PRODUCT SPECIFICATION

6220N-IN

Wi-Fi Single-band 1x1 802.11b/g/n + BLE v4.2

IOT Combo Module

Version:v2.1

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

6220N-IN Module Datasheet

	Part NO.	Description
Ordering Information	FG6220NINX-04	RTL8720CM-VA2, 802.11b/g/n+BLE4.2,1T1R,22.0*30.0, AWS 版,SPI/Uart/GPIO/I2C/PWM,Onboard ANT,PCB 版本 V2.0

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2019/05/22	Initial release	Wesley	Wesley	Stone
V1.1	2019/06/12	Correct BLE from 4.0 to 4.2	Wesley	Wesley	Stone
V1.2	2019/07/16	Modify some typos	Wesley	Wesley	Stone
V1.3	2019/07/24	Refine section 1, 6, 7.	Wesley	Wesley	Stone
V1.4	2019/09/10	Refine section 3,4,5 and 9	Wesley	Wesley	Stone
V1.5	2019/12/06	Refine section 4 and 7	Wesley	Wesley	Stone
V1.6	2020/03/12	Refine section 5	Wesley	Wesley	Stone
V1.7	2022/05/21	Update Specification Format Chip changed to RTL8720CM-VA2 Add electrical specifications information	Fc	Zzq	Qjp
V1.8	2023/07/31	Update Specification Format Increase the antenna clearance area	Lxp	Zzq	Qjp
V1.9	2023/11/08	Add Certificate No	Lxp	Zzq	Qjp
V2.0	2024/12/2	Update Marking Description	LXP	Zzq	QJP
V2.1	2024/12/12	Add 2MB Flash	LXP	Zzq	QJP

1. General Description

1.1 Introduction

6220N-IN combo module is a highly integrated IoT module with low power 802.11b/g/n Wireless LAN (WLAN) network controller. It combines a KM4 MCU, WLAN MAC, a 1T1R capable WLAN baseband, RF, and Bluetooth. It also provides a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage.

6220N-IN integrates internal memories for complete Wi-Fi protocol functions. The embedded memory configuration also provides simple application developments.

1.2 Description

Model Name	6220N-IN
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 30mm*22mm*3.1mm
Interface	UART, GPIO, SDIO device, SPI, PWM, I2C
BT Interface	UART
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	-20°C to +85°C
Storage temperature	-40°C to +125°C
Operating Voltage	3.3±10% Vdc

2. Features

General Features

- 802.11b/g/n compatible WLAN
- 65Mbps transmit and receive PHY rate using 20MHz bandwidth
- 802.11e QoS Enhancement (WMM)
- 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- Wi-Fi Direct support
- Internal 4MB pSRAM
- 2MB Flash

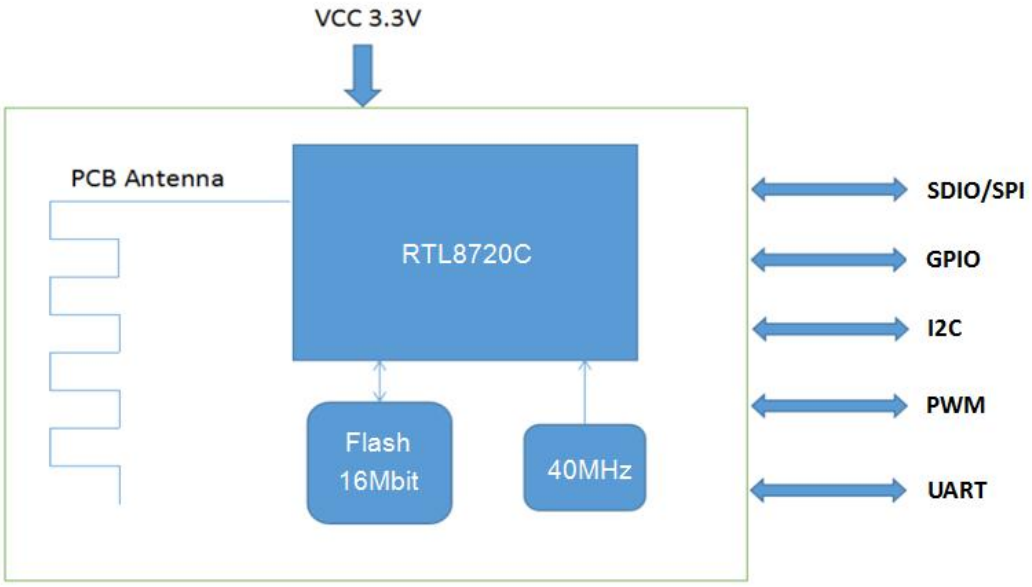
Interface

- UART
- SPI
- I2C
- GPIO
- PWM
- SDIO2.0 device

Bluetooth Features

- Bluetooth 4.2 Low Energy (BLE)

3. Block Diagram



4. General Specification

4.1 WI-FI Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11 b/g/n Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1 ~ Ch14	
Test Items	**Typical Value**	**EVM**
Output Power	802.11b /11Mbps : 17dBm ± 2 dB	EVM ≤ -10dB
	802.11g /54Mbps : 15dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 14dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
Test Items	**TYP Test Value**	**Standard Value**
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -92 dBm	≤-83
	- 11Mbps PER @ -84 dBm	≤-76
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -88 dBm	≤-85
	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -87 dBm	≤-85
	- MCS=7 PER @ -68 dBm	≤-67
Maximum Input Level	802.11b : -10 dBm	

