

XT-ZB6

—Zigbee3.0 and BLE5.0 Coexistence Module

Product Specification

Version: 1.0

Date: June.23, 2022

Features

■ General

- Chip: BL706C-22
- Optional: 16M bit Flash, 16M bit pSRAM
- Module Size: 16mm x 24mm x 3mm
- Bluetooth® Specification v5.0
- Zigbee 3.0, Base Device Behavior, Core Stack R21, Green Power
- 2.4 GHz RF transceiver
- Support BLE/Zigbee coexistence

■ Standards Supported

- IEEE 802.15.4 MAC/PHY
- Bluetooth® Low Energy 1Mbps and 2Mbps
- Bluetooth® Long Range Coded 500Kbps and 125Kbps
- Integrated balun, PA/LNA

■ MCU Features

- 32-bit RISC CPU with FPU
- One RTC timer update to one year
- CPU frequency configurable from 1MHz to 144MHz
- JTAG development support
- XIP QSPI Flash/pSRAM with hardware encryption support
- 132KB RAM
- 192KB ROM
- 1Kb eFuse

■ Peripheral Interfaces

- USB2.0 Full-Speed interface
- GPIO * 31;
- UART * 2;
- IIC * 1;
- IIS * 1

- Ethernet RMII interface
- Camera interface
- SPI * 1;
- EN * 1;
- PWM *5;
- 10-bit DAC ;
- 12-bit ADC;
- PIR * 1;
- IR remote control interface

■ Working temperature: -40°C -85°C

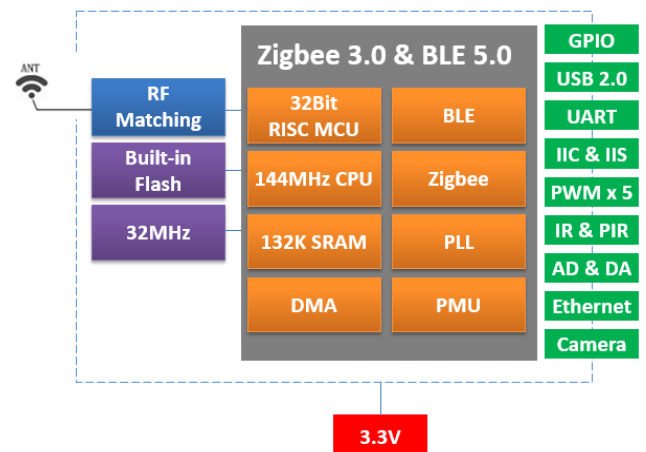
Applications

- Serial transparent transmission;
- Smart power plug/Smart LED light;
- Sensor networks;
- Industrial wireless control;

Module Type

Name	Antenna Type
XT-ZB6	PCB ANT
XT-ZB6-E	IPEX V1

Module Structure



Update Record

Date	Version	Update
2022-06-23	V1.0	First released

知识共享

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1. Introduction

XT-ZB6 is highly integrated BLE and Zigbee combo module for IoT applications.

XT-ZB6's wireless subsystem contains 2.4G radio, BLE + Zigbee baseband and MAC designs. Microcontroller subsystem contains 32-bit RISC CPU, high-speed cache and memories. Power Management Unit controls ultra-low-power modes. Moreover, varieties of security features are supported.

Peripheral interfaces include UART, PWM, USB, I2C, ADC, DAC and GPIOs.

