

6220N-IN

**Wi-Fi Single-band 1X1 802.11b/g/n + BLE v4.2
IOT Module Datasheet**



6220N-IN Module Datasheet

FG6220NINX-00

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	_____	Title
	_____	Signature
	_____	Date
	_____	Fn-Link

Revision History

Version	Date	Revision Content	Draft	Approved
1.0	2019/05/22	Initial release	Wesley	Stone
1.1	2019/06/12	Correct BT from 4.0 to 4.2	Wesley	Stone
1.2	2019/07/16	Modify RF spec and some typos	Wesley	Stone
1.3	2019/08/08	Add description for SPI interface; Modify RF Tx spec according to Realtek's suggestion.	Wesley	Stone
1.4	2019/09/10	Refine section 3,4,5 and 9	Wesley	Stone
1.5	2020/03/25	Refine section 1,3,5 and 9	Wesley	Stone
1.6	2020/8/18	Refine section 1.3,4.1,9 and10	Wesley	Stone
1.7	2023/11/21	Add Certificate No	Lxp	LSP

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1 Overview

1.1 Introduction

6220N-IN combo module (Fn-link PN: FG6220NINX-00) 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 Features

Wi-Fi General

- 802.11b/g/n compatible WLAN
- 65Mbps transmit and receive PHY rate using 20MHz bandwidth
- Compatible with 802.11n specification
- Backward compatible with 802.11b/g devices while operating in 802.11n mode

Wi-Fi 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
- Wi-Fi Direct support

WLAN PHY Features

- 802.11n OFDM
- One Transmit and one Receive path(1T1R)
- 20MHz bandwidth transmission
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble

Bluetooth Features

- Bluetooth 4.2 Low Energy (BLE)

Interfaces

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

Block Diagram:

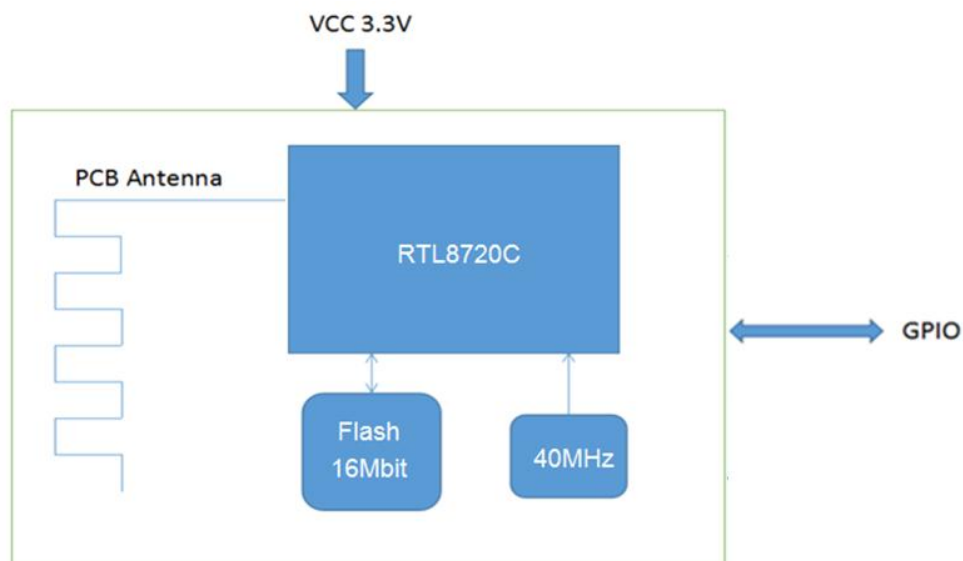


Figure 1

1.3 General specification

Model Name	6220N-IN
Main Chipset	Realtek RTL8720CN
Interfaces	UART, SPI, SDIO device, GPIO, PWM, I2C
Wi-Fi Standards	802.11b/g/n
Dimension	L x W x H: 30mm*22mm*3.1mm
RoHS	All hardware components are fully compliant with EU RoHS directive

1.4 Operating Conditions

Operating Voltage	3.3±10% Vdc
Operating Temperature	-20°C to +85°C
Storage Temperature	-40°C to +125°C