	802.11g/n : -20 dBm
Antenna Reference	Small antenna with 0~2 dBi peak gain

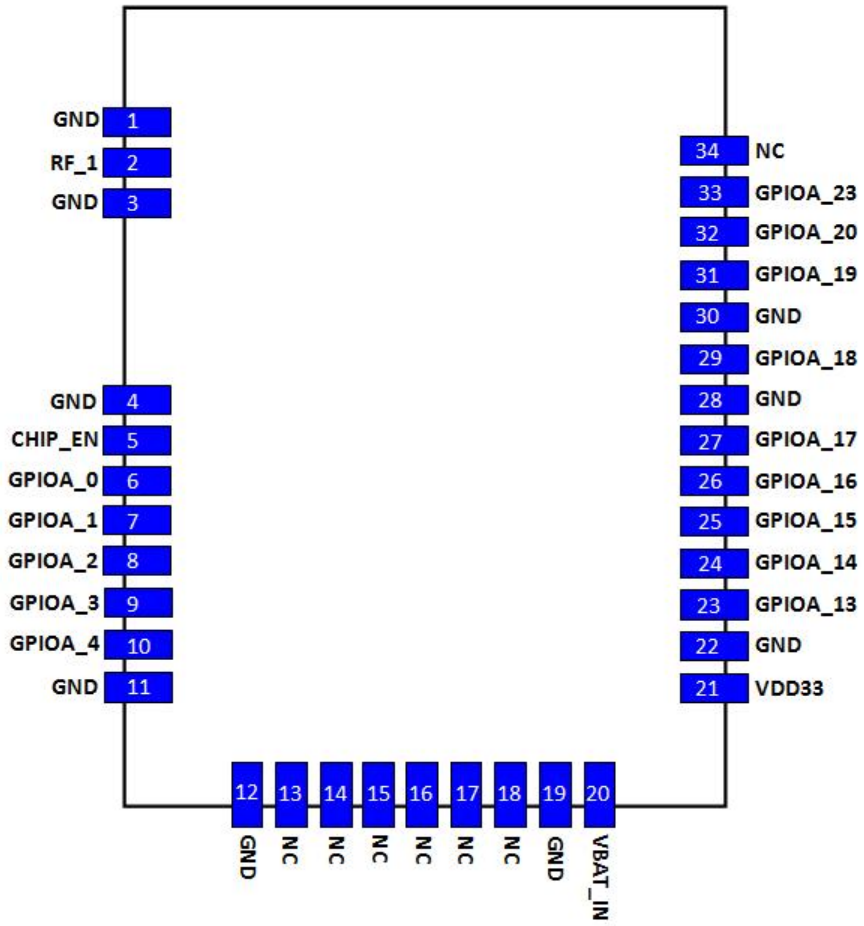
4.2 Bluetooth Specification

Feature	**Description**		
General Specification			
Bluetooth Standard	BLE V4.2.		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2400 MHz ~ 2483.5 MHz		
Number of Channels	40 channels		
Modulation	GFSK		
RF Specification			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)
Output Power	2.5	4.5	6.5
Sensitivity @ BER=0.1%		-90	
Maximum Input Level	GFSK (1Mbps):-20dBm		

5. Pin Definition

5.1 Pin Outline

< TOP VIEW >



5.2 Pin Definition details

NO.	Name	Type[Note1]	Description	Voltage
1	GND		Ground connections	
2	RF_1	I/O	WL RF signal; NC by default (use printing antenna on module)	
3	GND		Ground connections	
4	GND		Ground connections	
5	CHIP_EN	I	Enable Chip (1: enable; 0: shutdown)	3.3V
6	GPIOA_0[Note2,3]	I/O	GPIO pin, refer to Pin Function Table	3.3V
7	GPIOA_1[Note3]	I/O	GPIO pin, refer to Pin Function Table	3.3V
8	GPIOA_2	I/O	GPIO pin, can be used as UART1 input. refer to Pin Function Table	3.3V
9	GPIOA_3	I/O	GPIO pin, can be used as UART1 output. refer to Pin Function Table	3.3V
10	GPIOA_4	I/O	GPIO pin, refer to Pin Function Table	3.3V
11	GND		Ground connections	

12	GND		Ground connections	
13~18	NC		No connected	
19	GND		Ground connections	
20	VBAT_IN	P	3.3V±10% power supply	3.3V
21	VD33	P	NC, internally connected to VBAT_IN for 3.3V power supply	3.3V
22	GND		Ground connections	
23	GPIOA_13[Note2]	I/O	GPIO pin, refer to Pin Function Table	3.3V
24	GPIOA_14	I/O	GPIO pin, refer to Pin Function Table	3.3V
25	GPIOA_15	I/O	GPIO pin, refer to Pin Function Table	
26	GPIOA_16	I/O	GPIO pin, refer to Pin Function Table	
27	GPIOA_17	I/O	GPIO pin, refer to Pin Function Table	
28	GND		Ground connections	
29	GPIOA_18	I/O	GPIO pin, refer to Pin Function Table	
30	GND		Ground connections	
31	GPIOA_19	I/O	GPIO pin, refer to Pin Function Table	
32	GPIOA_20	I/O	GPIO pin, refer to Pin Function Table	
33	GPIOA_23[Note3]	I/O	GPIO pin, refer to Pin Function Table	3.3V
34	NC		No connected	

Note1: P for POWER, I for INPUT, O for OUTPUT

Note2: Make sure GPIOA_0 and GPIOA_13 won't be both pulled up when power-on.

Note3: GPIOA_0, GPIOA_1 and GPIOA_23 are power on trap pins with internal 10Kohm pull-low. We suggest keep them not connected, please contact us for support if customer really have to use them.

