PRODUCT SPECIFICATION

X253T-IH

Wi-Fi Single-band 1x1 802.11b/g/n/ax + BLE5.2

IoT Combo Module

Version:V1.0

Customer: ______________________

Customer P/N:______________________

Signature:______________________

Date:______________________

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X253T-IH Module Datasheet

Ordering Information	Part NO.	Description
	FGX253TIHX-00	GD32VW553-HI,24*16mm,ADC,GPIO/UART/SPI/IR

CONTENTS

1. General Description **5**
1.1 Introduction 5
1.2 Description 5
2. Features **6**
3. Block Diagram **6**
4. General Specification **6**
4.1 2.4G RF Specification 6
4.2 Bluetooth Specifications 7
5. Pin Definition **8**
5.1 Pin Outline 8
5.2 Pin Definition details 8
6. Electrical Specifications **11**
6.1 Power Supply DC Characteristics 11
7. Size reference **11**
7.1 Module Picture 11
7.2 Physical Dimensions 12
7.3 Layout Recommendation 13
8. The Key Material List **13**
9. Reference Design **14**
10. Requirements for antenna placement **15**
11. Recommended Reflow Profile **16**
12. Package **16**
12.1 Reel 16
12.2 Carrier Tape Detail 17
12.3 Packaging Detail 17
12.4 Tray 19
13. Moisture sensitivity **19**

Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2023/07/10	New version	Lxp	Zzq	Qjp

1. General Description

1.1 Introduction

The X253T-IH is a highly integrated 2.4GHz Wi-Fi and BLE module，It is an optimized module designed for a broad array of smart devices for Internet of Things (IoT) applications especially in areas such as industrial control, motor drives, user interface, power monitor and alarm systems, consumer and handheld equipment, gaming and GPS, E-bike, optical module and so on.

1.2 Description

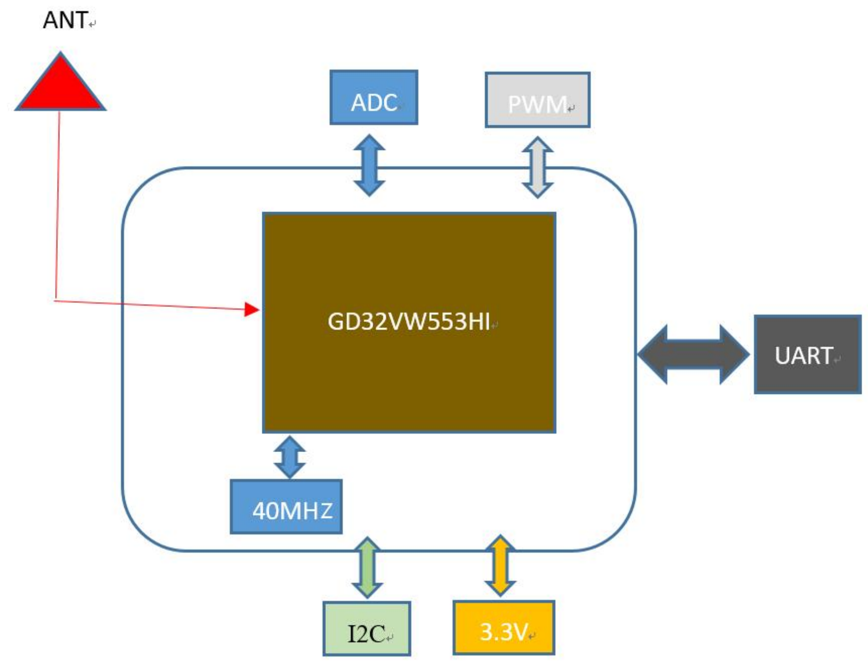
Model Name	X253T-IH
Product Description	Support Wi-Fi/BLE functionalities
Dimension	L x W x H: 24 x 16 x2.2 mm
Wi-Fi Interface	Support UART
BT Interface	UART
Operating temperature	-40°C to 85°C
Storage temperature	-40°C to 125°C

2. Features

General Features

- 802.11b/g/n/ax compatible
- 802.11i (WPA, WPA2, WPA3). Open, shared key, and pair-wise key authentication services
- Single antenna 1x1 stream in 20MHz channels
- Support of 802.11ax MCS up to MCS9 with Max phy rate as 114.7Mbps
- BLE5.2
- BLE Support High speed 2M PHY
- Built-in 2MB FLASH
- Onboard antenna