※1.5 EEPROM Information

2 RF Specification

2.1 Wi-Fi 2.4GHz RF Specification

Operating Frequency	2.400~2.4835GHz
Freq. Tolerance	± 20 ppm
Channels	Wi-Fi: USA/Canada: channel 1~11; Europe/China/Australia: channel 1~13;
Modulation	Wi-Fi: 802.11b(DSSS): CCK, DSSS 802.11g(OFDM): BPSK, QPSK, 16QAM, 64QAM 802.11n(OFDM): BPSK, QPSK, 16QAM, 64QAM
PHY Data rates	Wi-Fi: 802.11b: 11, 5.5, 2, 1Mbps 802.11g: up to 54Mbps 802.11n: up to 65Mbps
Output Power	Wi-Fi: 802.11b 17 ± 1.5 dBm 802.11g 15 ± 1.5 dBm 802.11n 14 ± 1.5 dBm
EVM	802.11b $EVM \leq 35\%$ 802.11g $EVM \leq -25$ dB 802.11n $EVM \leq -28$ dB
Sensitivity	Wi-Fi: 802.11b@8% PER 1Mbps -92dBm 11Mbps -84dBm 802.11g@10% PER 6Mbps -88dBm 54Mbps -71dBm 802.11n_HT20@10% PER MCS 0 -87dBm MCS 7 -68dBm
Security	802.11i (WPA, WP2). Open, shared key, and pair-wise key authentication services
Antenna Reference	Small antenna with 0~2 dBi peak gain

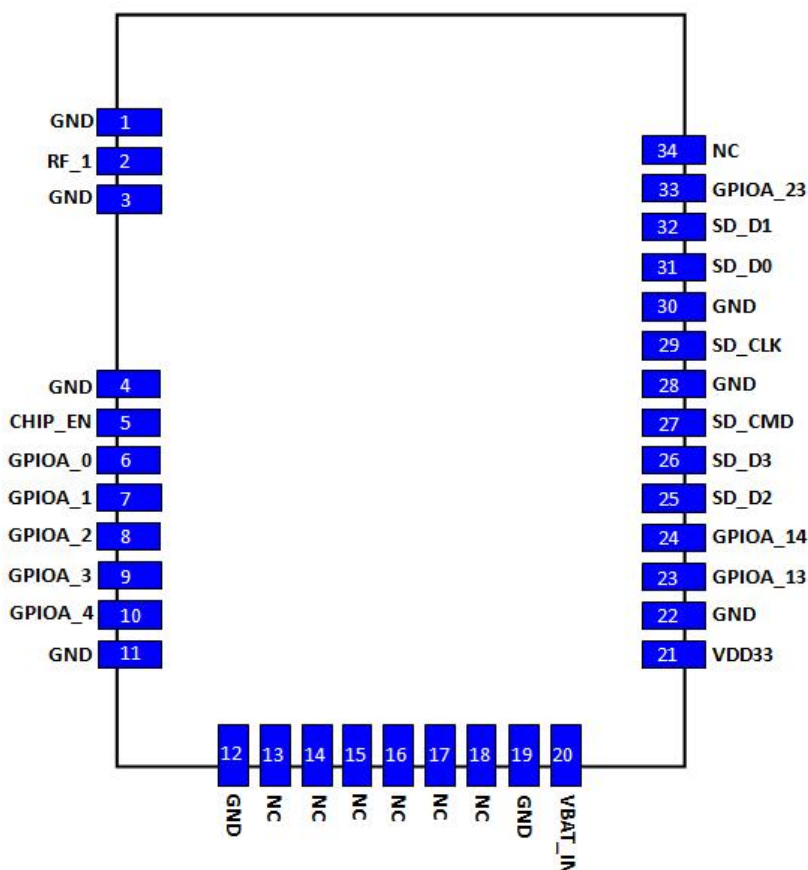
2.2 Bluetooth Specification

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.	Typical.	Max.
Output Power	2.5 dBm	4.5 dBm	6.5 dBm
Sensitivity @ BER=0.1%		-90 dBm	
Maximum Input Level	-20dBm		

3 Pin Assignments

3.1 Pin outline

< TOP VIEW >



3.2 Pin Definition

Pin#	Name	Type ^{Note1}	Description	Voltage
1	GND		Ground connections	
2	RF_1	I/O	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, refer to Pin Function Table	3.3V

9	GPIOA_3	I/O	GPIO Pin, 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	SD_D2	I/O	SDIO data line 2, multiplexed with SPI, refer to Pin Function Table	
26	SD_D3	I/O	SDIO data line 3, multiplexed with SPI, refer to Pin Function Table	
27	SD_CMD	I/O	SDIO command line, for GPIO usage please refer to Pin Function Table	
28	GND		Ground connections	
29	SD_CLK	I/O	SDIO clock line, for GPIO usage please refer to Pin Function Table	
30	GND		Ground connections	
31	SD_D0	I/O	SDIO data line 0, multiplexed with SPI, refer to Pin Function Table	
32	SD_D1	I/O	SDIO data line 1, multiplexed with SPI, 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.

