PRODUCT SPECIFICATION

5220D-UUQ

Wi-Fi Dual-band 2x2 11ax + Bluetooth 5.2

Combo Module

Version:v1.0

5220D-UUQ Module Datasheet

	Part NO.	Description
Ordering Information	FG5220DUUQ-00	MT7920QUN,a/b/g/n/ac/ax,Wi-Fi+BT5.2,2T2R,USB3.0, 3 Antenna ,with shielding

Customer: _____

Customer P/N:_____

Signature:_____

Date:_____

Office: 14th floor, Block B, phoenix zhigu, Xixiang Street, Baoan District, Shenzhen

Factory: NO.8, Litong RD., Liuyang Economic & Technical Development Zone, Changsha, CHINA

TEL:+86-755-2955-8186 Website:www.fn-link.com

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Revision History

Version	Date	Contents of Revision Change	Preparde	Checked	Approved
V1.0	2022/08/23	Initial Release	LTK	LTK	QJP

1. General Description

1.1 Introduction

Fn-Link Technology would like to announce a low-cost and low-power consumption module which has all of the Wi-Fi functionalities.It is a highly-integrated IEEE 802.11 a/b/g/n/ac/ax MAC/Baseband/RF WLAN single chip.For Wireless LAN operation. The integrated module provides USB interface for Wi-Fi.The module provides simple legacy and 20MHz/40MHz/80MHz co-existence mechanism to ensure backward and network compatibility.

The wireless module complies with IEEE 802.11 a/b/g/n/ac/ax 2x2 MIMO standard and the speed can achieve up to 1201Mbps with dual stream in 802.11ax. The integrated module provides USB interface for Wi-Fi, USB/ PCM interface for Bluetooth.

This combo module is a total solution for a combination of Wi-Fi and Bluetooth V5.2 technologies. The module is specifically developed for all portable devices.

1.2 Description

Model Name	5220D-UUQ
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 27 x 18 mm x 2.5 mm
Wi-Fi Interface	Support USB V2.0/V3.0
BT Interface	USB / PCM
OS supported	Android /Linux/iOS /WIN10
Operating temperature	0°C to 70°C
Storage temperature	-40°C to 85°C

2. Features

General

- Highly integrated wireless local area network (WLAN) system-on-chip (SOC) for 802.11a/b/g/n/ac/ax WLAN applications
- Supports Dual band Single concurrent (2.4G/5G).

PHY Features

- Dual-stream spatial multiplexing up to 1201 Mbps data rate.
- Supports 20/40MHz at 2.4GHz and supports 20/40/80MHz at 5GHz
- Supports Transmit Beamformee

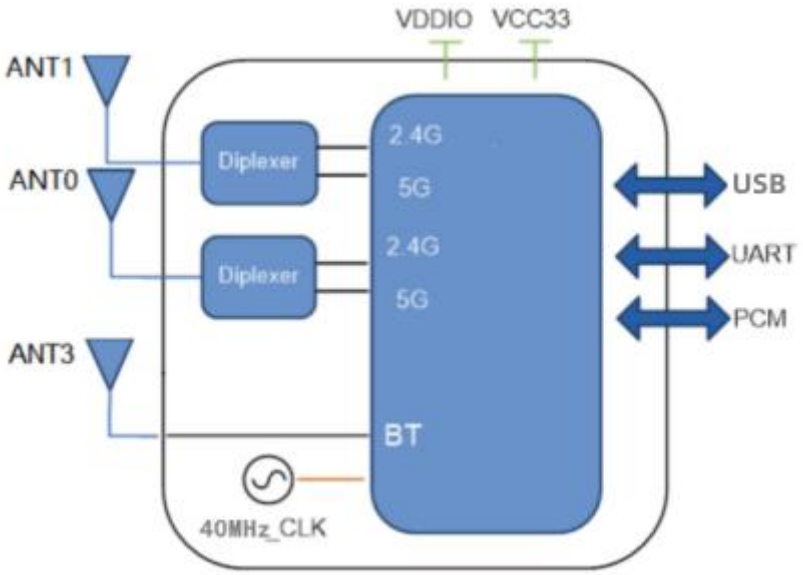
Host Interface

- Supports low power USB3.0(complies with USB2.0) interface for WLAN and USB/PCM interface for Bluetooth.

Bluetooth Features

- Supports Bluetooth system (BT5.2 Logo Compliant)
- Supports WLAN/Bluetooth coexistence
- Compatible with Bluetooth v2.1+EDR.
- Dual Mode support: Simultaneous LE and BR/EDR
- BT host digital interface:
  - USB
  - PCM for audio data

3. Block Diagram



--- 3 antenna version

4. General Specification

4.1 WI-FI 2.4GHz Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11 b/g/n/ac/ax Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.483.5 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1 ~ Ch14	
Test Items	**Typical Value**	**EVM**
Output Power[1]	802.11b /11Mbps : 19dBm ± 2 dB	EVM ≤ -10dB
	802.11g /54Mbps : 18dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 17dBm ± 2 dB	EVM ≤ -28dB
	802.11ac VHT20 MCS8: 16dBm ± 2 dB	EVM ≤ -30dB
	802.11ac VHT40 MCS9: 15dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 13dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 13dBm ± 2 dB	EVM ≤ -35dB

Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94 dBm	≤-83
	- 11Mbps PER @ -85 dBm	≤-76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -90 dBm	≤-85
	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤-85
	- MCS=7 PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-82
	- MCS=7 PER @ -66 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤ -82
	- MCS=8 PER @ -66 dBm	≤ -60
SISO Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤ -79
	- MCS=9 PER @ -59 dBm	≤ -55
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0 PER @ -90 dBm	≤-74
	- MCS=11 PER @ -60 dBm	≤-52
SISO Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-71
	- MCS=11 PER @ -57 dBm	≤-49
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

4.2 WI-FI 5GHz Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11a/n/ac/ax, Wi-Fi compliant	
Frequency Range	5.15 GHz ~ 5.850 GHz(5.0 GHz ISM Band)	
Test Items	**Typical Value**	**EVM**
Output Power[1]	802.11a /54Mbps: 18 dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 17 dBm ± 2 dB	EVM ≤ -28dB
	802.11ac vHT20 MCS8: 16 dBm ± 2 dB	EVM ≤ -30dB
	802.11ac vHT40 MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ac vHT80 MCS9: 15 dBm ± 2 dB	EVM ≤ -32dB
	802.11ax HE20 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE40 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
	802.11ax HE80 MCS11: 13 dBm ± 2 dB	EVM ≤ -35dB
Spectrum Mask	Meet with IEEE standard	

Freq. Tolerance	±20ppm		
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps	PER @ -90 dBm	≤-85
	- 54Mbps	PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -90 dBm	≤-85
	- MCS=7	PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -87 dBm	≤-82
	- MCS=7	PER @ -66 dBm	≤-64
SISO Receive Sensitivity (11ac,20MHz) @10% PER	- MCS=0, NSS1	PER @ -90 dBm	≤ -82
	- MCS=8, NSS1	PER @ -66 dBm	≤ -60
SISO Receive Sensitivity (11ac ,40MHz) @10% PER	- MCS=0, NSS1	PER @ -87 dBm	≤ -79
	- MCS=9, NSS1	PER @ -59 dBm	≤ -55
SISO Receive Sensitivity (11ac,80MHz) @10% PER	- MCS=0, NSS1	PER @ -84 dBm	≤-79
	- MCS=9, NSS1	PER @ -56 dBm	≤-54
SISO Receive Sensitivity (11ax,20MHz) @10% PER	- MCS=0	PER @ -90 dBm	≤-74
	- MCS=11	PER @ -60 dBm	≤-52
SISO Receive Sensitivity (11ax ,40MHz) @10% PER	- MCS=0	PER @ -87 dBm	≤-71
	- MCS=11	PER @ -57 dBm	≤-49
SISO Receive Sensitivity (11ax,80MHz) @10% PER	- MCS=0	PER @ -84 dBm	≤-68
	- MCS=11	PER @ -54 dBm	≤-46
Maximum Input Level	802.11a/n: -30 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

2. 2.4G,5G output power control by firmware power by rate table, the table value must same with module target power

[1]5GHz(20MHz) Channel table

Band range	Operating Channel Numbers	Channel center frequencies(MHz)
5180MHz~5240MHz	36	5180
	40	5200
	44	5220
	48	5240
5260MHz~5320MHz	52	5260
	56	5280
	60	5300
	64	5320
5550MHz~5700MHz	100	5500
	104	5520

	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
	140	5700
5745MHz~5825MHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

Note: The Wi-Fi RF specification data will be updated in future version.

4.3 Bluetooth Specification

Feature	**Description**		
General Specification			
Bluetooth Standard	Bluetooth V5.2.		
Host Interface	USB		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, π/4-DQPSK, 8-DPSK		
RF Specification			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)
Output Power (Class 1)	2	13	17
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-92	

Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-85	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	π/4-DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

Note: The Bluetooth Specification will be updated in future version.