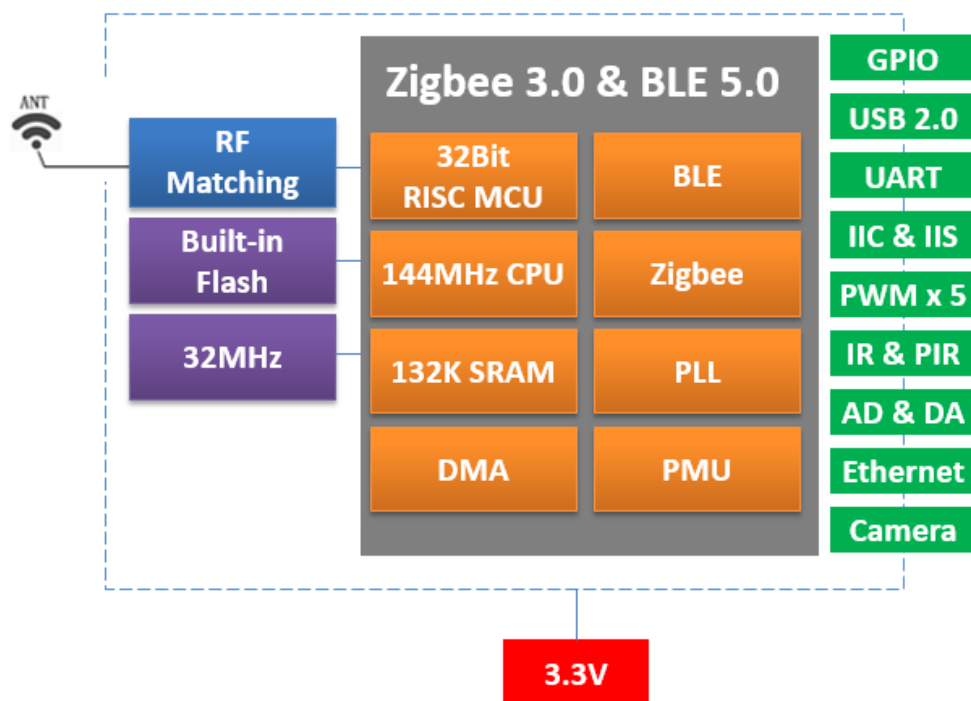


Fig.1.1 XT-ZB6 Module Structure

Technical parameters for XT-ZB6 are listed as follows.

Table 1.1 XT-ZB6 Parameters

Types	Items	Parameters
RF	Zigbee Sensitivity	-104 dBm @250Kbps
	BLE Sensitivity	-104 dBm @120Kbps
		-100 dBm @500Kbps
		-97 dBm @1Mbps
		-94 dBm @2Mbps
	TX Power	0-14 dBm
	TX EVM	11%
	Antenna	PCB antenna / U.F.L IPEX V1
Hardware	CPU	32-bit RISC CPU
	Interface	UART/GPIO/PWM
	Working voltage	2.5V ~ 3.6V
	Working current	3.5mA @RF only
		17mA @TX 10dBm
		45mA @TX 14dBm
	Working temperature	-40°C ~85°C
	Storage temperature	-45°C ~ 135°C
	Shape	16mm x 24mm x 3mm
Software	Encryption type	AES 128/192/256
	Update firmware	UART Download
	Software develop	SDK

2. Interface Definition

XT-ZB6 module interface definition is shown as below.

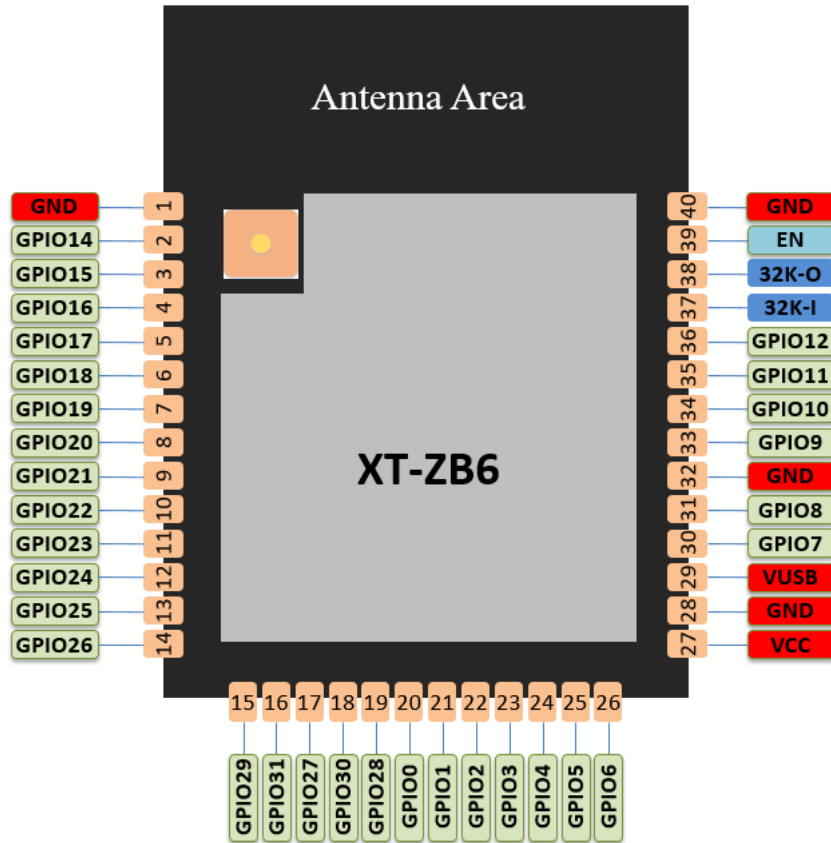


Fig.2.1 XT-ZB6 Pin Definition

Working mode and pins function are shown in Table 2.1.