5.3 Pin Function Table

Module Pin#	IC Pin Name	SDIO	JTAG	UART	SPI/WL_LED /EXT_32K	I2C	PWM
6	GPIOA_0		JTAG_CLK	UART1_IN	EXT_32K		PWM[0]
7	GPIOA_1		JTAG_TMS	UART1_OUT	BT_LED		PWM[1]
8	GPIOA_2		JTAG_TDO	UART1_IN	SPI_CSn	I2C_SCL	PWM[2]
9	GPIOA_3		JTAG_TDI	UART1_OUT	SPI_SCL	I2C_SDA	PWM[3]
10	GPIOA_4		JTAG_TRST	UART1_CTS	SPI_MOSI		PWM[4]
23	GPIOA_13			UART0_IN			PWM[7]
24	GPIOA_14			UART0_OUT			PWM[2]

25	GPIOA_15	SD_D2		UART2_IN	SPI_CSn	I2C_SCL	PWM[3]
26	GPIOA_16	SD_D3		UART2_OUT	SPI_SCL	I2C_SDA	PWM[4]
27	GPIOA_17	SD_CMD					PWM[5]
29	GPIOA_18	SD_CLK					PWM[6]
31	GPIOA_19	SD_D0		UART2_CTS	SPI_MOSI	I2C_SCL	PWM[7]
32	GPIOA_20	SD_D1		UART2_RTS	SPI_MISO	I2C_SDA	PWM[0]
33	GPIOA_23				LED_0		PWM[7]

Note: Please contact Fn-Link for SW feasibility once you confirm GPIO configuration.

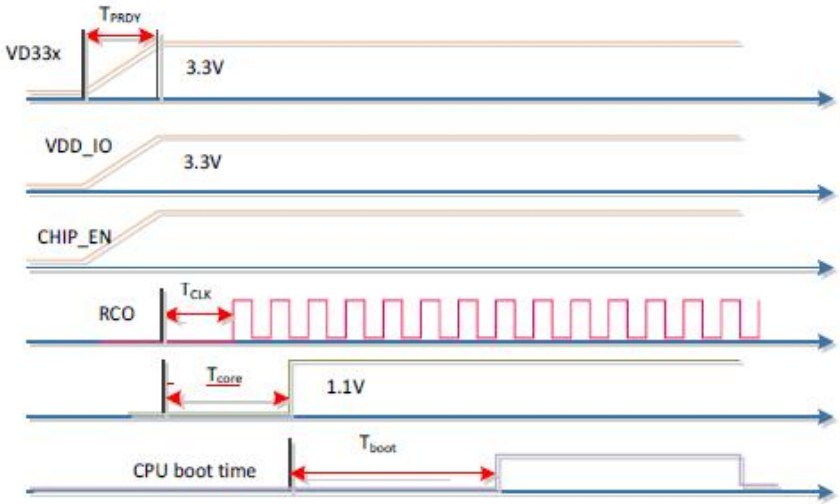
6. Electrical Specifications

6.1 Power Supply DC Characteristics

	MIN	TYP	MAX	Unit
Operating Temperature	-20	25	85	deg.C
VCC33	3.0	3.3	3.6	V

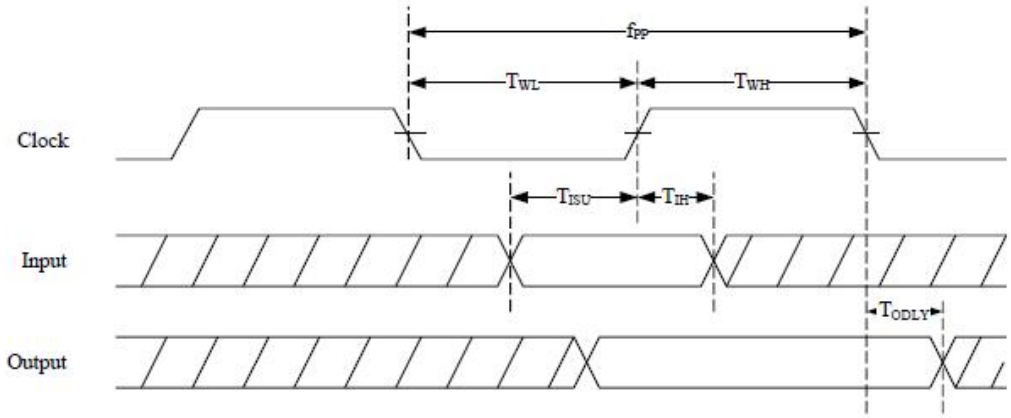
6.2 Interface Circuit time series

6.2.1 Power On Sequence



Symbol	Parameter	Minimu	Typica	Maxi	Unit
TPRDY	3.3V ready time	0.6	0.6	1	ms
T_{CLK}	Internal ring clock stable time after 3.3V ready	1			ms
T_{core}	Core power ready time	1.5	1.5		ms
T_{boot}	Application ready time				ms
V_{RST}	Shutdown occurs after CHIP_EN lower than this voltage	0	0	1.65	V
T_{RST}	The require time that CHIP_EN lower than V_{RST}	--	10	--	us