3. Block Diagram



4. General Specification

4.1 2.4G RF Specification

features	**describe**	
WLAN 标准	IEEE 802.11 ax/b/g/n/ Wi-Fi compliant	
Range of frequency	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
channels	2.4GHz：Ch1 ~ Ch14	
Test Items	**Typical Value**	**EVM**

Power output	802.11b /11Mbps : 17dBm ± 2 dB	EVM ≤ -9dB
	802.11g /54Mbps : 15dBm ± 2 dB	EVM ≤ -25dB
	802.11n20 /MCS7 : 14dBm ± 2 dB	EVM ≤ -28dB
	802.11ax /MCS9 : 13dBm ± 2 dB	EVM ≤ -32dB
Frequency spectrum template	Meet with IEEE standard	
Standard frequency	±20ppm	
Test Items	**TYP Test Value**	**Standard Value**
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps @ -92 dBm	≤-83 dBm
	- 11Mbps @ -85 dBm	≤-76 dBm
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps @ -89 dBm	≤-85 dBm
	- 54Mbps @ -70 dBm	≤-68 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 @ -89 dBm	≤-85 dBm
	- MCS=7 @ -68 dBm	≤-67 dBm
Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 @ -83 dBm	≤-82 dBm
	- MCS=9 @ -64 dBm	≤-62dBm
Maximum receiving level	802.11b : -10 dBm	
	802.11ax/g/n : -20 dBm	

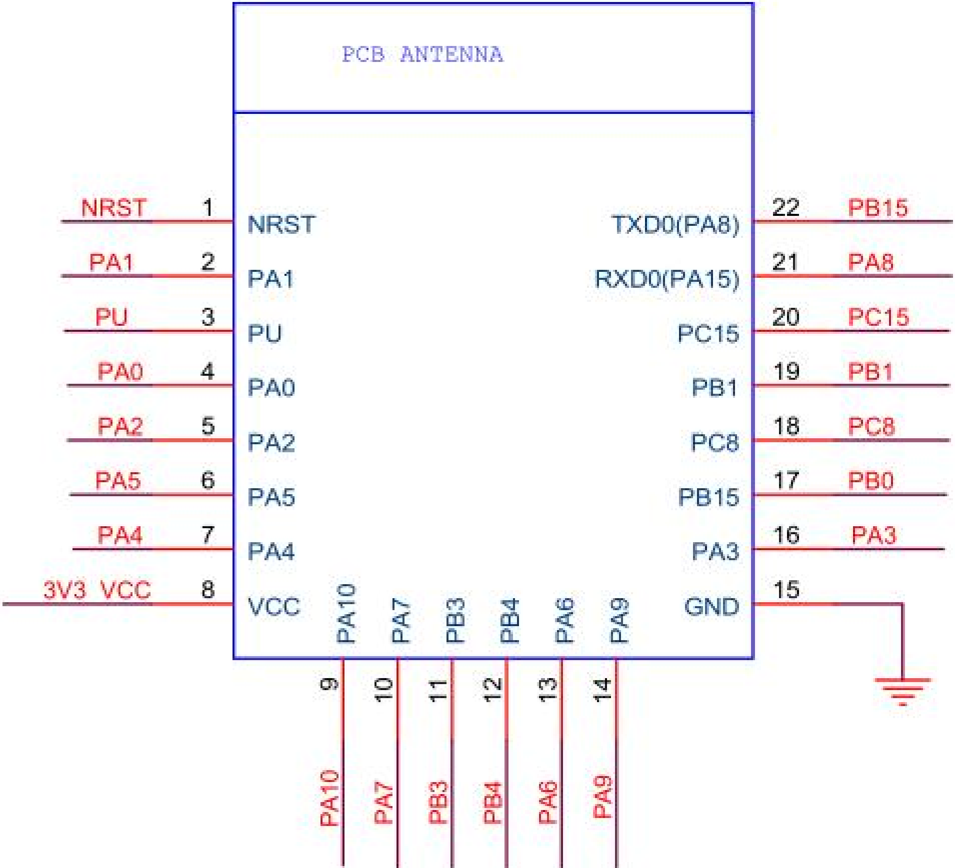
4.2 Bluetooth Specifications

Feature	**Description**		
General Specification			
Bluetooth Specification	Bluetooth V5.2		
Host interface	UART		
Range of frequency	2400 MHz ~ 2483.5 MHz		
channels	40 channels		
Radio frequency Specifications			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)
Power output	2	4	6
sensitivity @ BLE=30.8%			-80
Maximum input level	GFSK (1Mbps):-20dBm		

