

XT-BL10

——2.4GHz Wi-Fi and BLE coexistence Module

Ver : 1.0

Date: June.3,2021

Features

■ General

- Chip: BL602
- Module Size:16mm*20mm*3mm
- Complete 802.11 b/g/n solution for 2.4GHz band
- 65 Mbps receive PHY rate and 65 Mbps transmit PHY rate using 20 MHz bandwidth
- 32-bit RISC CPU

■ Standards Supported

- 802.11b/g/n compatible WLAN
- 802.11e QoS Enhancement (WMM)
- 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- WiFi Direct support
- Light Weight TCP/IP protocol
- Power saving mechanism

■ WLAN PHY Features

- Wi-Fi and BLE coexistence
- One Transmit and one Receive path (1T1R)
- 20MHz/40MHz bandwidth transmission
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble
- OFDM with BPSK, QPSK, 16QAM, and 64QAM modulation. Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 26Mbps in 802.11g and 65Mbps in 802.11n
- Fast receiver Automatic Gain Control (AGC)

■ 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;

■ Working temperature: -20℃-85℃

Application

- Serial transparent transmission;
- WiFi 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
XT-BL10	PCB ANT

Module Structure



Update Record

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

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1. Introduction

XT-BL10 Wi-Fi and BLE coexistence Module is a highly integrated single-chip low power 802.11n 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.

XT-BL10 WiFi Module use BL602 as Wi-Fi and BLE coexistence soc chip.

XT-BL10 WiFi Module integrates internal memories for complete WIFI protocol functions. The embedded memory configuration also provides simple application developments.

XT-BL10 WiFi 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 WiFi function for the installed devices, and also can be viewed as a independent network controller. Anyway, XT-BL10 WiFi module provides many probabilities with the best price.

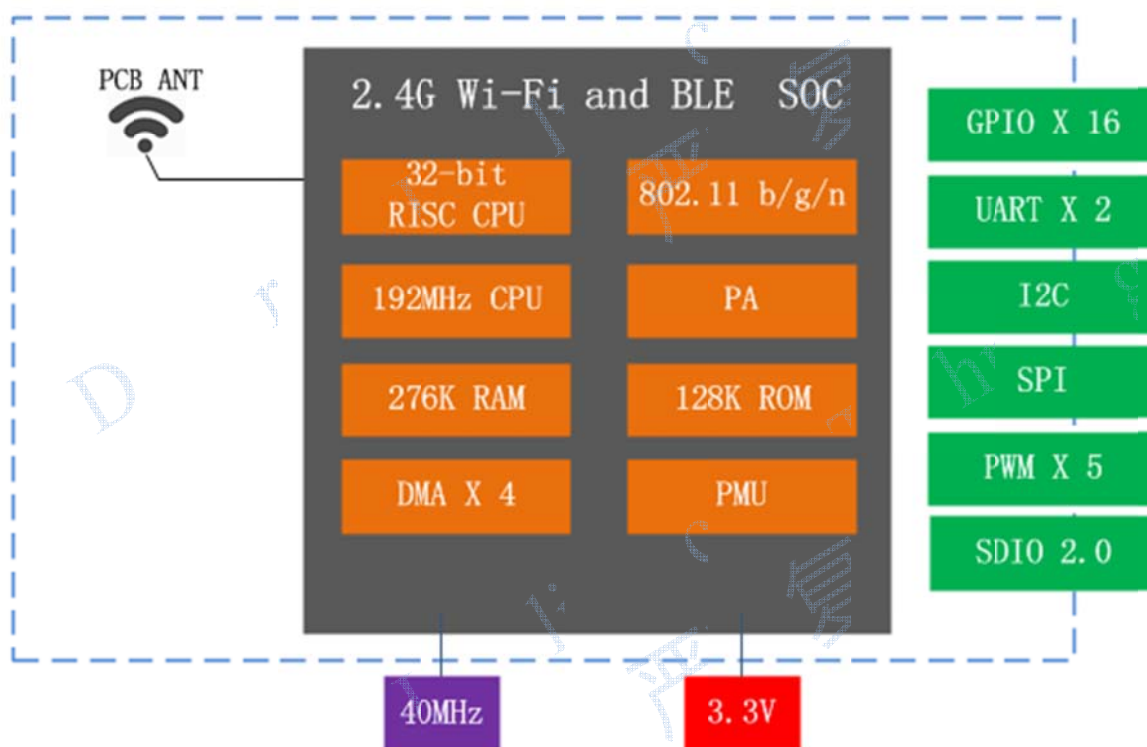


Fig. 1.1 XT-BL10 Module Structure

Technical parameters for XT-BL10 are listed as follows.