5. ID setting information

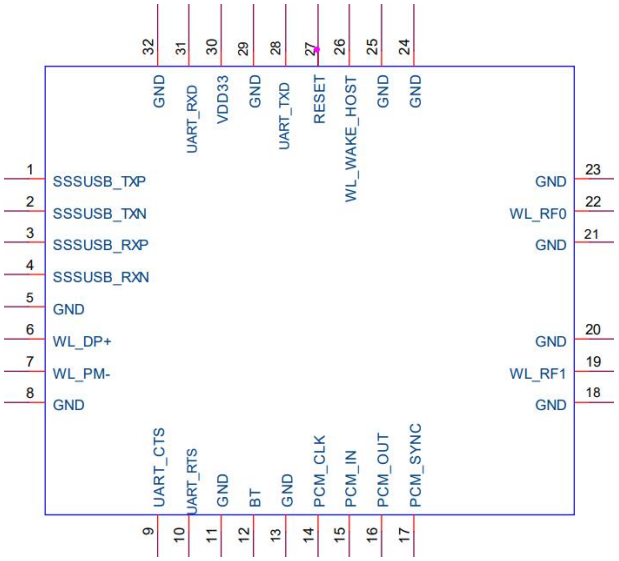
WI-FI

Vendor ID	14C3
Product ID	7902

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	SSSUSB_TXP	O	USB 3.0 Transmit Differential Pair	
2	SSSUSB_TXN	O	USB 3.0 Transmit Differential Pair	
3	SSSUSB_RXP	I	USB 3.0 Receive Differential Pair	
4	SSSUSB_RXN	I	USB 3.0 Receive Differential Pair	
5	GND	—	Ground connections	
6	WL_DP+	I/O	USB2.0 differential pair D+	
7	WL_DM-	I/O	USB2.0 differential pair D-	
8	GND	—	Ground connections	
9	UART_CTS	I	Bluetooth UART interface	
10	UART_RTS	O	Bluetooth UART interface	
11	GND	—	Ground connections	
12	ANT_BT	I/O	BT RF port	
13	GND	—	Ground connections	
14	PCM_CLK	I/O	PCM clock	VDDIO
15	PCM_IN	I	PCM data input	VDDIO
16	PCM_OUT	O	PCM Data output	VDDIO
17	PCM_OUT	O	PCM Data output	VDDIO
18	GND	—	Ground connections	
19	WL_RF1	I/O	WL1 RF port	VDDIO
20	GND	—	Ground connections	
21	GND	—	Ground connections	
22	WL_RF0	I/O	WL0 RF port	
23	GND	—	Ground connections	
24	GND	—	Ground connections	
25	GND	—	Ground connections	
26	WL_WAKE_HOST	O	WLAN wake up HOST(Share with IC GPIO01)	
27	RST	I/O	Enable pin for device ON: pull high; OFF: pull low	VDDIO
28	UART_TXD	O	Bluetooth UART interface	VDDIO
29	GND	—	Ground connections	
30	VDD33	P	Main power voltage source input 3.3V	3.3V
31	UART_RXD	I	Bluetooth UART interface	VDDIO
32	GND	—	Ground connections	

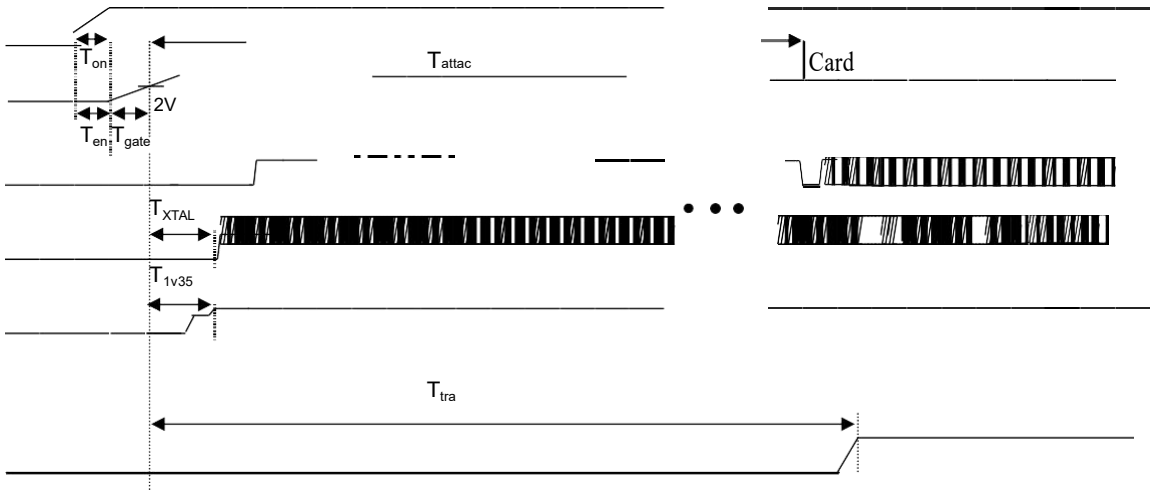
P:POWER I:INPUT O:OUTPUT VDDIO:3.3V

7. Electrical Specifications

7.1 Power Supply DC Characteristics

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.6	V
VDDIO (3.3V)	-	3.3	3.6	V
VDDIO (1.8V)	1.62	1.8	1.98	V

7.2 USB Bus during power on Sequence



Ton: The main power ramp up duration

Ten: Interval between the rising point of 3.3V and chip_en

Tgate: Interval of 3.3V to be gated when chip_en voltage level < 2V

Tattach: USB attach state. The duration from resistor attached to USB host starting card detection procedure

Txtal: XTAL starts

Ttrap: Power on trap duration. In back of this duration if pull high GPIO4, GPIO5 and EESK are necessary.

Power on Flow Description

After the main 3.3V ramp up, the internal power on reset is released by the power ready detection circuit and the power management unit is enabled. The power management unit enables the internal regulator and

clock circuits.

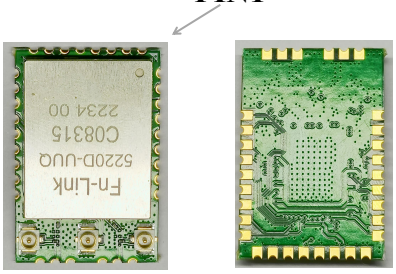
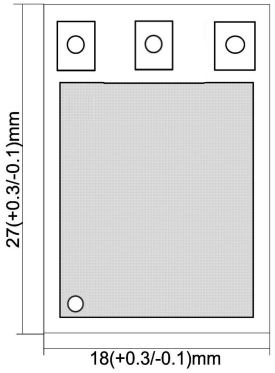
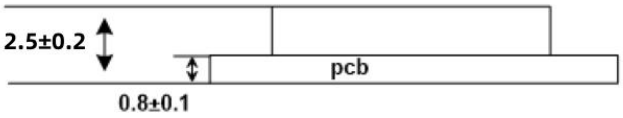
The power management unit also enables the USB circuits.

USB analog circuits attach resisters to indicate the insertion of the USB device.