Table.2.1 Working mode

Mode	GPIO31
UART Download Mode	High
Flash Boot Mode	LOW (default)

Table.2.2 Pins Function Definition

Num.	Pin Name	Type	Function
1,28,32,40	GND	P	POWER GROUND
2	GPIO14	I/O	TXD (download),SS,SCL,ADC_CH5,I2S_DIO,PWM_CH4
3	GPIO15	I/O	RXD(download), SCLK,SDA,ADC_CH1,I2S_DIO,PWM_CH0
4	GPIO16	I/O	MOSI,SCL,PWM_CH1
5	GPIO17	I/O	MISO/MOSI,SDA,I2S_FS,PWM_CH2,DAC,PIX_DAT4
6	GPIO18	I/O	SF1_IO1,SS,PIX_DAT5,RMII_MDC
7	GPIO19	I/O	SF1_CS,SCLK,SDA,PIX_DAT6,RMII_MDIO

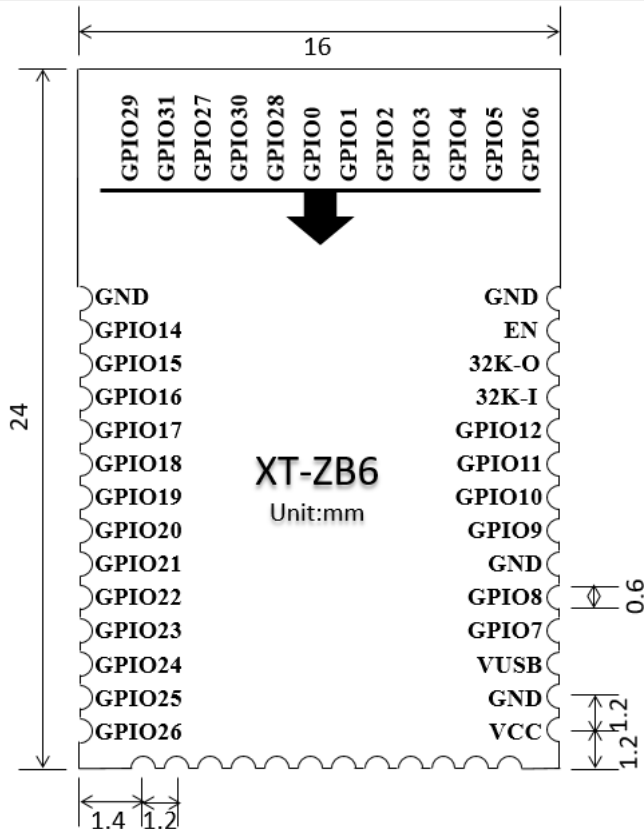
8	GPIO20	I/O	SF1_IO3,PIX_DAT7,SCL,RMII_RXERR
9	GPIO21	I/O	SF1_CLK,SDA,RMII_TX_EN
10	GPIO22	I/O	SF1_IO2,SS,PWM_CH2,RMII_RX_DV
11	GPIO23	I/O	SCLK, I2S_DI, SPI,SDA,PWM_CH3,IRTX
12	GPIO24	I/O	SF2_IO1,PIX_DAT5,SCL,RMII_MDC
13	GPIO25	I/O	MISO/MOSI,SDA,I2S_FS,PWM_CH0
14	GPIO26	I/O	SF2_IO3,SS,PIX_DAT7,RMII_RXERR
15	GPIO29	I/O	PIX_DAT5,PEM_CH4
16	GPIO28	I/O	MISO/MOSI,SCL,I2S_BCLK,PWM_CH3,RMII_RX_DV
17	GPIO27	I/O	SF2_CLK,SCLK, RMII_TX_EN
18	GPIO30	I/O	PIX_DAT6,SCL,PWM_CH0
19	GPIO31	I/O	PIX_DAT7,SDA,PWM_CH1,,PULL-DOWN
20	GPIO0	I/O	MISO/MOSI,SCL,I2S_BCLK,PWM_CH0
21	GPIO1	I/O	MISO/MOSI,SDA,I2S_FS,PWM_CH1
22	GPIO2	I/O	MISO/MOSI,SCL,I2S_DIO,PWM_CH2
23	GPIO3	I/O	PIX_DAT0,SDA
24	GPIO4	I/O	PIX_DAT1,SCL
25	GPIO5	I/O	PIX_DAT2,SDA
26	GPIO6	I/O	PIX_DAT3,SCL
27	VCC	P	POWER IN,3.3V
29	VUSB	P	USB power
30	GPIO7	I/O	USB_DP,SCLK,SDA,PWM_CH2,ADC_CH6
31	GPIO8	I/O	USB_DM, MISO/MOSI,SCL,PWM_CH3,ADC_CH0
33	GPIO9	I/O	MISO/MOSI,SDA,I2S_FS,PWM_CH4,ADC_CH7
34	GPIO10	I/O	SS,SCL,
35	GPIO11	I/O	SCLK,SDA
36	GPIO12	I/O	PIX_DAT4,SCL
37	32K-I	A	CRYSTAL:32.768K INPUT
38	32K-O	A	CRYSTAL:32.768K OUTPUT
39	EN	-	Chip enable; Built-in Pull-up