Table 1.1 XT-BL10 Parameters

Types	Items	Parameters
Wi-Fi	Frequency	2.4G~2.5G(2400M~2483.5M)
	Transmit power	802.11b: 19 ±1dBm
		802.11g: 19 ±1dBm
		802.11n: 19 ±1dBm
	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	-30°C ~85°C
	Environment temperature	-30°C ~ 105°C
	Shape	16mm x 20mm x 3mm
Software	Wi-Fi working mode	STA, SoftAP 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

XT-BL10 module interface definition is shown as below.

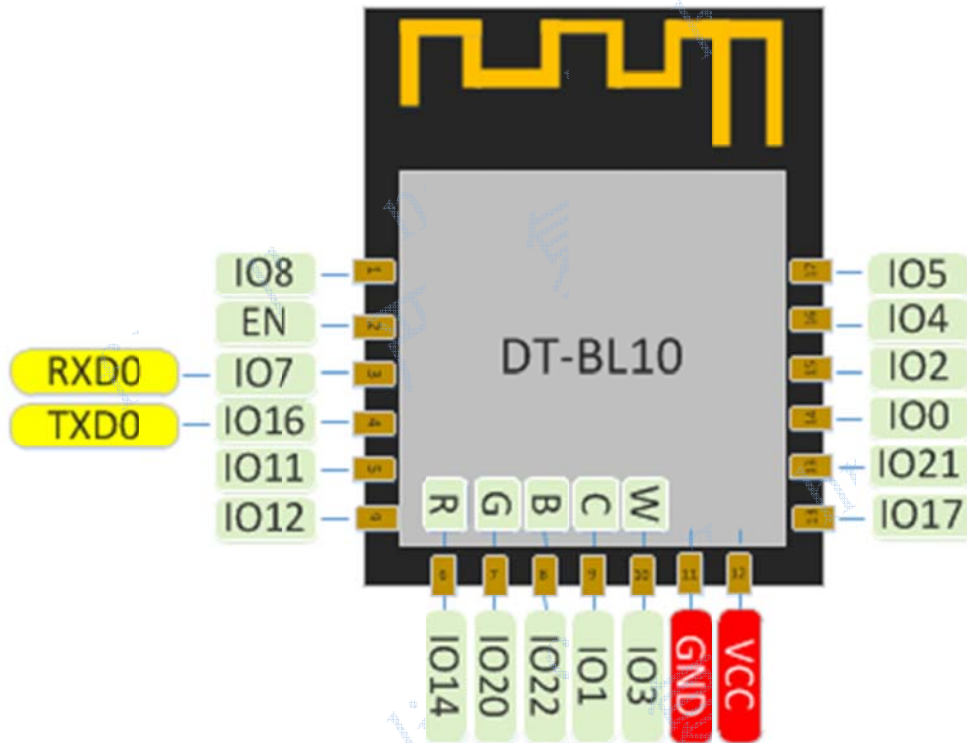


Fig. 2.1 XT-BL10 Pin Definition

Working mode and pin function is shown in Table 2.1.

Table 2.1 Working mode

Mode	GPIO8
UART Download Mode	High
Flash Boot Mode	Low

Table 2.2 Pin 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 XT-BL10 can be shown as follows.