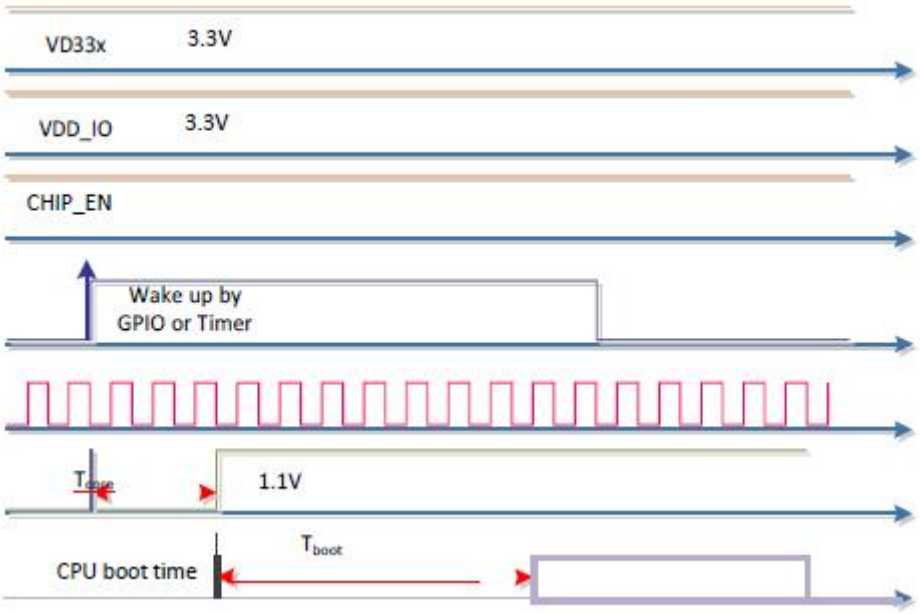
6.2.2 Bus Timing Specification



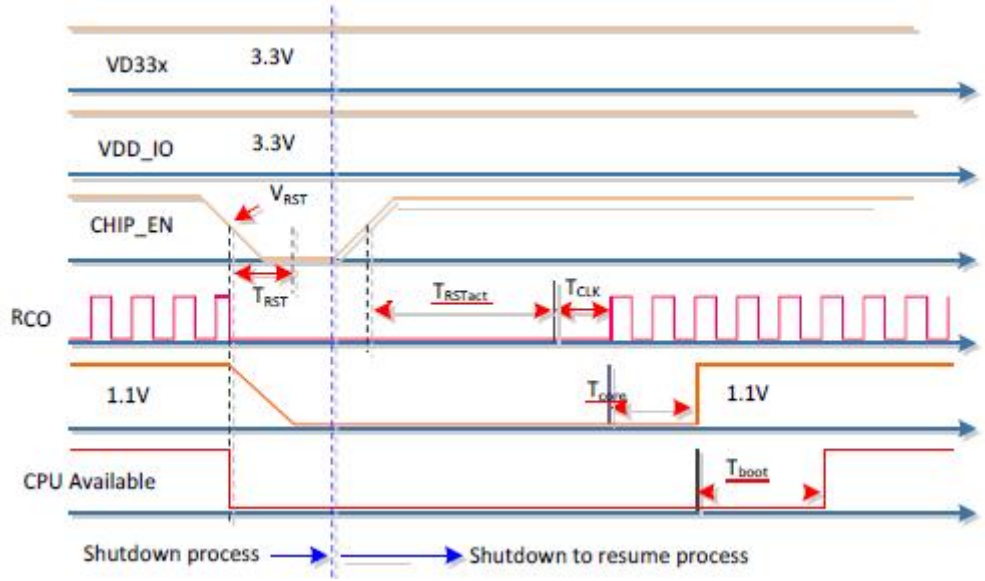
NO	Parameter	Mode	MIN	MAX	Unit
f_{PP}	Clock Frequency	Default	0	25	MHz
		HS	0	50	MHz
T_{WL}	Clock Low Time	DEF	10	-	ns
		HS	7	-	ns
T_{WH}	Clock High Time	DEF	10	-	ns
		HS	7	-	ns
T_{ISU}	Input Setup Time	DEF	5	-	ns
		HS	6	-	ns
T_{IH}	Input Hold Time	DEF	5	-	ns
		HS	2	-	ns
		DEF	-	14	ns

		HS	-	14	ns

6.2.3 Resume from Standby



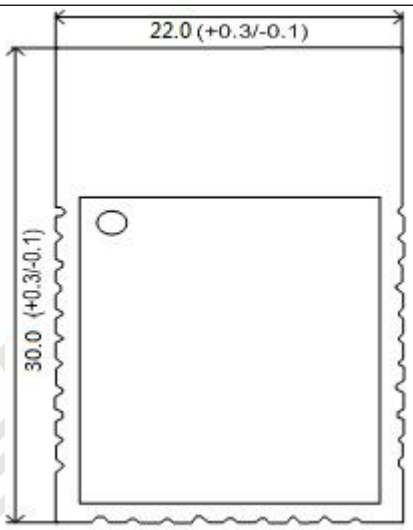
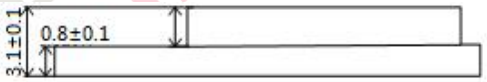
6.2.4 Shutdown Sequence



7. Size reference

7.1 Module Picture

<table>
<tr><td>L x W : 30 x 22 (+0.3/-0.1) mm
 

Refer to section 4.2 for detailed marking info.</td><td> 
</td></tr>
<tr><td>H: 3.1 (±0.1) mm</td><td> 
</td></tr>
<tr><td>Weight</td><td>2.56g</td></tr>
</table>