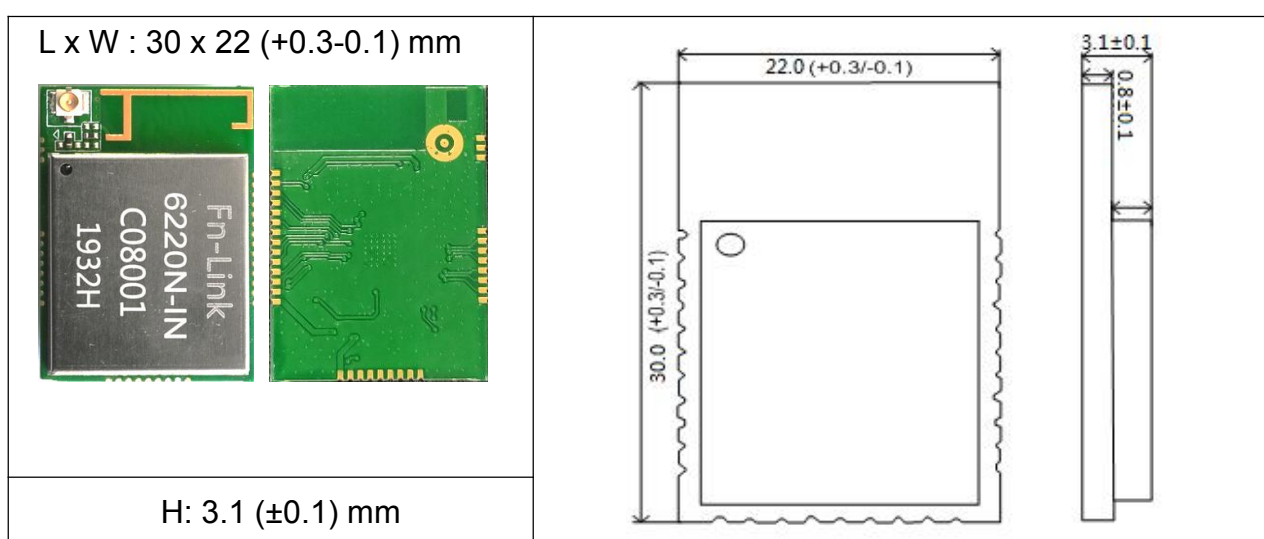
3.3 Pin Function Table

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_CS _n	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_CS _n	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