5. Pin Definition

5.1 Pin Outline

< TOP VIEW >



5.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	NRST	-	Default: NRST	
2	PA1	I/O	Default:PA1 Alternate:USART0_RX, TIMER1_CH1, SPI_MISO, UART1_RTS, EVENTOUT Additional: ADC_IN1	
3	PU	-	Default: PU	
4	PA0	I/O	Default: PA0 Alternate: USART0_TX, TIMER1_CH0, TIMER1_ETI,	

			SPI_MOSI, UART1_CTS, TIMER0_ETI, EVENTOUT	
5	PA2	I/O	Default: PA2 Alternate: USART0_CTS, TIMER1_CH2, I2C0_SCL, SPI_SCK, TIMER0_CH0, UART1_TX, EVENTOUT Additional: ADC_IN2	
6	PA5	I/O	Default: PA5 Alternate: UART1_RX, TIMER2_ETI, QSPI_CSN, SPI_MISO, SPI_SCK, TIMER0_CH1_ON , EVENTOUT Additional: ADC_IN5	
7	PA4	I/O	Default: PA4 Alternate: UART1_TX, SPI_MOSI, QSPI_SCK, SPI_NSS, TIMER0_CH1, EVENTOUT Additional: ADC_IN4	
8	VCC	P	3.3V(+/-0.3)	
9	PA10	I/O	Default: PA10 Alternate: SPI_MISO, TIMER0_CH2, QSPI_CSN, TIMER16_CH0, USART0_RX, EVENTOUT	
10	PA7	I/O	Default: PA7 Alternate: I2C1_SDA , TIMER0_CH0_ON, TIMER2_CH1, QSPI_IO1, SPI_NSS, SPI_MOSI, TIMER0_CH1_ON, UART2_RX, TIMER1_CH2, EVENTOUT Additional: ADC_IN7, WAKUP2	
11	PB3	I/O	Default: JTDO, PB3 Alternate: TIMER1_CH1, QSPI_IO2, USART0_RX, UART1_RX, TIMER15_BRKIN, EVENTOUT	
12	PB4	I/O	Default: NJTRST, PB4 Alternate: TIMER1_CH0, TIMER1_ETI, QSPI_IO3, USART0_TX, UART1_TX, EVENTOUT	
13	PA6	I/O	Default: PA6 Alternate: TIMER2_CH0, QSPI_IO0, I2C1_SCL, SPI_MISO, SPI_SCK, TIMER0_CH1, TIMER1_CH1, UART2_TX, EVENTOUT Additional: ADC_IN6	
14	PA9	I/O	Default: PA9 Alternate: SPI_MOSI, TIMER0_CH1, QSPI_SCK, USART0_TX, TIMER15_CH0_ON, EVENTOUT	
15	GND	P	GND	
16	PA3	I/O	Default: PA3	

			Alternate: USART0_RTS, TIMER1_CH3, I2C0_SDA, SPI_NSS, TIMER0_CH0_ON, UART1_RX, RTC_OUT, EVENTOUT Additional: ADC_IN3	
17	PB0	I/O	Default:PB0 Alternate:TIMER0_CH1_ON,TIMER0_CH0, TIMER0_CH2, UART1_TX, I2C0_SCL, TIMER2_ETI, TIMER16_CH0, UART2_CTS, TIMER0_BRKIN, EVENTOUT Additional: ADC_IN8	
18	PC8	I/O	Default: PC8 Alternate: TIMER2_CH2, I2C0_SDA, I2C1_SDA, USART0_TX, UART1_TX, EVENTOUT Additional: BOOT0	
19	PB1	I/O	Default: PB1 Alternate: TIMER0_CH2_ON, TIMER0_CH0_ON, TIMER2_CH2, UART1_RX, I2C0_SDA, TIMER16_CH0_ON, UART2_RTS, EVENTOUT Additional: BOOT1	
20	PC15	I/O	Default: PC15 Alternate: IFRP_OUT, EVENTOUT Additional: OSC32OUT	
21	PA8	I/O	Default: PA8 Alternate: CK_OUT0, TIMER0_CH0, USART0_RX, UART1_RX, I2C0_SDA, I2C1_SDA, USART0_CK, TIMER15_CH0, RTC_OUT, TIMER0_CH2_ON, EVENTOUT	
22	PB15	I/O	Default: PB15 Alternate: RTC_REFIN, TIMER0_CH2_ON, TIMER2_CH0, I2C0_SCL, I2C1_SCL, UART1_TX, USART0_TX, IFRP_OUT , EVENTOUT	

I = Input, O = Output, P = ower.