3. Size and Layout

Shape for XT-ZB6 can be shown as follows.



Fig.3.1 Shape for XT-ZB6



(a) Vertical View

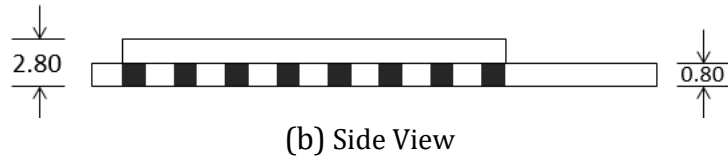


Fig.3.2 Size for XT-ZB6

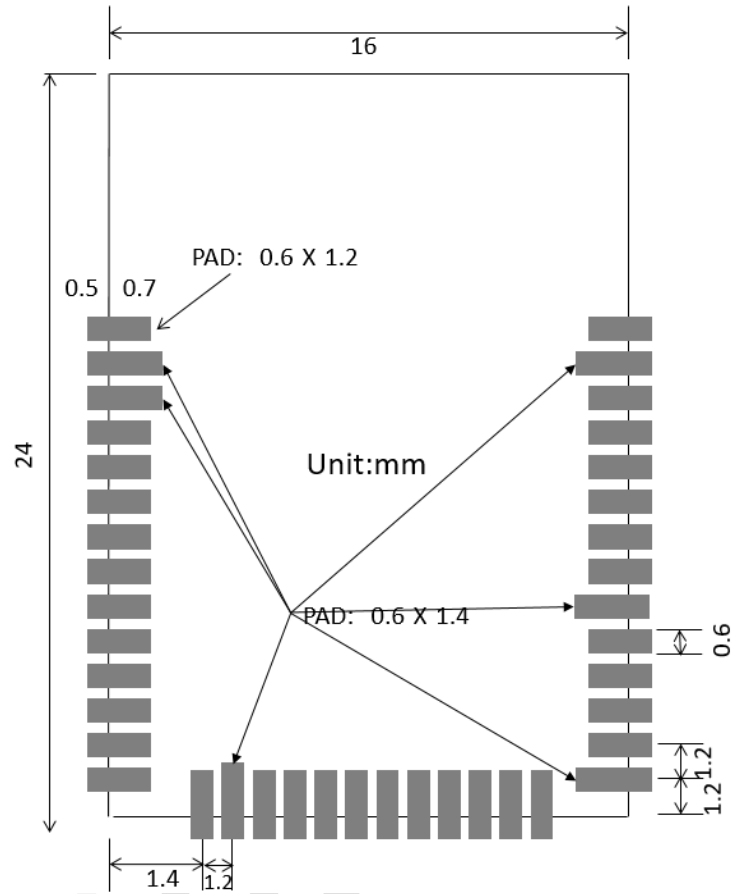


Fig.3.3 PCB Layout for XT-ZB6

4. Electrical Characteristics

Table 4.1 Electrical Characteristics

Parameters		Condition	Min	Classical	Max	Unit
Store Temperature		-	-40	Normal	125	°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 only	-	3.5	-	mA
TX 0dbm	-	4.8	-	mA
TX 10dbm	-	17	-	mA
TX 14dbm	-	45	-	mA
Run in RAM @RC32M 144MHz	-	8.44	-	mA
Run in RAM @RC32M 32MHz	-	3.36	-	mA
Run in FLASH @RC32M 144MHz	-	7.72	-	mA
Run in FLASH @RC32M 32MHz	-	3.39	-	mA
Hibernate Mode	-	1.2	-	uA
Shut Down	-	0.1	0	uA