	Unit	Min.	Typical	Max.
T_{on}	ms	-	1.5	5
T_{en}	ms	0	0	5
T_{gate}	ms	0	1.5	8
T_{attach}	ms	100	250	-
T_{xtal}	ms	-	1.5	8
T_{1v35}	ms	-	3	11
T_{trap}	ms	400	500	-

8. Size reference

8.1 Module Picture

<table>
<tr><td>L x W : 25 x 18 (+0.3/-0.1) mm
PIN1
  </td><td> 
</td></tr>
<tr><td>H: 2.5 (±0.2) mm</td><td> 
</td></tr>
<tr><td>Weight</td><td>0.8g</td></tr>
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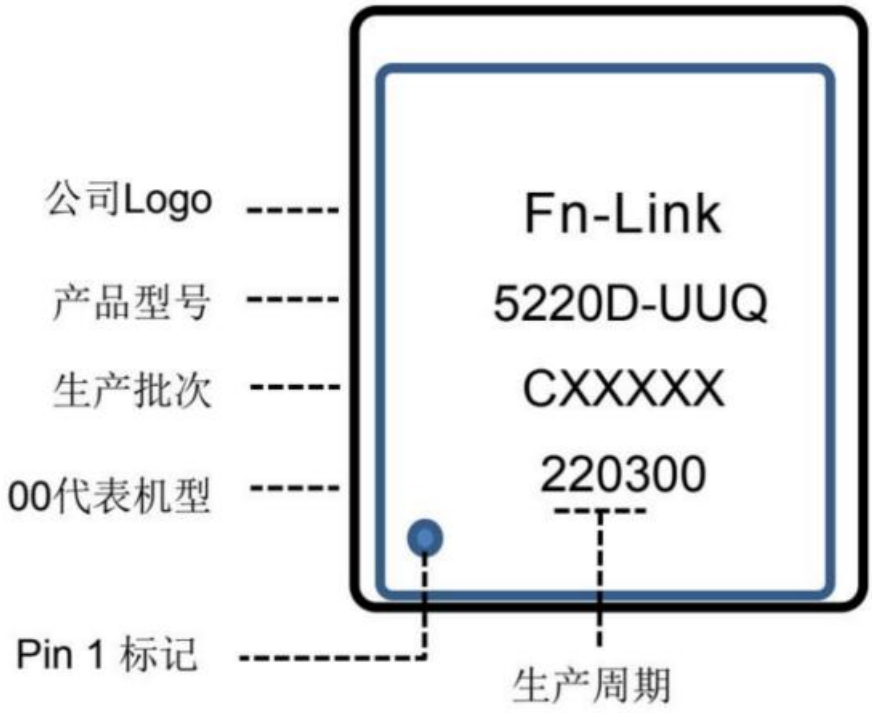
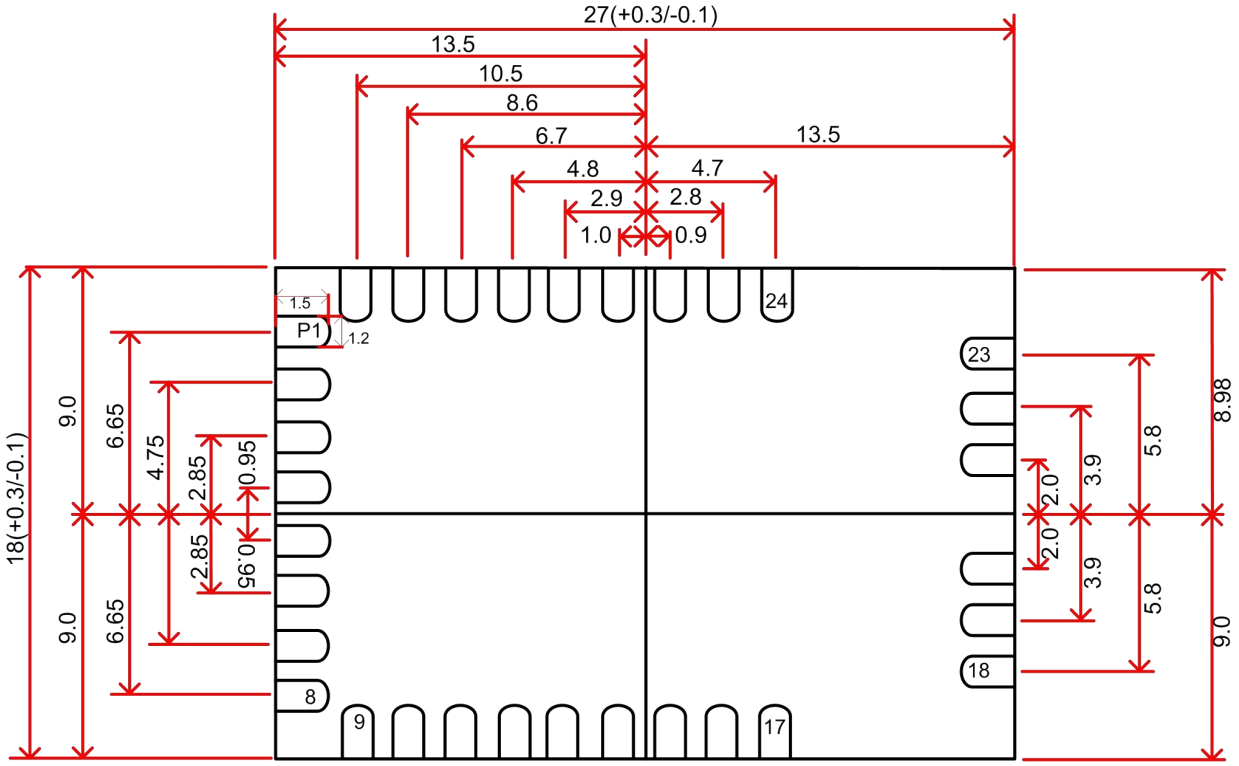
8.2 Marking Description