6. Electrical Specifications

6.1 Power Supply DC Characteristics

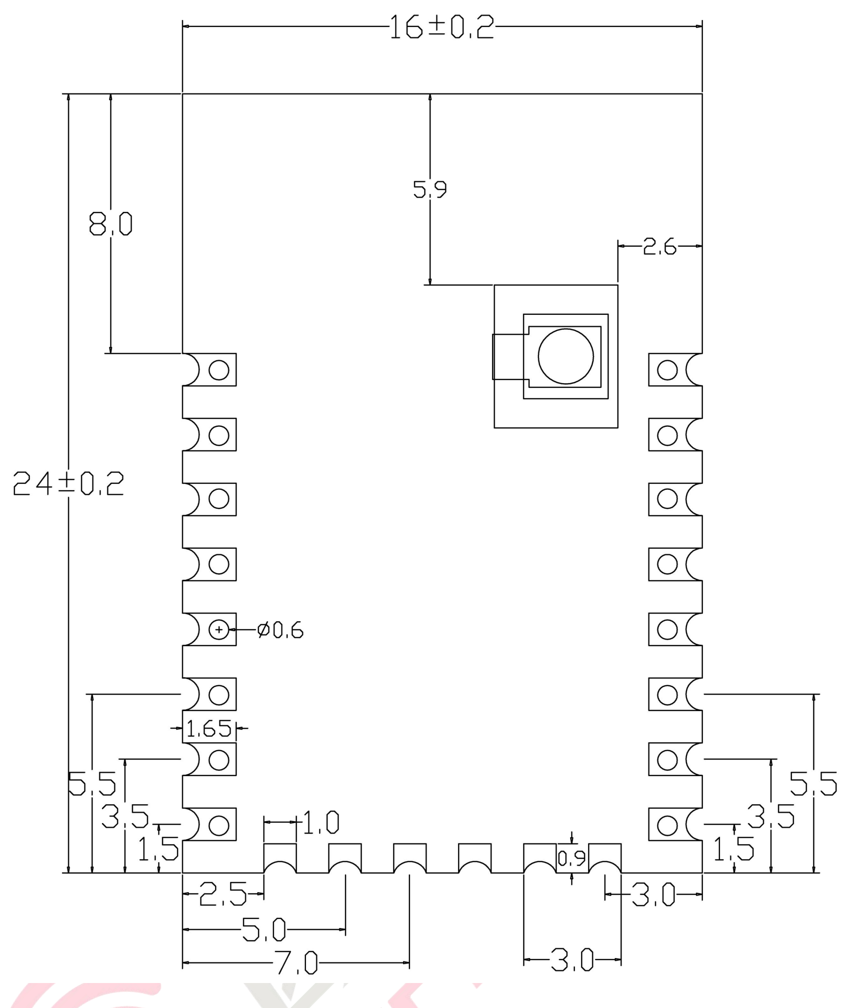
	MIN	TYP	MAX	Unit
Operating Temperature	-40	25	85	deg.C
VCC33	3.0	3.3	3.6	V