7.2 Marking Description

< TOP VIEW >

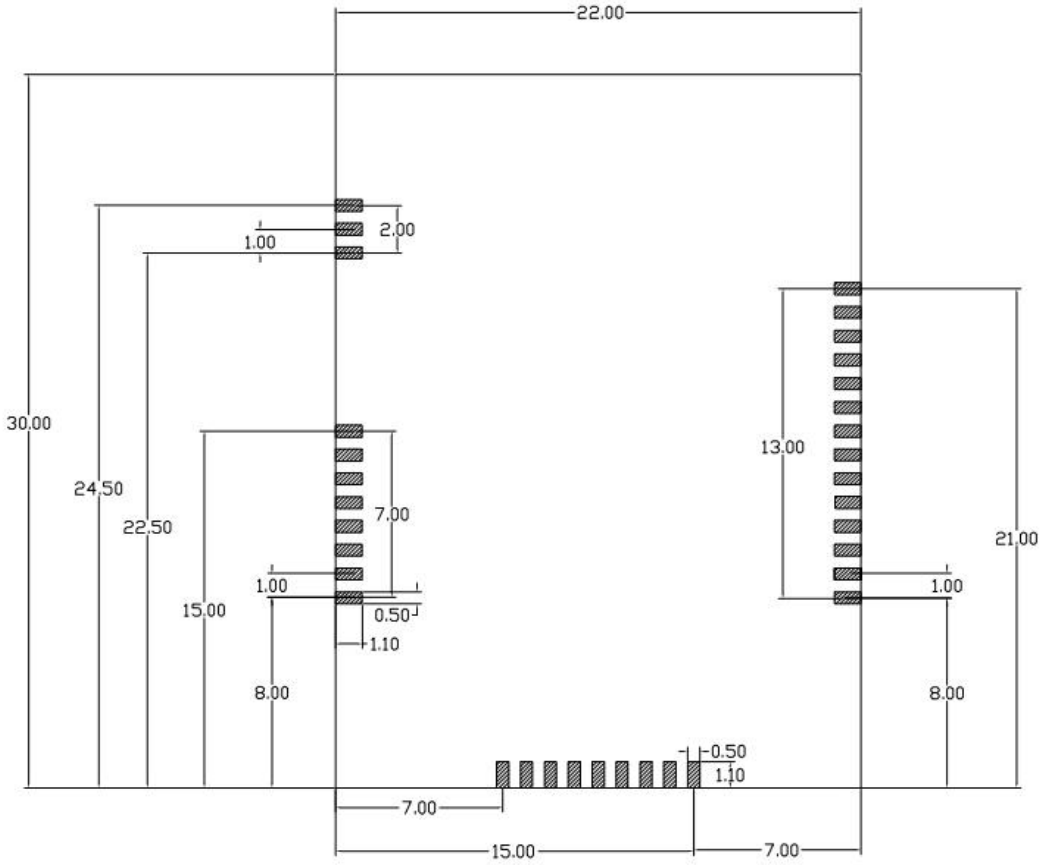
备注：
二维码内容：112233445566;FG6220NINX-04
1. Fn-Link 商标 logo
2. 机型：6220N-IN
3. 二维码：编码规则为“wifi mac 地址;成品料号”
例如：112233445566;FG6220NINX-04（MAC 地址以实际为准）
---BT MAC 在 WIFI MAC 基础上+1(WIFI地址需跳 1，不能与 BT 地址重复)，二维码中不显示此内容。

7.3 List of certified information

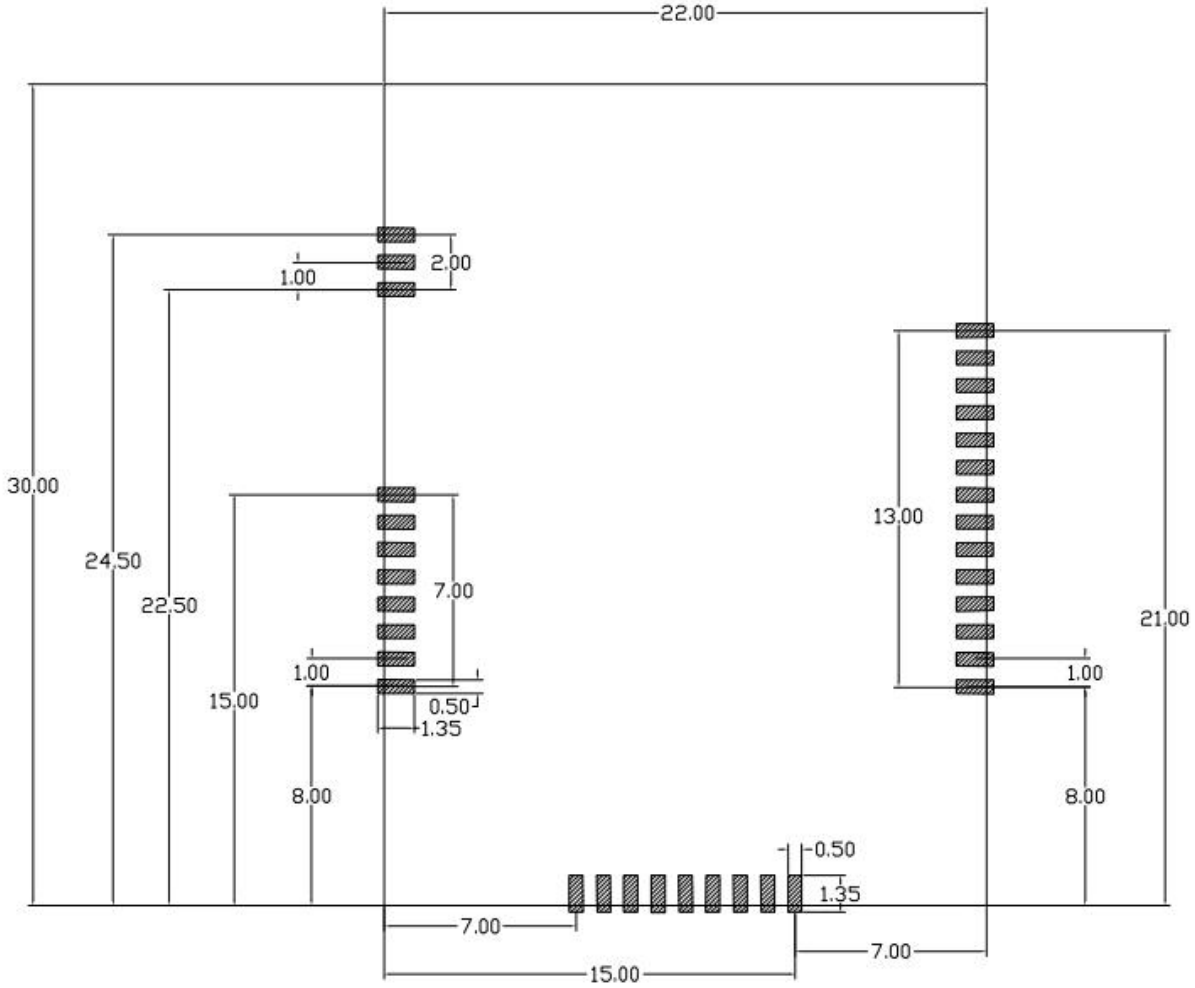
Certification project	Certificate number
SRRC	TBD
FCC	TBD
CE	EC1911028RE01
IC	TBD
NCC	TBD
KCC	TBD
TELEC	TBD
Brazil	TBD
Argentina	TBD
Japan	TBD