6. RF Characteristics

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

Table 6.1 RF Characteristics

Parameters	Min	Classical	Max	Unit
TX				
TX Power	0	0	14	dBm
TX EVM	-	11	13	%
Sensibility				
Zigbee @250Kbps	-	-104	-	dBm
BLE @125Kbps	-	-104	-	dBm
BLE @500Kbps	-	-100	-	dBm
BLE @1Mbps	-	-97	-	dBm
BLE @2Mbps	-	-94	-	dBm

7. Recommended Reflow Profile

- (1) Reflow Times ≤ 2 times (Max.)
- (2) Max Rising Slope: $3^{\circ}\text{C}/\text{sec}$
- (3) Max Falling Slope: $-3^{\circ}\text{C}/\text{sec}$
- (4) Over 217°C Time: 60~120sec
- (5) Peak Temp: $240^{\circ}\text{C} \sim 250^{\circ}\text{C}$

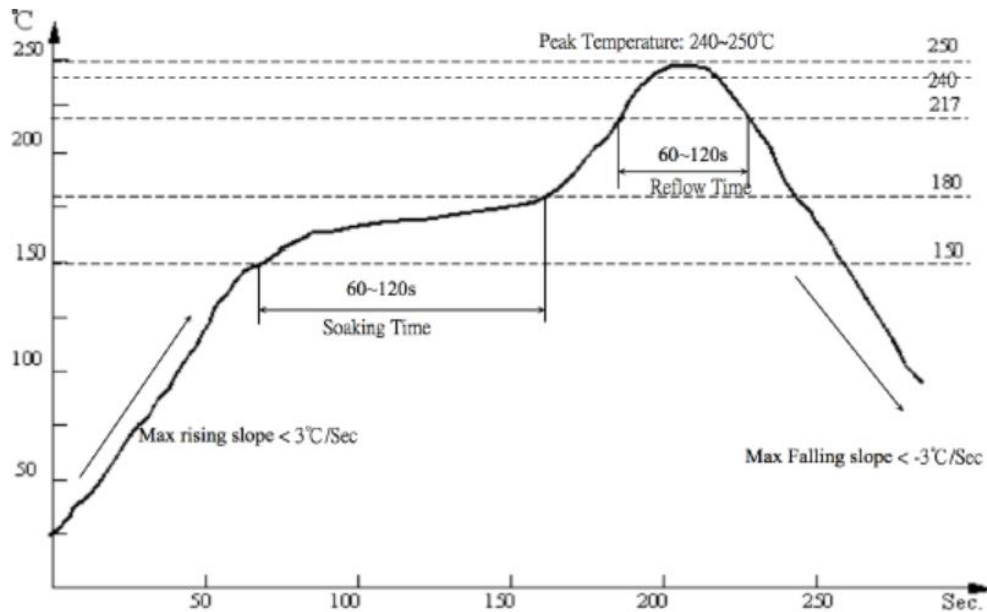


Fig.7.1 Recommended Reflow Profile

8. Minimum User System

This module can work just at 3.3V working voltage:

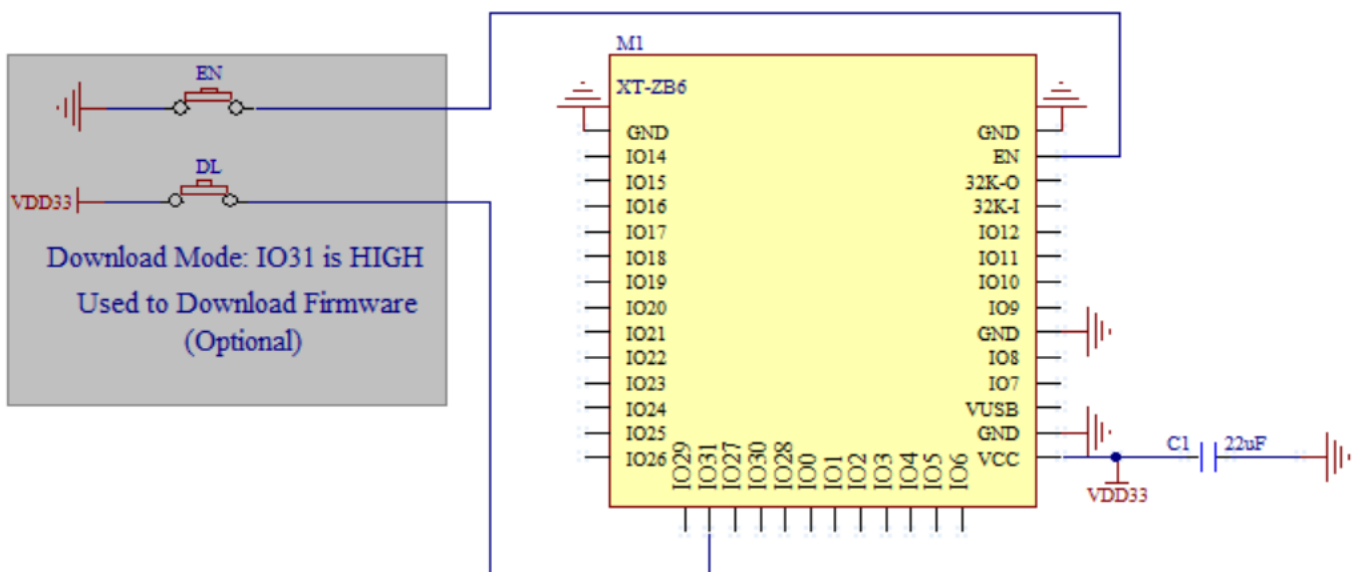


Fig.8.1 Minimum User System

Note:

- (1) The working voltage for module is DC 3.3V;
- (2) The max current from IO of this module is 12mA;
- (3) Zigbee module is at download mode: GPIO31 are HIGH level, then module reset to power on;
- (4) Zigbee module is connected to RXD of the other MCU, and TXD is connected to RXD of the other MCU.

9. Recommended Layout Design

XT-ZB6 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.