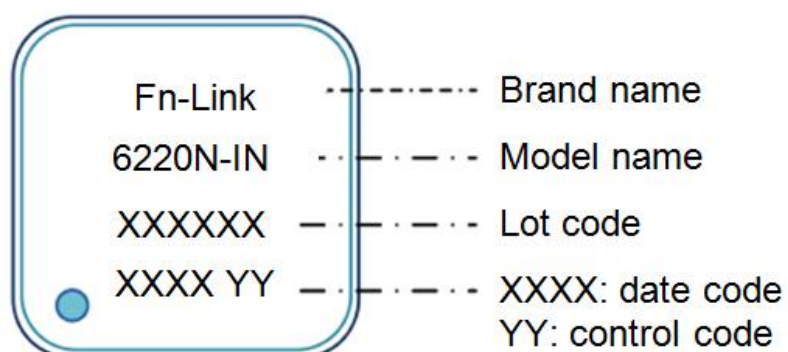
4 Dimensions

4.1 Module Picture



4.2 Marking Description

< TOP VIEW >



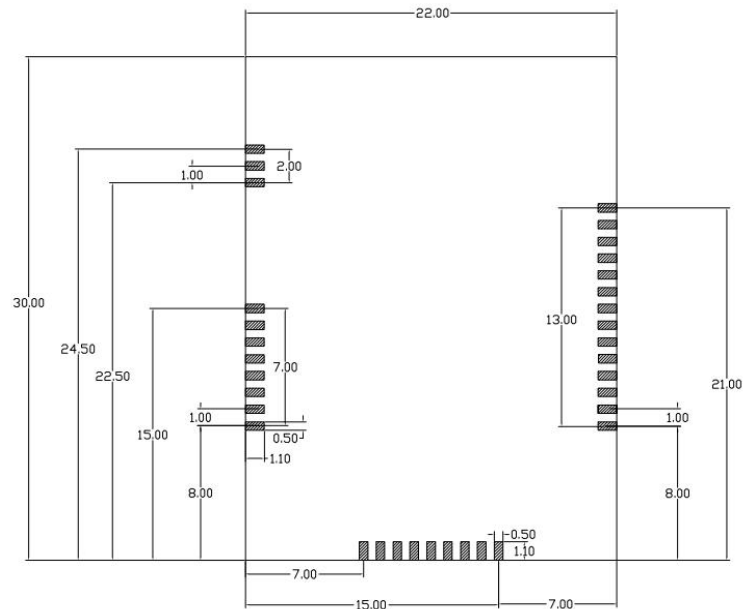
4.3 List of certified information

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

4.4 Physical Dimensions

(unit: mm)