7.4 Physical Dimensions

<TOP View>


22.00
2.00
1.00
30.00
24.50
22.50
15.00
7.00
1.00
0.50
1.10
8.00
13.00
21.00
1.00
8.00
0.50
1.10
7.00
15.00
7.00

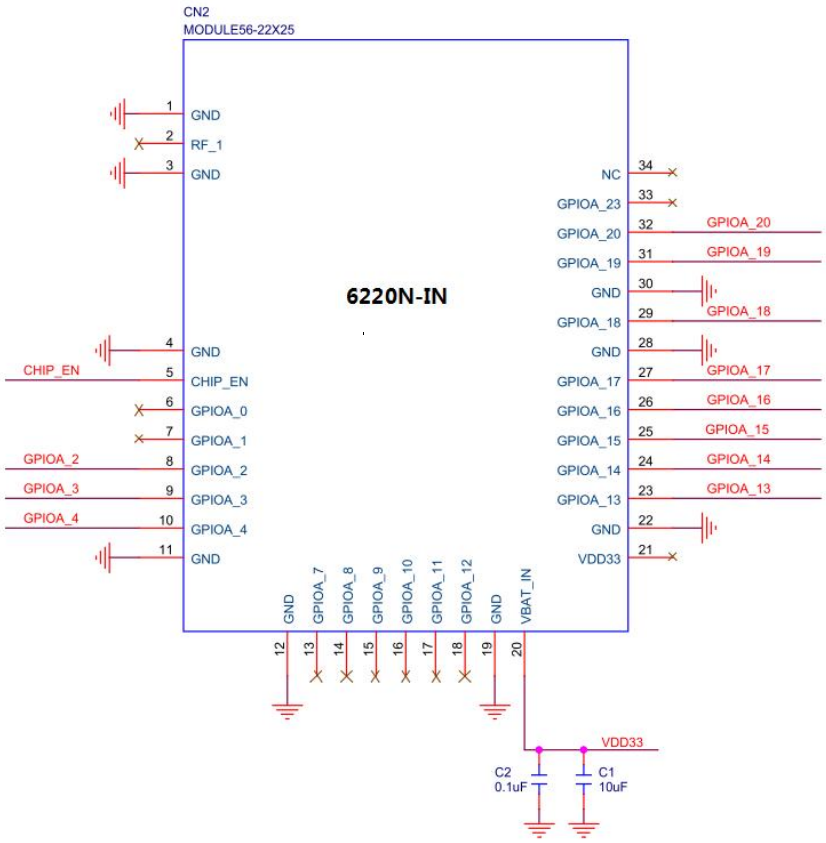
7.5 Layout Recommendation



8. The Key Material List

Item	Part Name	Description	Manufacturer
1	PCB	6220N-IN,深绿色,无卤,2L 30x22x0.8mm	XY-PCB, GDKX, Sunlord, SLPCB
2	Crystal	3225 40MHz, ±10ppm, 12pF	ECEC, Hosonic, TKD, JWT
3	Chipset	RTL8720CM-VA2, QFN40	Realtek
4	Shielding	6220N-IN Shielding	信太，精力通
5	Flash	MX25L1606EM1I-12G SOP8-150MIL	MXIC,GigaDevice

9. Reference Design



Note 1: Use on-board printing antenna by default. Contact Fn-Link for technical support if you want to use reserved pin2 or U.FL connector for external antenna design.

10. Antenna clearance area requirements

When using PCB antenna on Wi-Fi module, make sure the distance between PCB on motherboard and other metal devices is at least 16mm.The shaded areas in the figure below need to be marked away from metal devices, sensors, interference sources, and other materials that may interfere with the signal.