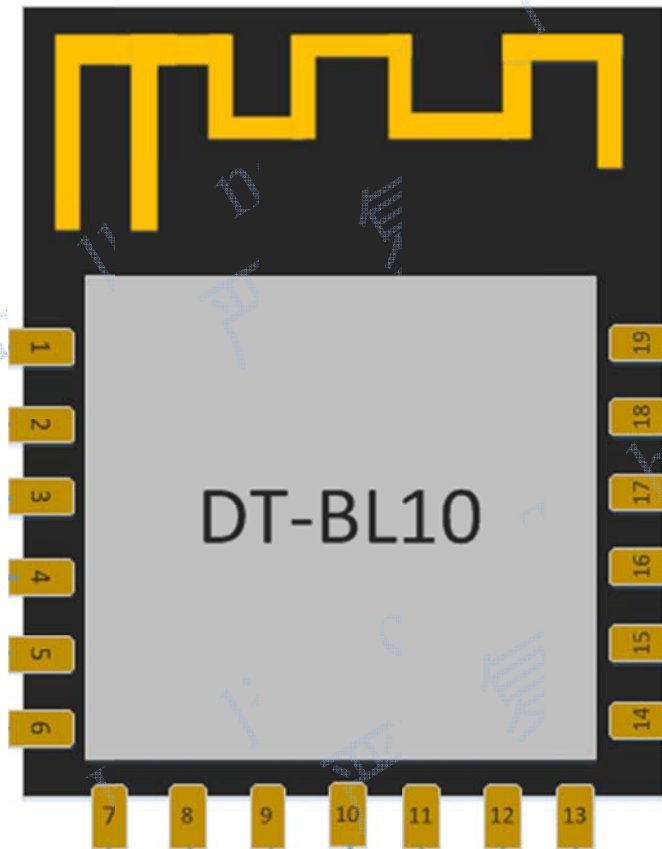
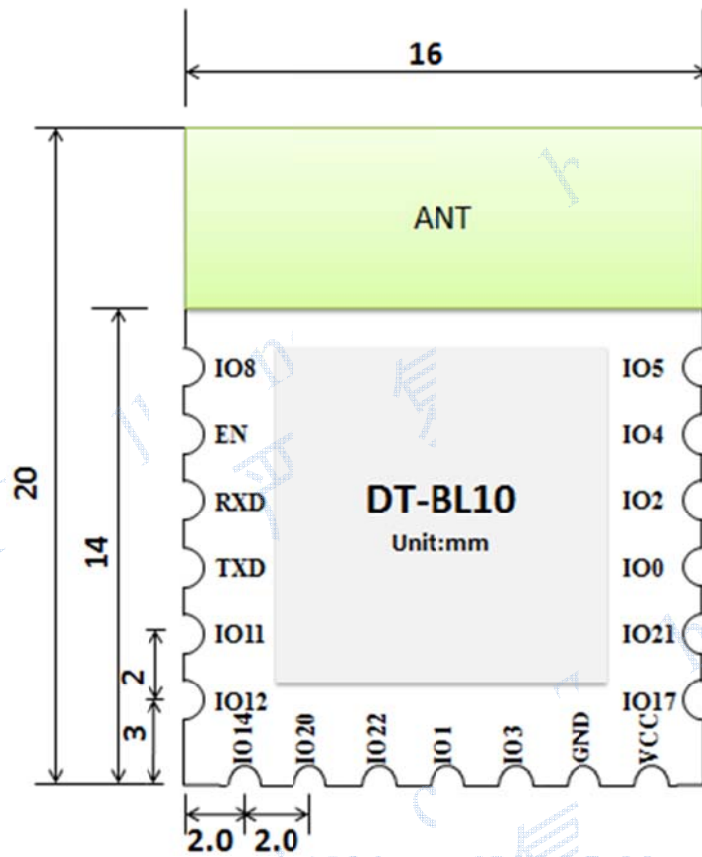