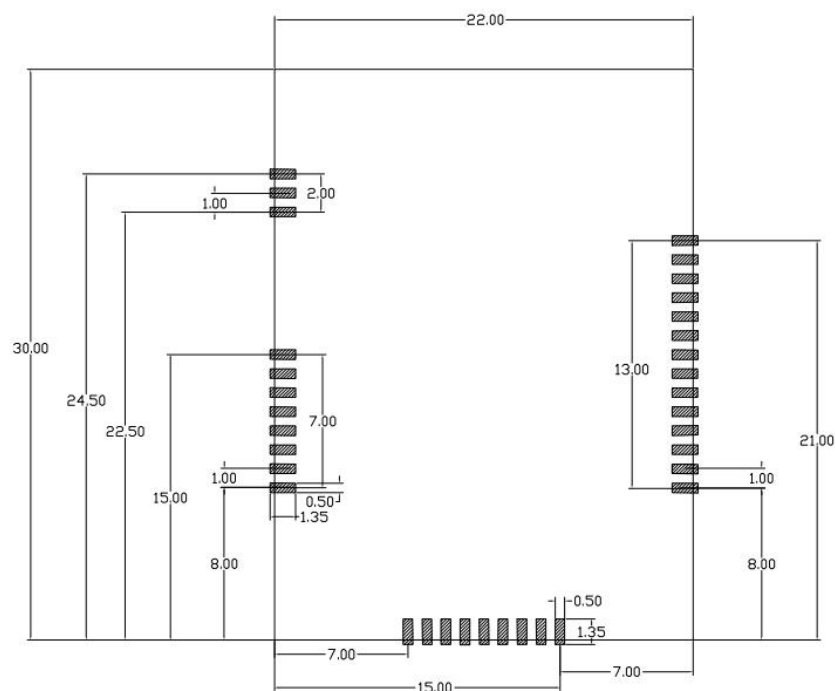
< TOP VIEW >



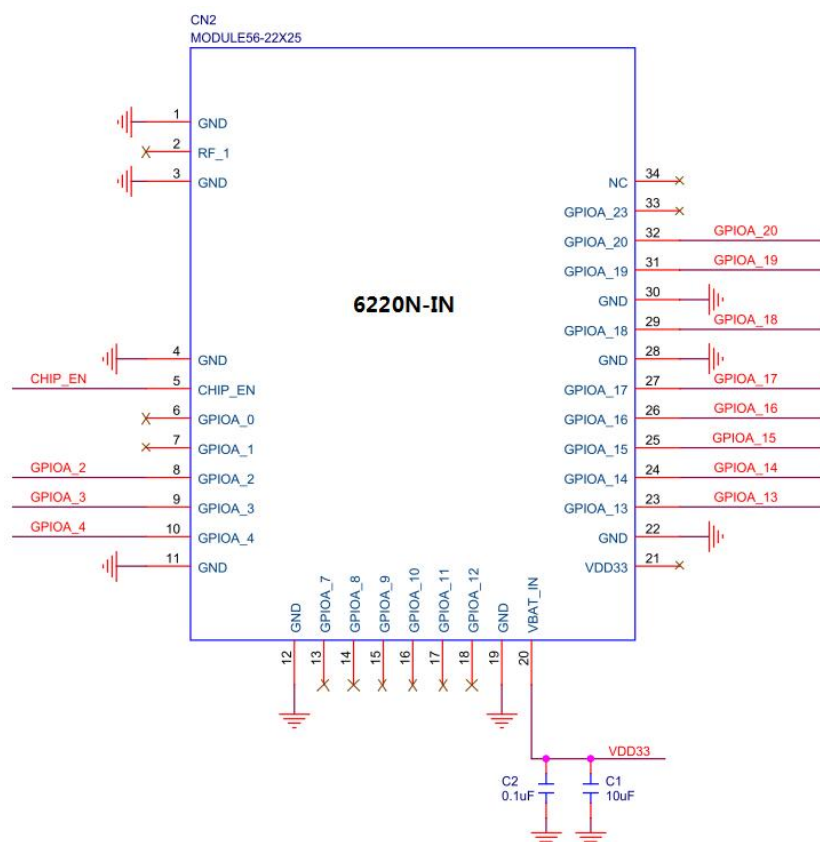
4.5 Layout Recommendation

(unit: mm)

< TOP VIEW >



5 Reference Design



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

6 Ordering Information

Part NO.	Description
FG6220NINX-00	RTL8720CN-VA1, Wi-Fi 1T1R, BLE 4.2, Printing Antenna

7 The Key Material List

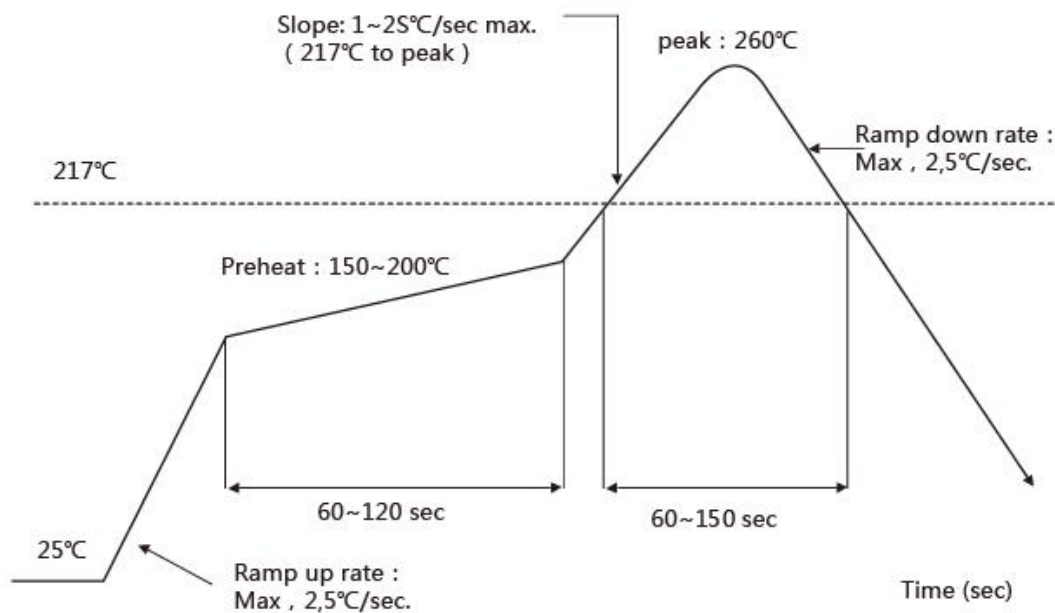
Main	Shielding cover	6220N-IN V1.0 Shielding cover Non-positioning foot (material: copper)
Main	Crystal	3225 40MHz, ±10ppm, 12pF, 7M40000010(TXC)
Alternative	Crystal	3225 40MHz, E3SB40E000900E(HOSONIC)
Alternative	Crystal	3225 40MHz, ±10ppm, 12pF (ECEC)
Main	Chipset	RTL8720CN-VA1 QFN40 5X5 (Realtek)
Main	Flash	MX25L1606EM1I-12G SOP8-150MIL (MXIC)

8 Recommended Reflow Profile

Refer to IPC/JEDEC standard.