7. Size reference

7.1 Module Picture

L x W : 24 x16 (±0.2 mm)	16 24
H: 2.2(±0.2) mm	2.2 0.8
重量	**1.06±0.01g**

7.2 Physical Dimensions



注:未标注焊盘公差值皆为±0.1mm

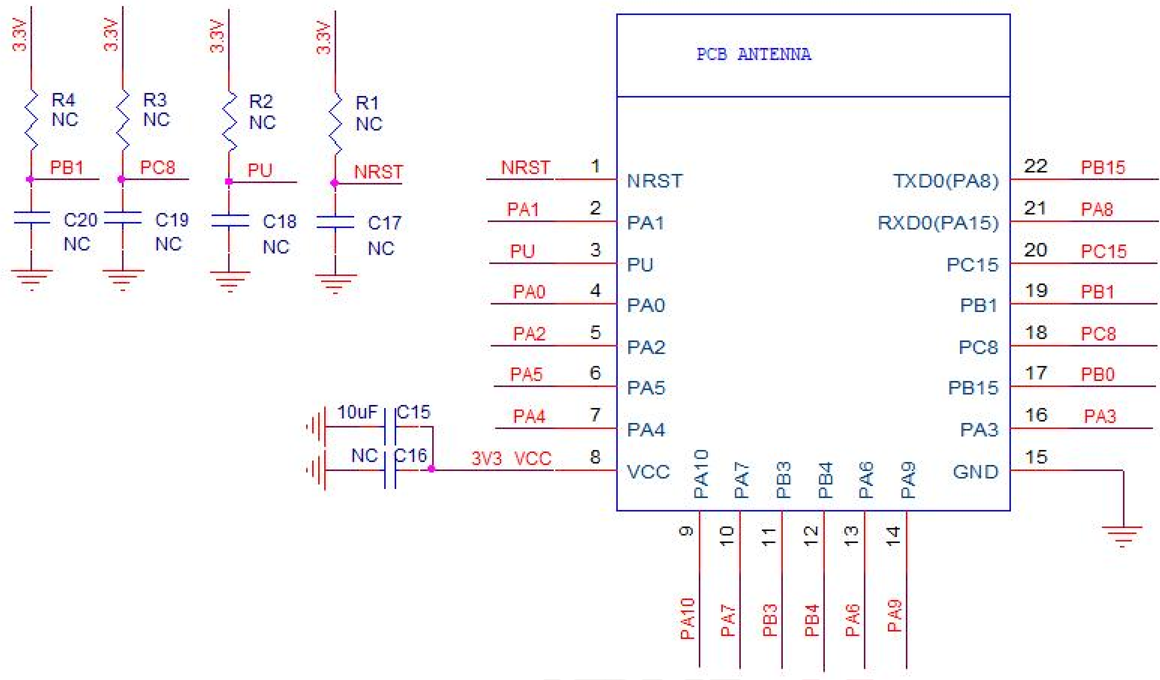
7.3 Layout Recommendation

注:未标注焊盘公差值皆为±0.1mm

8. The Key Material List

Item	Part Name	Description	Manufacturer
1	Crystal	2016 40MHz 9pf ±10ppm	ECEC, TKD, Hosonic, JWT, TXC
2	Chipset	GD32VW553HIQ7 QFN40	GigaDevic
3	PCB	GD32VW553-HI,深绿色 ，FR4，4 层有卤 TG150，16*24*0.8mm，化金	XY-PCB,GDKX,Sunlord, SL-PCB
4	Shielding	X253T-IH Shielding	信太，卓益，精力通

9. Reference Design



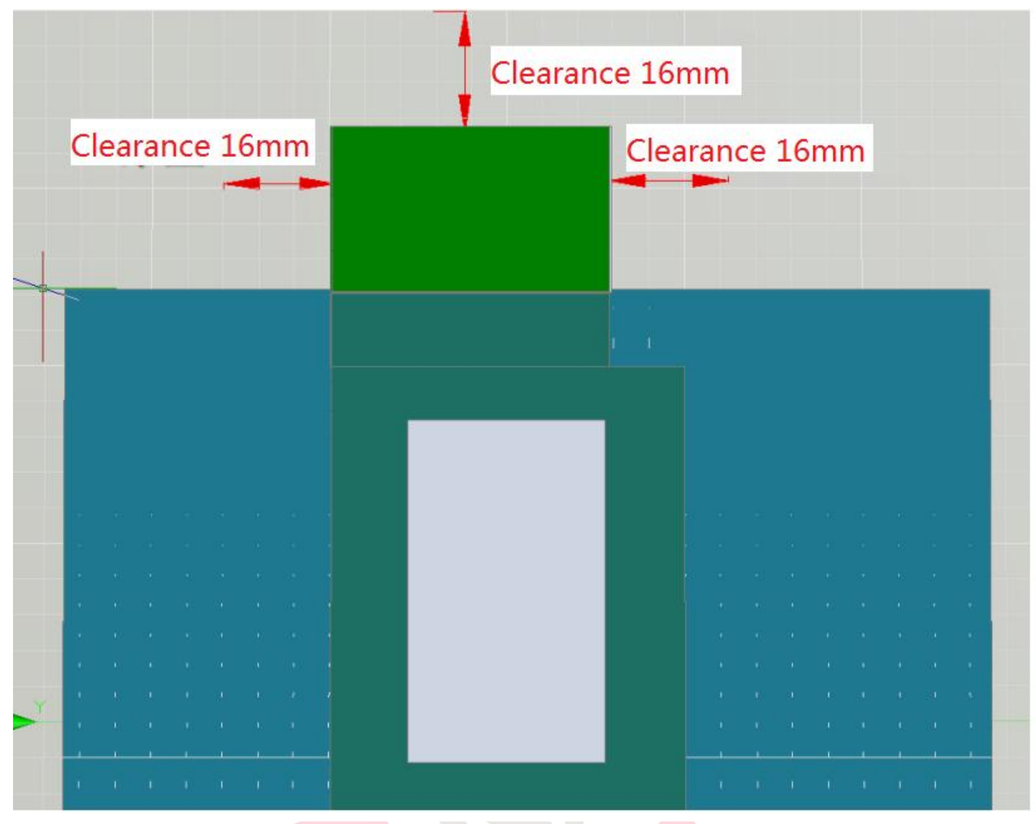
管脚 PU 和 NRST 分别为芯片电源使能与复位管脚，两者都拉高时，芯片才能工作。设计时可在靠近管脚的位置摆放滤波电容与上拉电阻,若 X253T-IH 作为主控 MCU，推荐使用 NRST 作为使能管脚，同时 PU 常拉高；若 X253T-IH 作为从属设备，则推荐使用 PU 作为使能管脚，同时 NRST 常拉高。3.3V 电源建议预留电大于 600mA。