Fig. 3.1 Shape for XT-BL10



(a) Vertical View



(b) Side View

Fig. 3.2 Size for XT-BL10

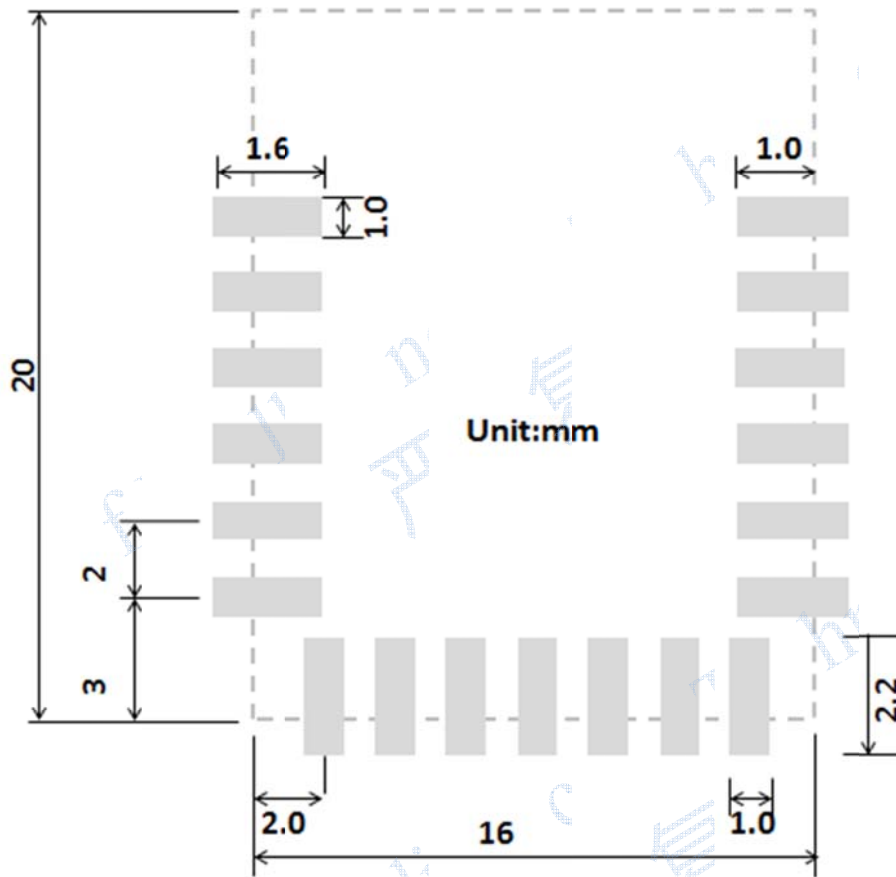


Fig. 3.3 PCB Layout for XT-BL10

4. Electrical Characteristics

Table 4.1 Electrical Characteristics

Parameters	Condition	Min	Classical	Max	Unit
Store Temperature	-	-30	Normal	155	°C
Sold Temperature	IPC/JEDEC J-STD-020	-	-	260	°C
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°C	-	-	2	KV
Electrostatic release quantity (Human model)	TAMB=25°C	-	-	0.5	KV

5. Power Consumption

Table 5.1 Power Consumption

Parameters	Min	Classical	Max	Unit
RX 11b	-	35	-	mA
RX 11g		39		

RX 11n		39		
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	Unite
Input frequency	2412	-	2462	MHz
Input impedance	-	50	-	Ω
Input reflection	-	-	-10	dB
At 11b mode, output power consumption	-	18	-	dBm
At 11g mode, output power consumption	-	19	-	dBm
At 11n mode, output power consumption	-	18	-	dBm
Sensibility	-	-	-	-
802.11b, 1Mbps	-	-98	-	dBm
802.11g, 64Mbps	-	-93	-	dBm
802.11n, MCS7	-	-73	-	dBm

7. The Recommended Sold Temperature Curve

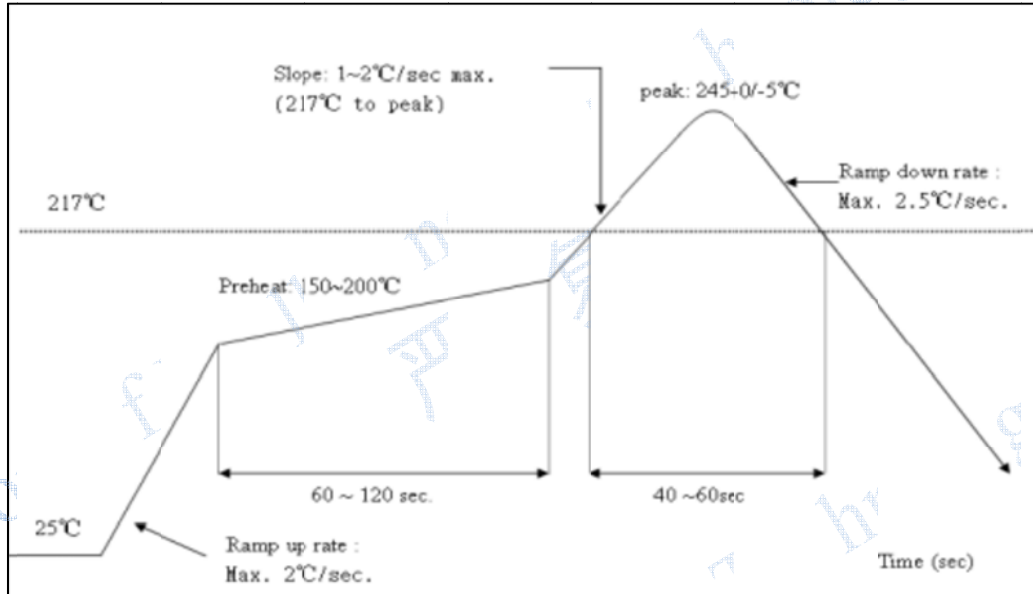


图 7.1 Temperature Curve when sold

8. Minimum User System

This module can work just at 3.3V working voltage:

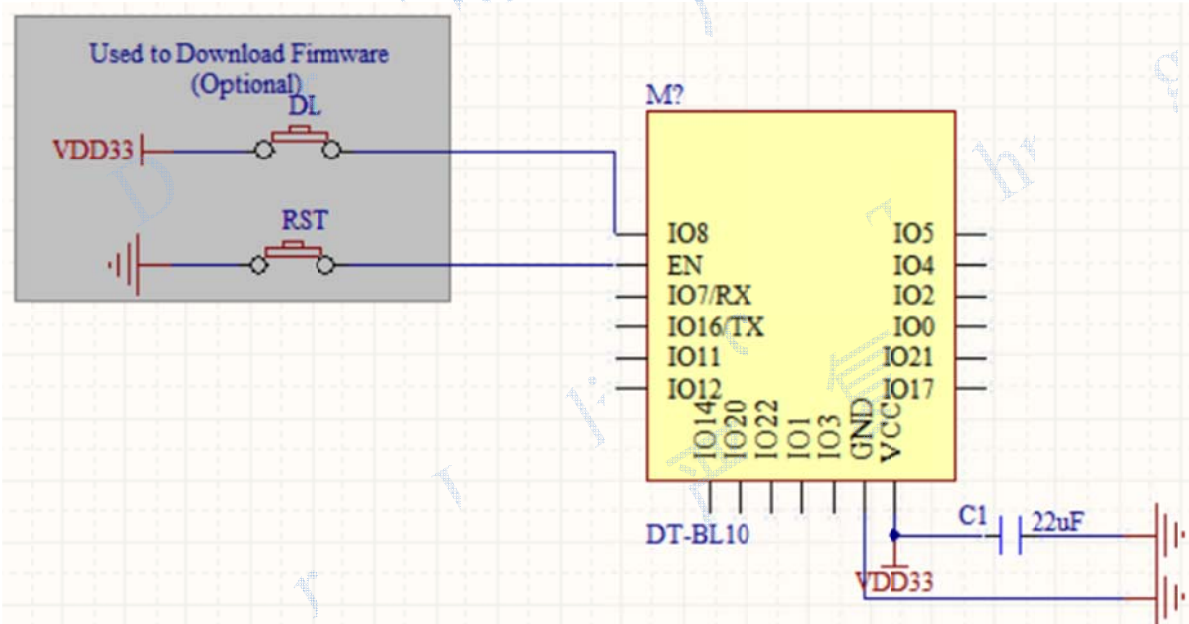


Fig.8.1 minimum system

Note

- (1) the working voltage for module is DC 3.3V;
- (2) the max current from IO of this module is 12mA;

(3) WiFi 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 WiFi Module with PCB antenna.

Solution 1:optical solution. The WiFi 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:suboptical solution. The WiFi 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 WiFi module is placed on the side of the board, and the PCB area under the antenna is empty, and copper cannot be laid.