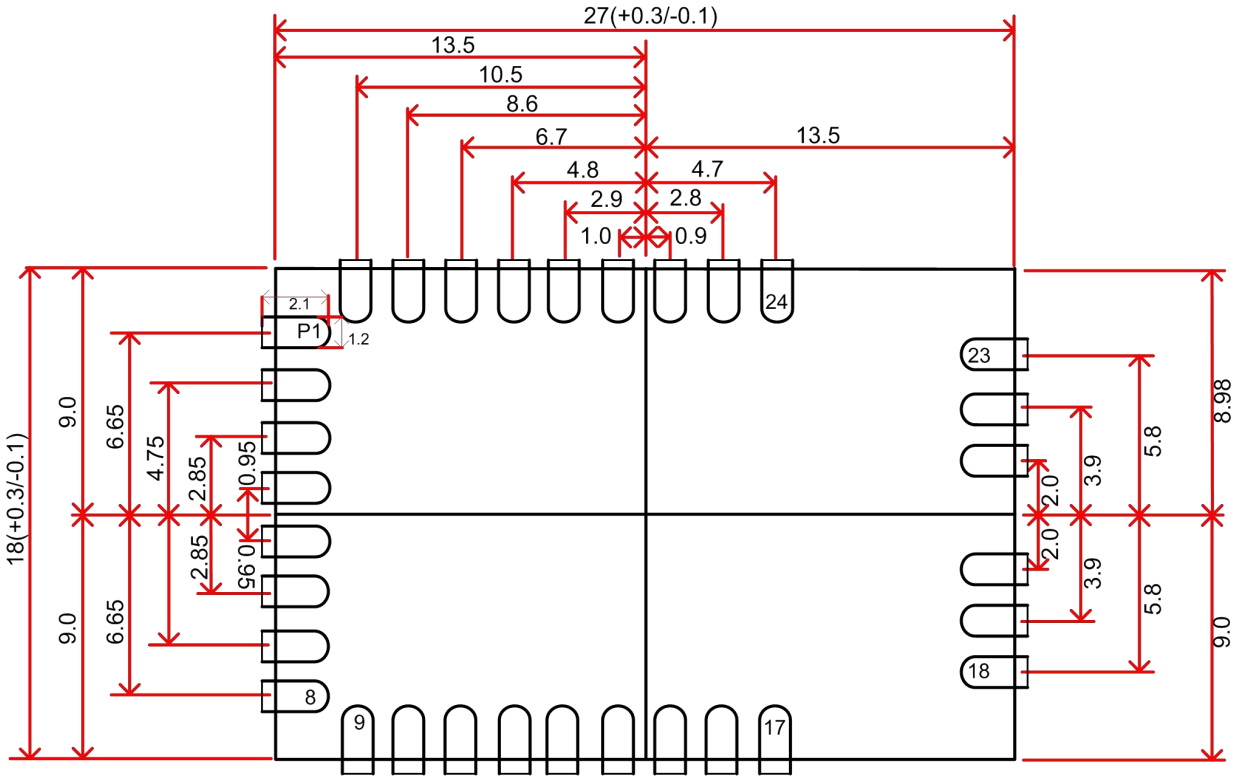


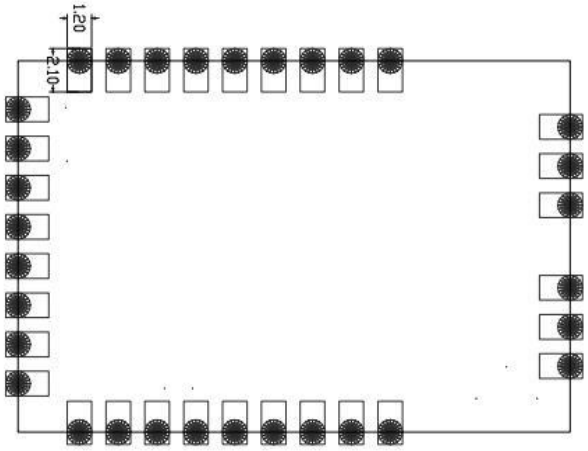
8.3 Physical Dimensions

<TOP View>



8.4 Layout Recommendation



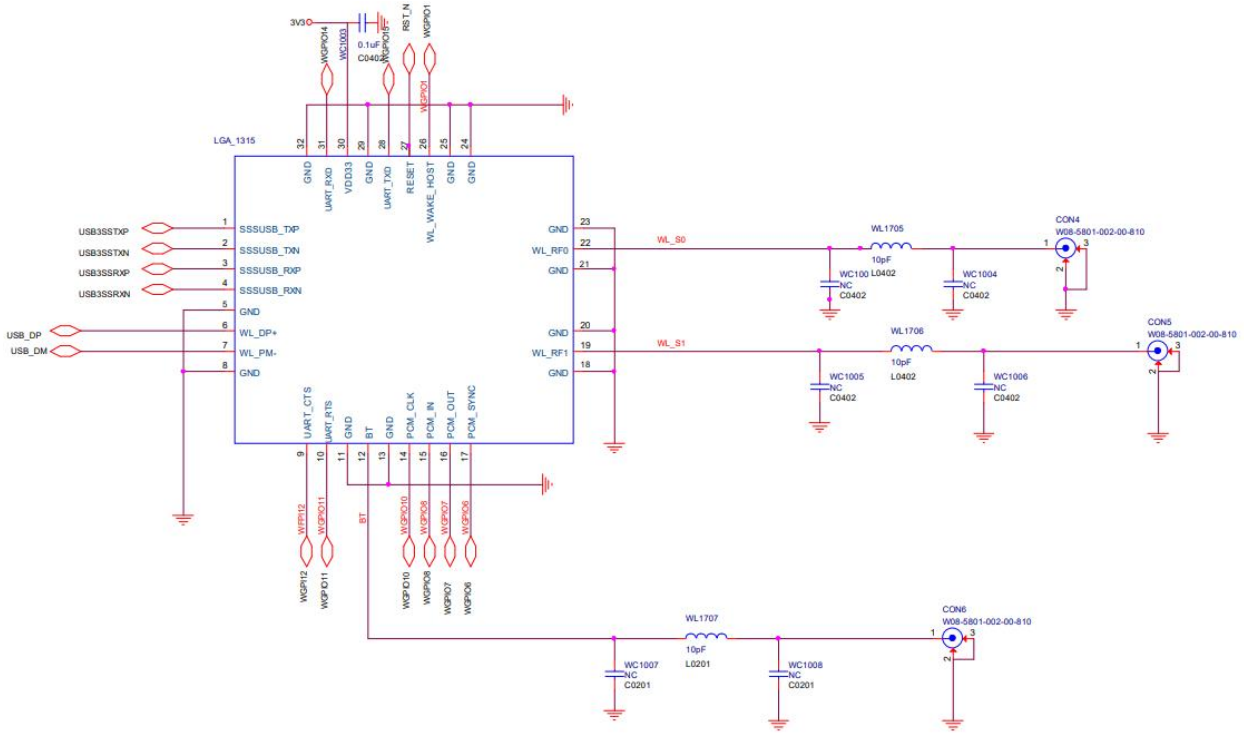