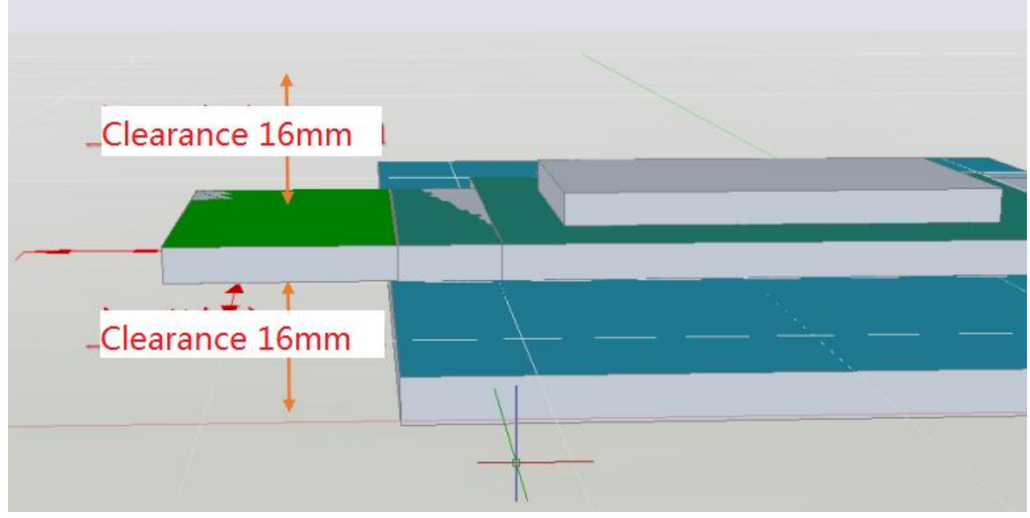
boot 模式选择管脚为 BOOT0(PC8)和 BOOT1(PB1)

BOOT1	BOOT0	启动模式
X	0	Flash
0	1	Legacy Bootloader
1	1	SRAM

10. Requirements for antenna placement

使用 Wi-Fi 模块上的 PCB 天线时，主板上的 PCB 与其他金属设备的距离至少为 16mm。下图阴影区域需要远离金属设备、传感器、干扰源和其他可能干扰信号的材料。