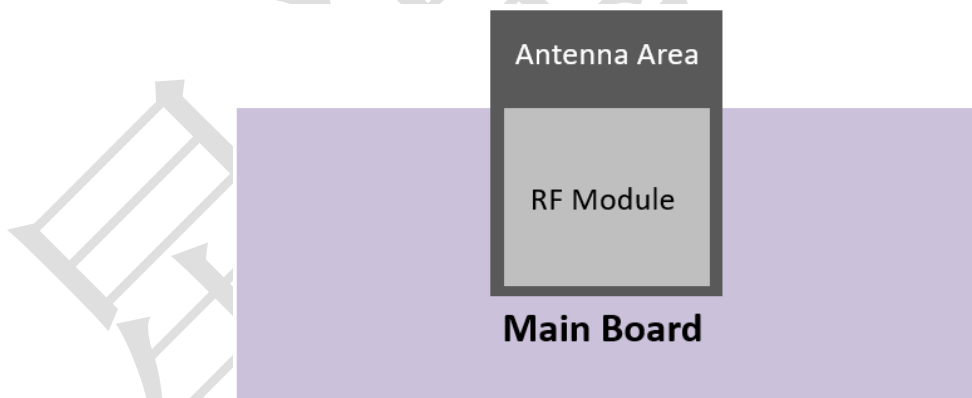


Fig.9.1 Solution 1

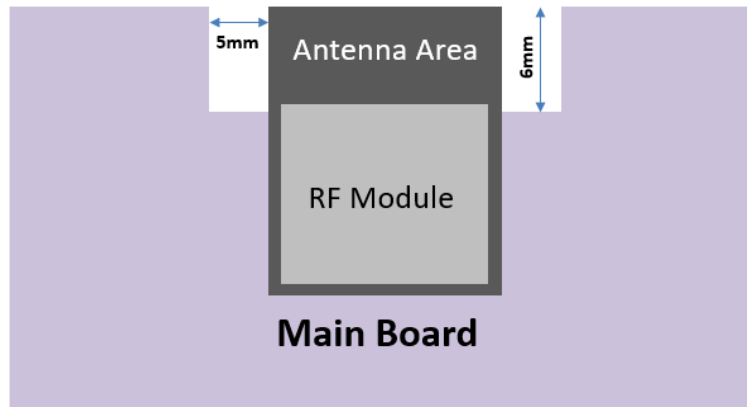


Fig.9.2 Solution 2

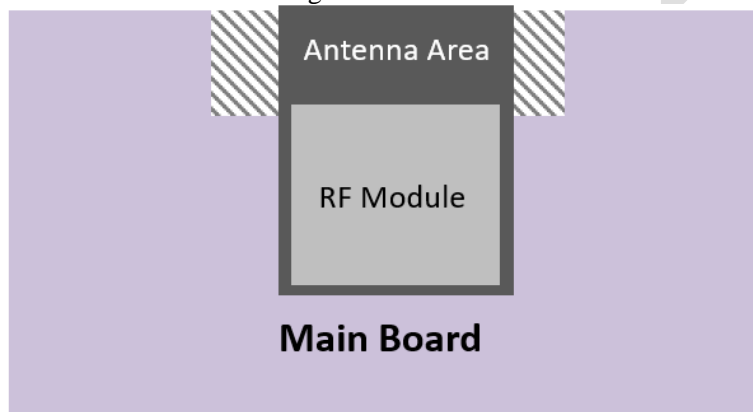


Fig.9.3 Solution 3

10. Peripheral Design Suggestion

XT-ZB6 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).

11. Product Handling

11.1 Storage Conditions

The products sealed in moisture barrier bags (MBB) should be stored in a non-condensing atmospheric environment of $< 40^{\circ}\text{C}$ and $/90\%\text{RH}$. The module is rated at the moisture sensitivity level (MSL) of 3. After unpacking, the module must be soldered within 168 hours with the factory conditions $25\pm 5^{\circ}\text{C}$ and $/60\%\text{RH}$. If the above conditions are not met, the module needs to be baked.

11.2 Electrostatic Discharge (ESD)

- Human body model (HBM): $\pm 2000\text{ V}$
- Charged-device model (CDM): $\pm 500\text{ V}$

12. U.F.L RF Connector

XT-ZB6-E module use U.F.L type RF connector for external antenna connection. (IPEX V1.0).

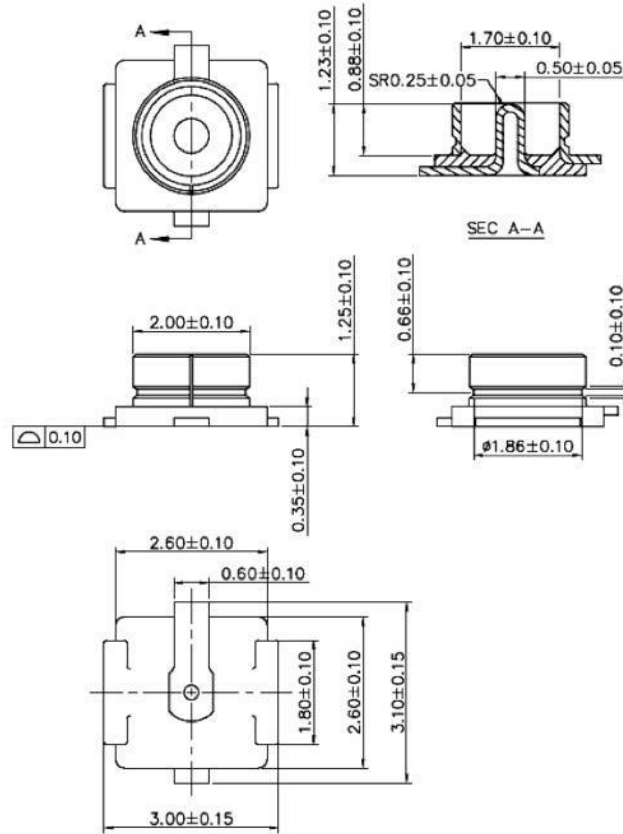


Fig.12.1 U.F.L RF Connector

13. Packing Instruction

The product is packed in a tray, as shown in the following figure.

The size of the single box is: 340 x 360 x 60mm, and 800 pieces module is in the box. And the outer box size is 355 x 375 x 325mm, including 5 single box which include 4000 pieces module.



Fig.13.1 Module Package