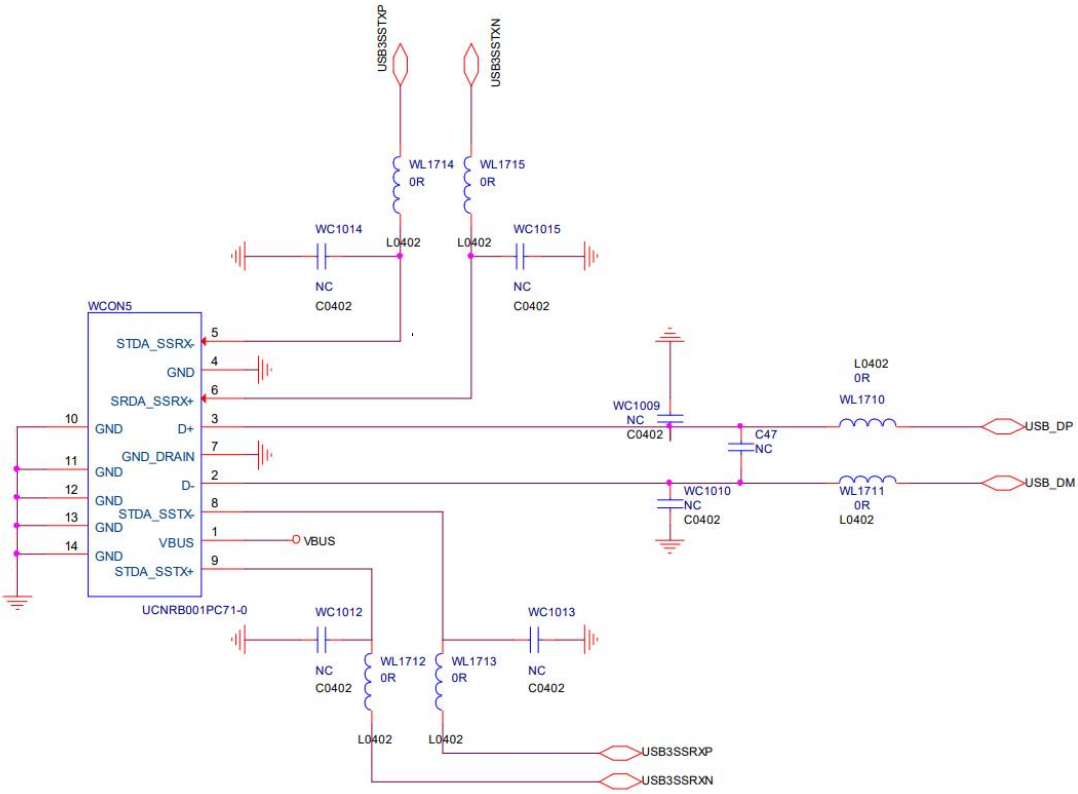
9. The Key Material List

Chipset	MT7920QUN	MTK
PCB	FR4, 4 LAYER, GREEN	XY-PCB, GDKX, Sunlord, SLPCB,TRULY
Crystal	2016 40MHz ±10ppm	ECEC, TKD, Hosonic, JWT, TXC

