

Solution 2: sub-optical solution. The Wi-Fi module is placed on the side of the board, and the antenna below is hollowed out. There is a gap of not less than 5 mm reserved with the PCB, and there is no metal material around the antenna, including wires, metal casings, weight plates, and the like.

Solution 3: The Wi-Fi module is placed on the side of the board, and the PCB area under the antenna is empty, and copper cannot be laid.

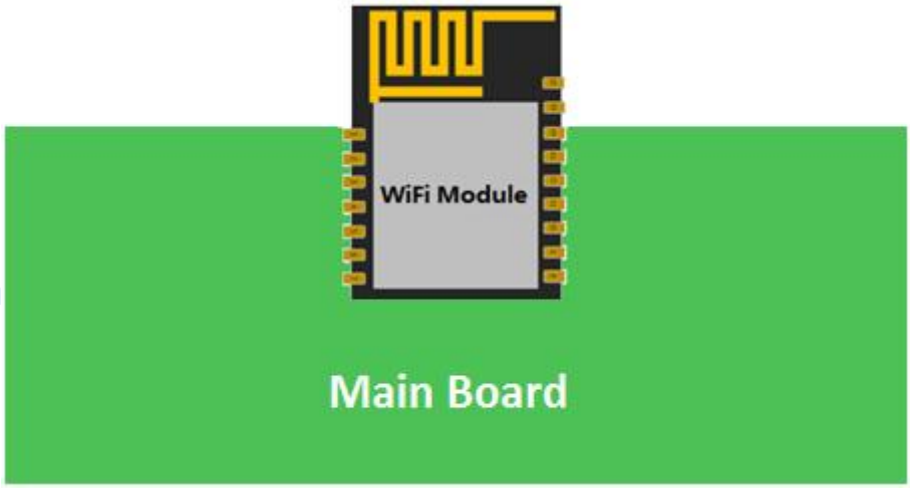


Fig.9.1 Solution 1

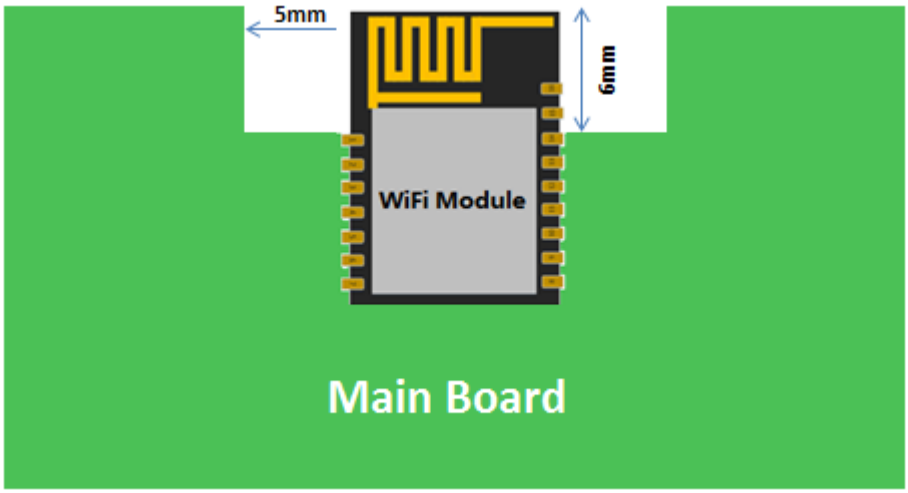


Fig.9.2 Solution 2

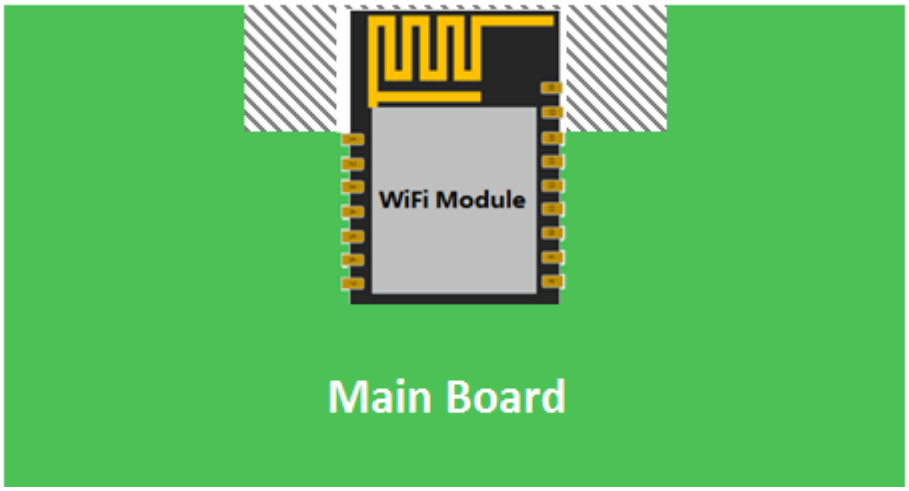


Fig.9.3 Solution 3

10. Peripheral Design Suggestion

Wi-Fi module is already integrated into high-speed GPIO and Peripheral interface, which may be generated the switch noise. If there is a high request for the power consumption and EMI characteristics, it is suggested to connect a serial 10~100 ohm resistance, which can suppress overshoot when switching power supply, and can smooth signal. At the same time, it also can prevent electrostatic discharge (ESD).