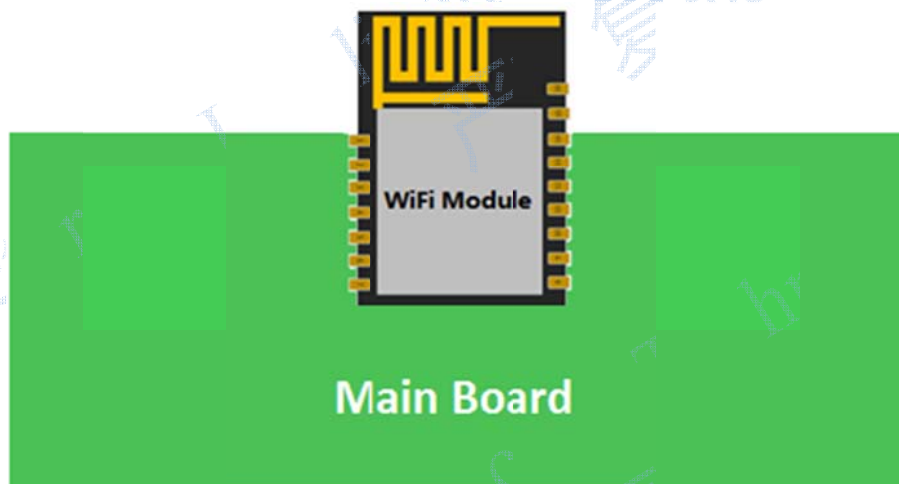


Fig.9.1 Solution 1

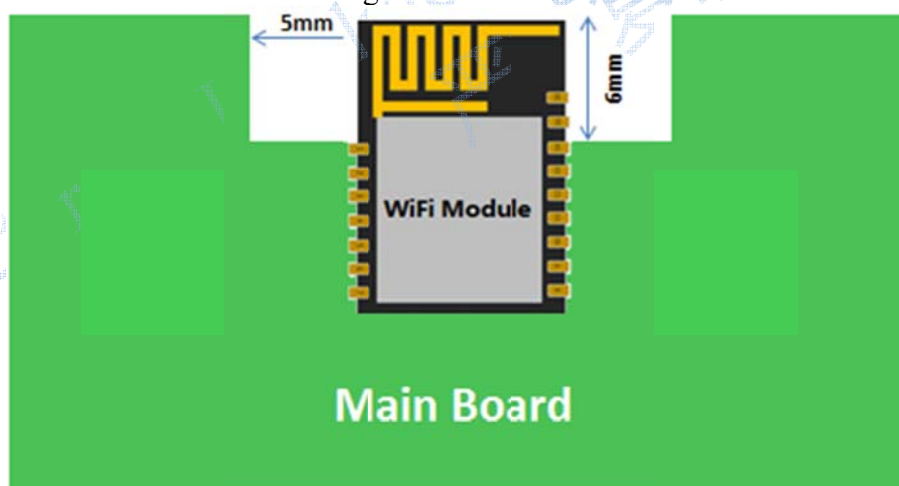


Fig.9.2 Solution 2

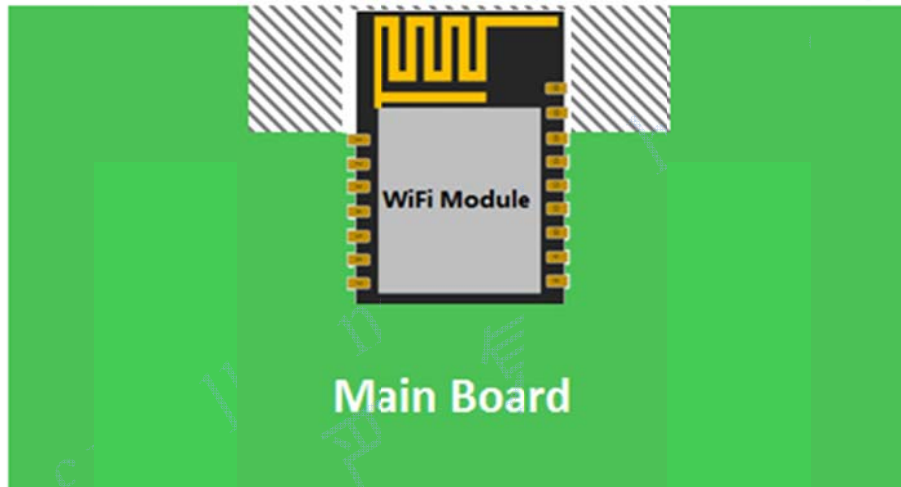


Fig.9.3 Solution 3

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).

FCC WARNING

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

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20

cm between the radiator and your body.

Radiation Exposure Statement:

This equipment complies with FCC 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.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module “2A3UG-XT-BL10”

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.³

Explanation: This module meets the requirements of FCC part 15C (15.247).it Specifically identified AC Power Line Conducted Emission, Radiated Spurious emissions, Band edge and RF Conducted Spurious Emissions, Conducted Peak Output Power, Bandwidth, Power Spectral Density, Antenna Requirement.

Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The EUT has one PCB Antenna, the antenna can be replaced by other authorized antennas, and the gain of each replacement antenna is no more than 1.0dBi

2.3 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited

module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is a single module.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement, FCC ID is: 2A3UG-XT-BL10.

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type"))).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product.

The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT has one PCB Antenna, the antenna can be replaced by other authorized antennas, and the gain of each replacement antenna is no more than 1.0dBi

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This

includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2A3UG-XT-BL10.

2.9 Information on test modes and additional testing requirements⁵

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: Shenzhen Sibozhilian Technology Co., Ltd. can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the 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. If the grantee markets their product

as being Part 15

Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuitry, so the module does not require an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B.