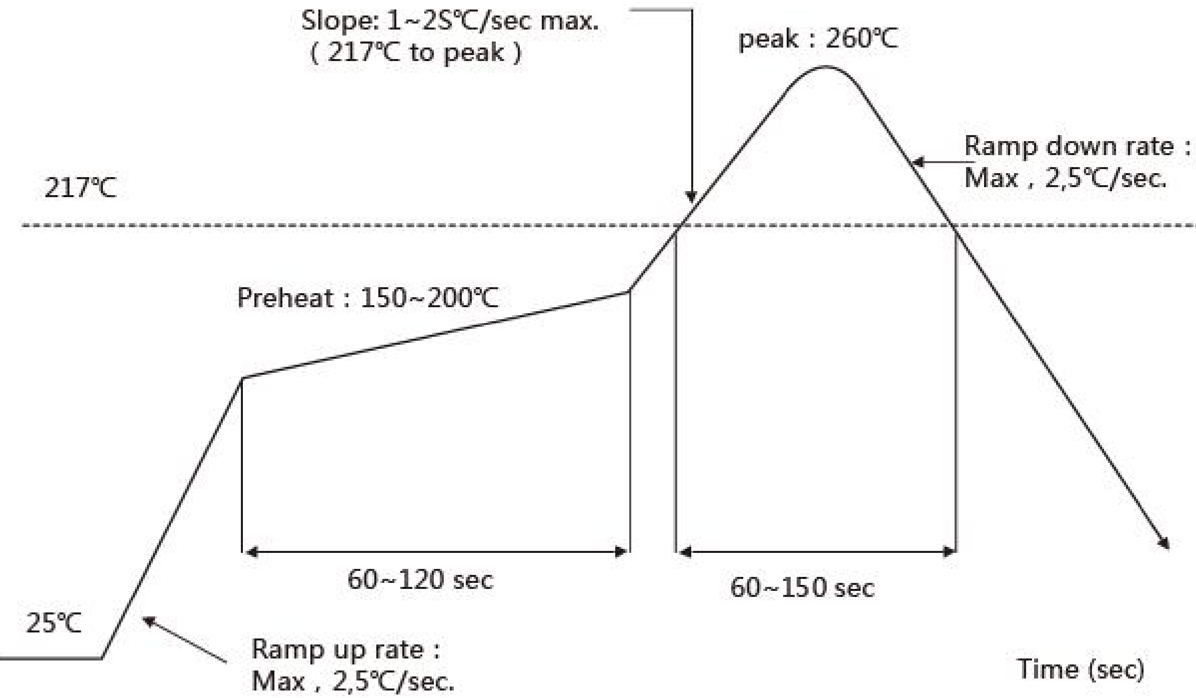
11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature: 260±5 °C