Inductor	2520 2.2UH,±20%	Sunlord, Ceaiya, Cenker
Diplexer	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	Glead, Walsin, ACX, Murata, MAG.LAYERS,TDK

10. Reference Design





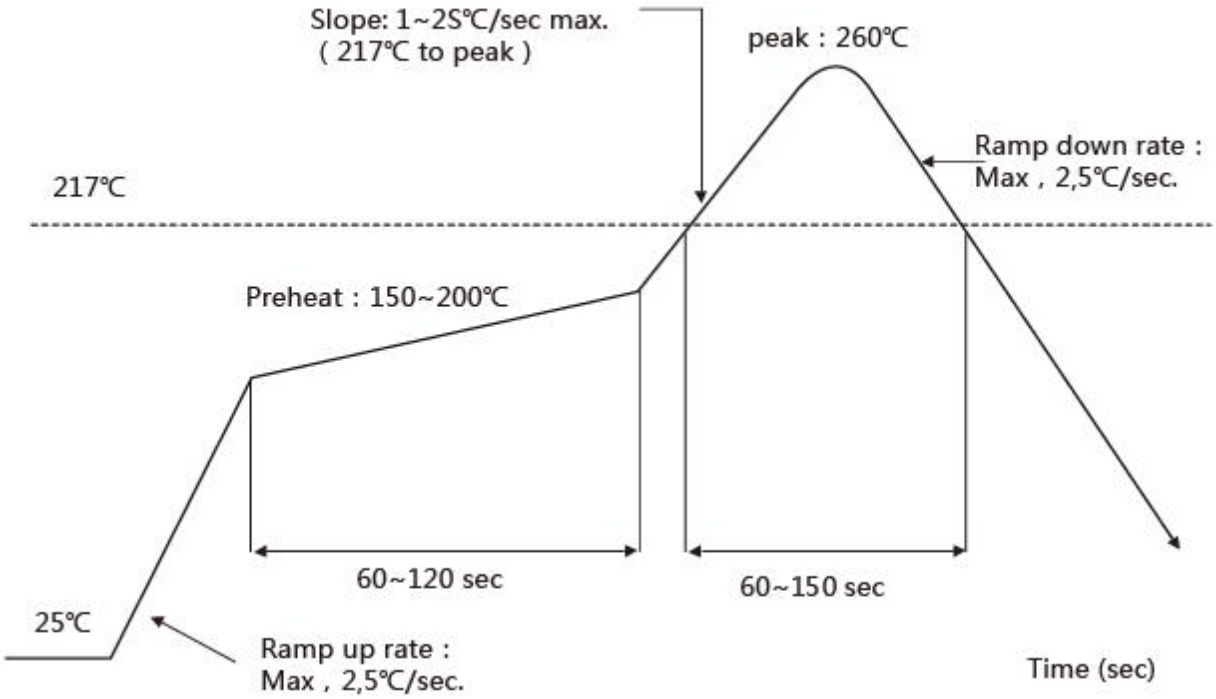
11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