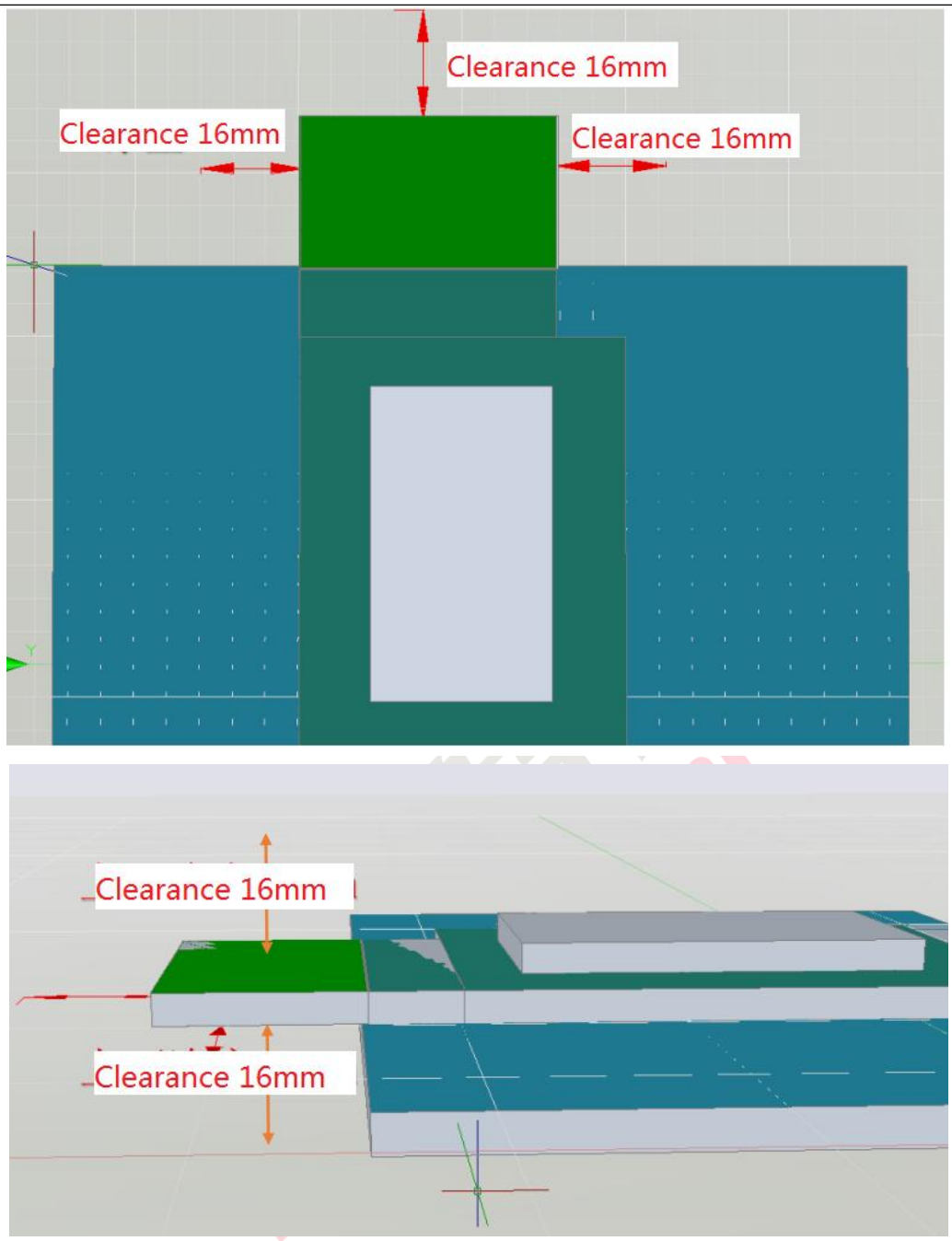


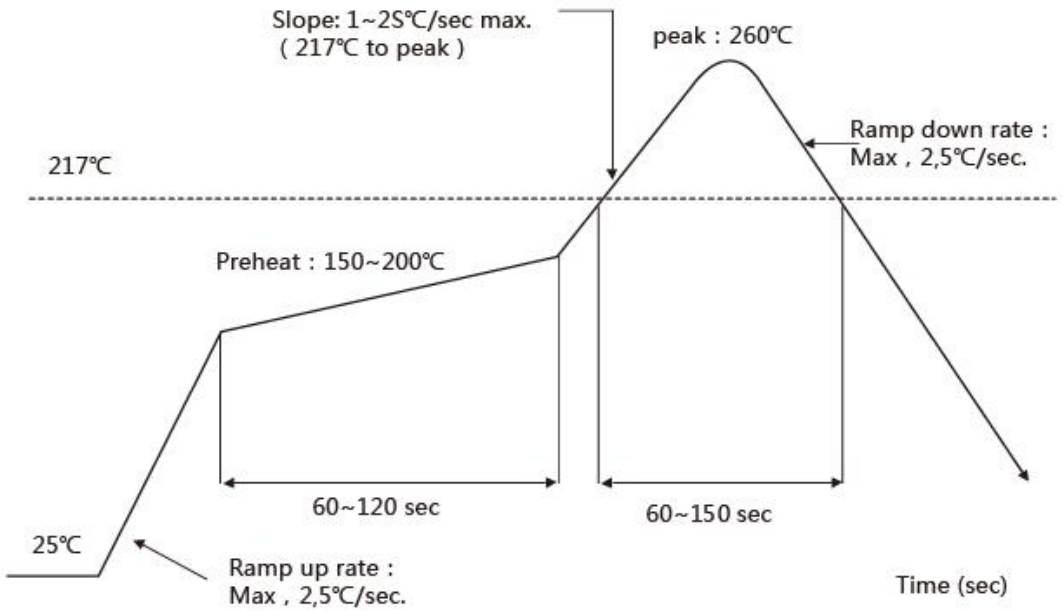
Figure 6-2 Antenna clearance reference

11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

Number of Times : ≤2 times



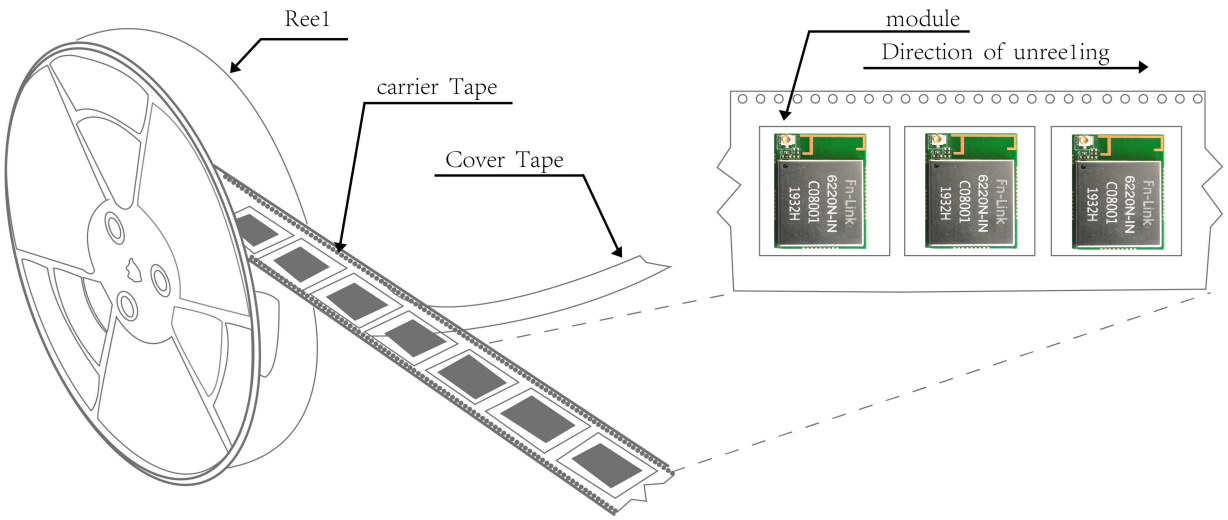
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

13. Package

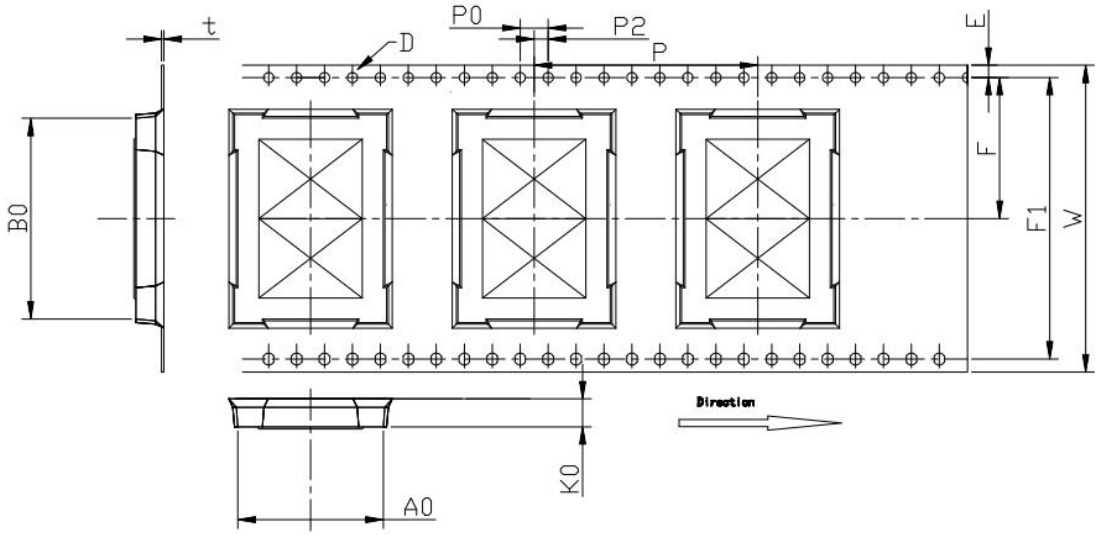
13.1 Reel

A roll of 500pcs



13.2 Carrier Tape Detail

ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	44	22.45	30.40	1.5	1.75	20.2	40.4	3.15	4.0	2.0	32.0	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



13.3 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape: 44mm　　the cover tape　:37.5mm

Color of plastic disc: blue

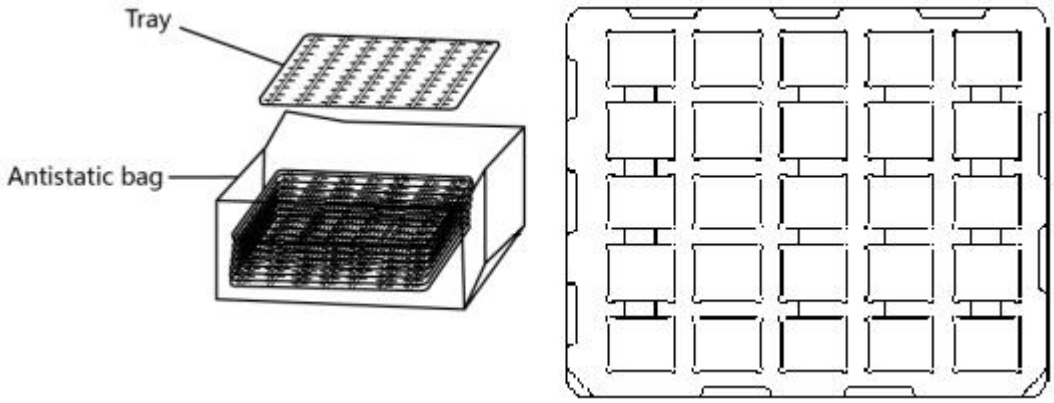
NY bag size:500mm*420mm

size ： 335*335*55mm

The packing case size:360*210*370mm

13.4 Tray

Use pallet packaging for less than 300 pieces



14. 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