5Time within 5° C of peak temperature：≥10s

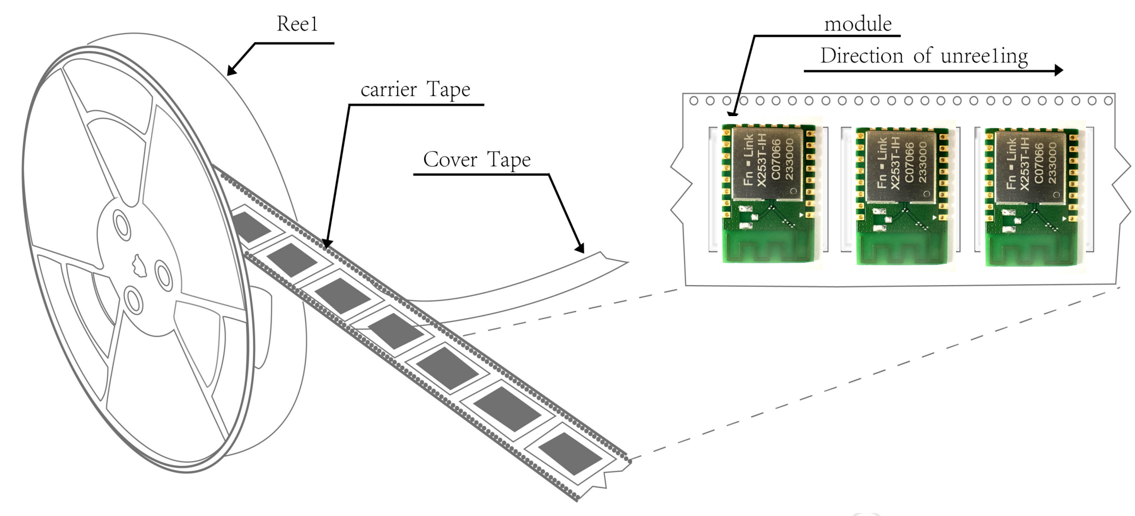
Number of Times: 2 times



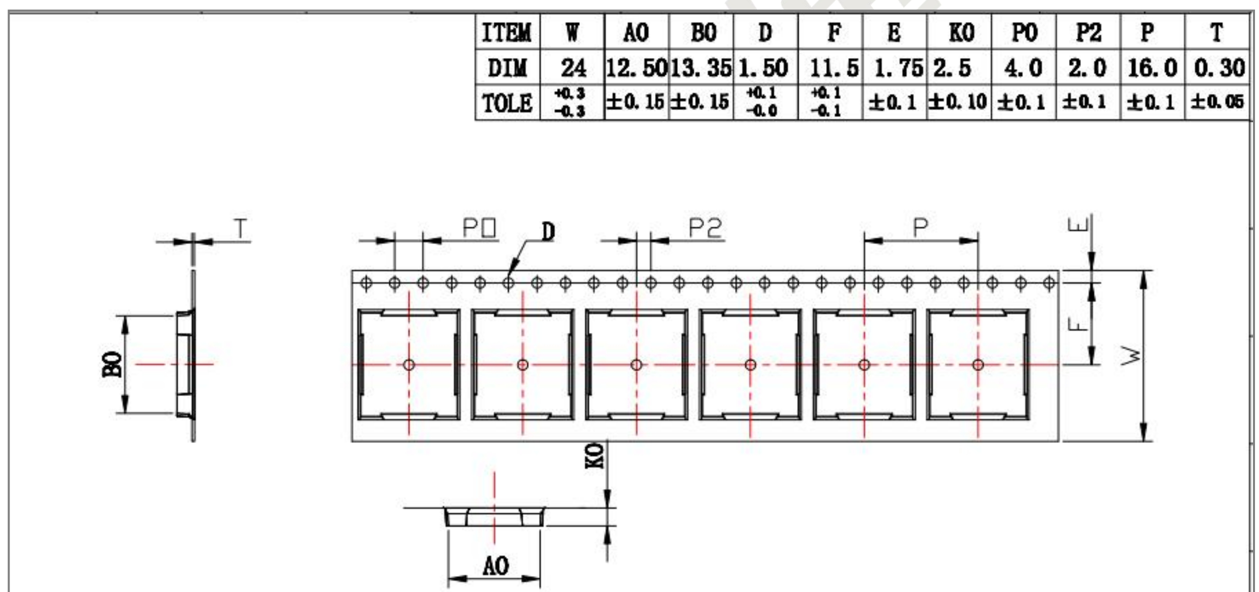
12. Package

12.1 Reel

A roll of 1500pcs



12.2 Carrier Tape Detail



ITEM	W	AO	BO	D	F	E	KO	PO	P2	P	T
DIM	24	12.50	13.35	1.50	11.5	1.75	2.5	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05

12.3 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape: 24mm*24.4m the cover tape :21.3mm*32.6m

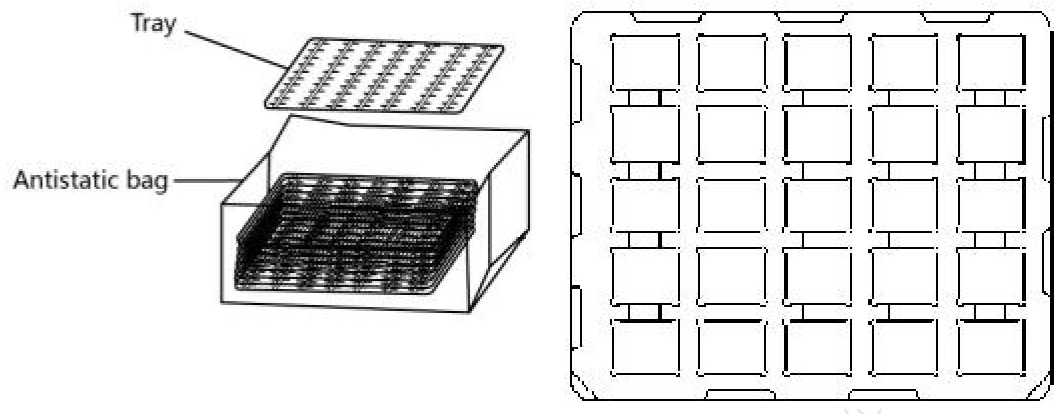
Color of plastic disc: blue

NY bag size:450mm*415mm size ： 350*350*35mm

The packing case size:360*210*370mm

12.4 Tray

Use pallet packaging for less than 300 pieces



13. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care

all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

d) "IPC/JEDEC J-STD-033A paragraph 5.2" is respected

e) Baking is required if conditions b) or c) are not respected

f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more