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

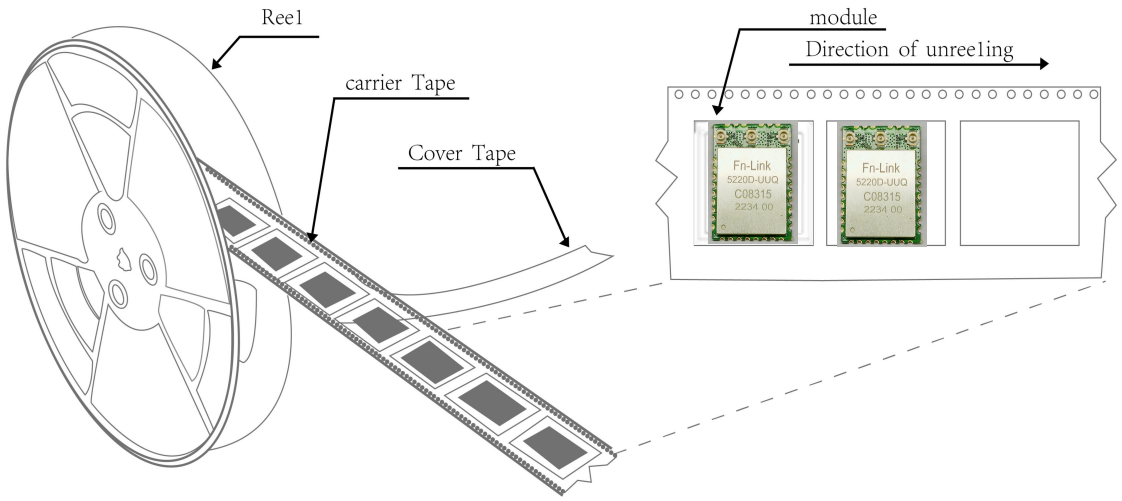
Number of Times : ≤2 times



12. Package

12.1 Reel

A roll of 800pcs



Using self-adhesive tape

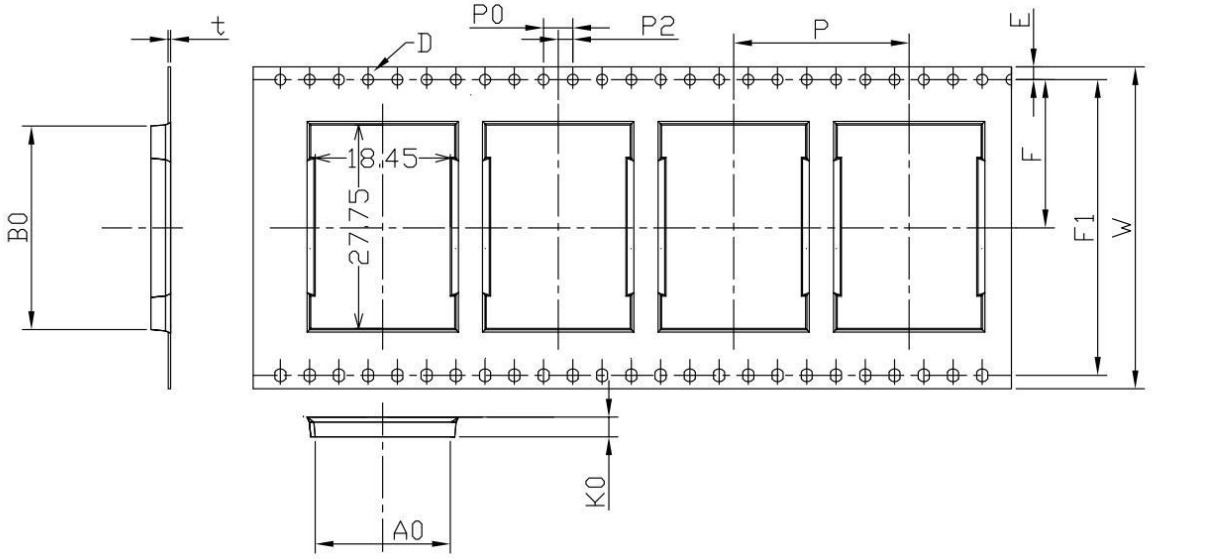
Size of black tape:24mm*32.6m the cover tape :2.1 3mm*32.6m

Color of plastic disc:blue

A roll of 800pcs

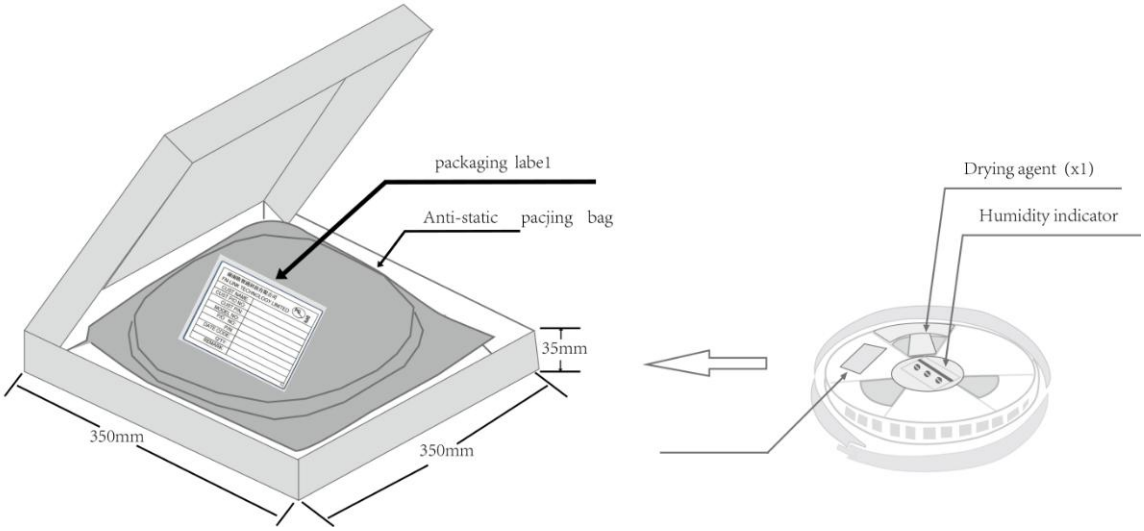
12.2 Carrier Tape Detail

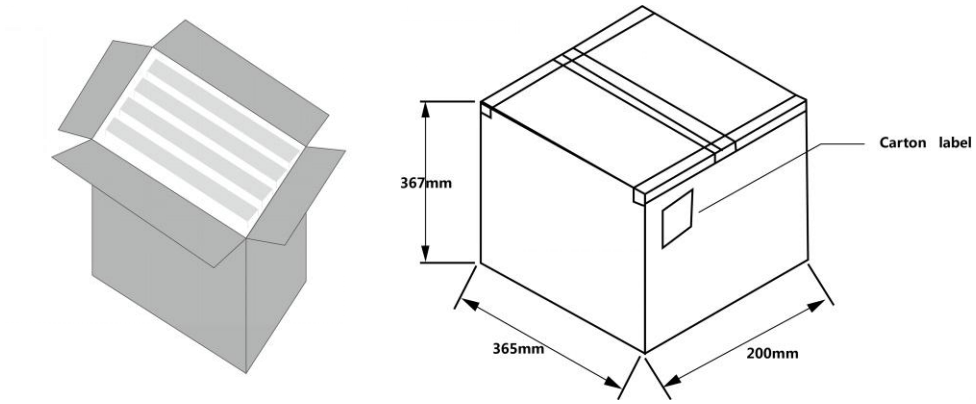
ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	44	18.45	27.75	1.5	1.75	20.2	40.4	2.80	4.0	2.0	24.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	±0.1	±0.15	±0.10	±0.10	±0.1	±0.15	±0.1	±0.05



12.3 Packaging Detail

the take-up package





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

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

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

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