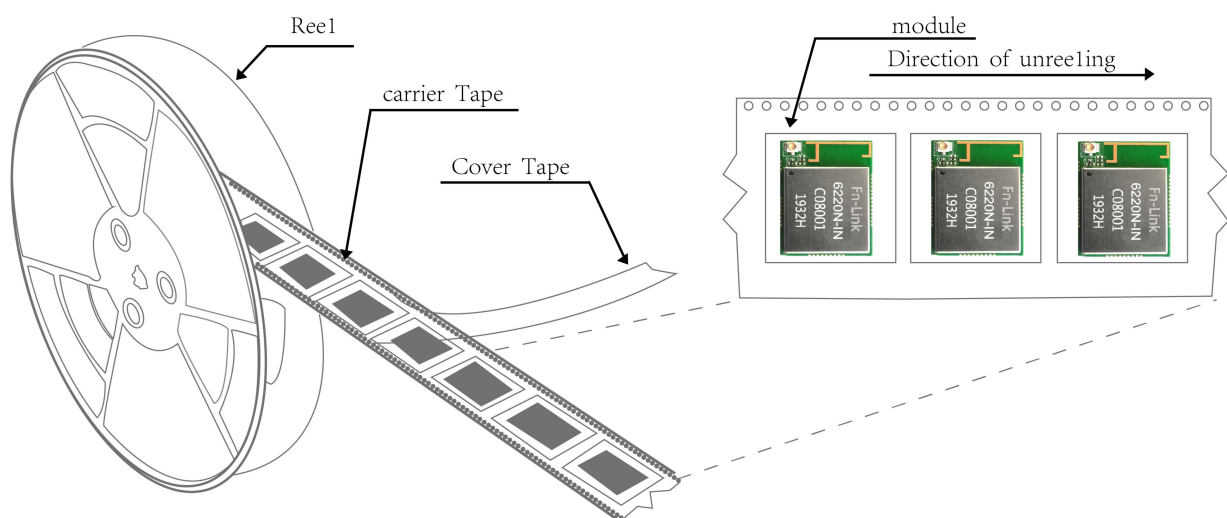
Peak Temperature : <260°C

Number of Times: ≤2 times



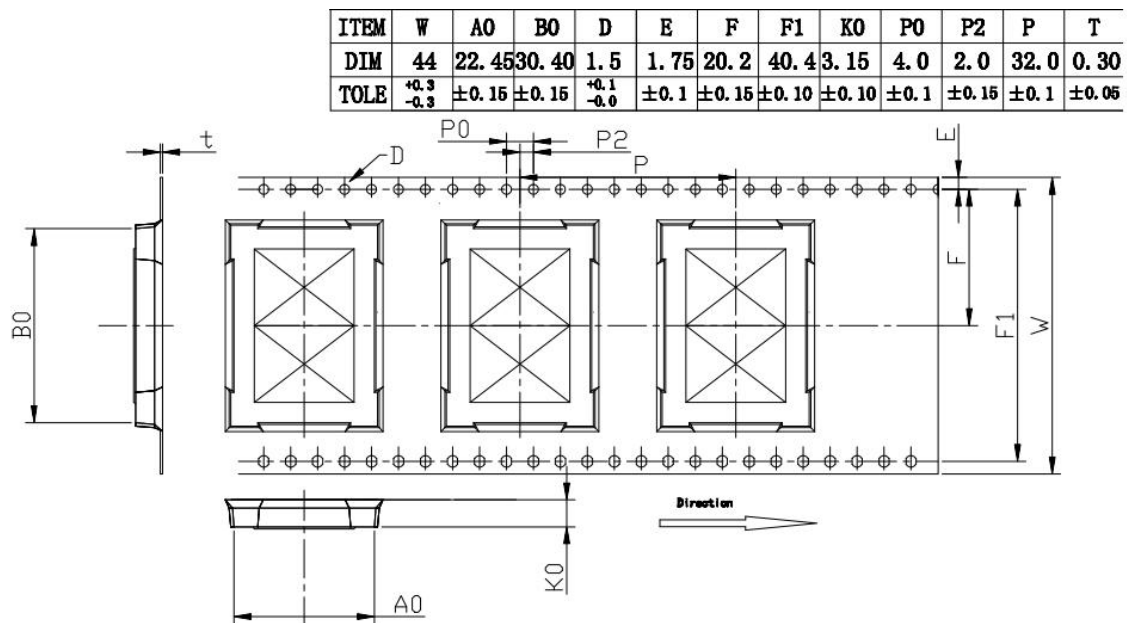
9 Package Information

9.1 Reel



Reel Dimension: 13

9.2 Tape Details



Total length per 13" Reel: 16.5m.

Component load per 13" Reel: 500pcs.

Use hot sealing tape.

9.3 Package Details



NY bag size: 460mm*385mm



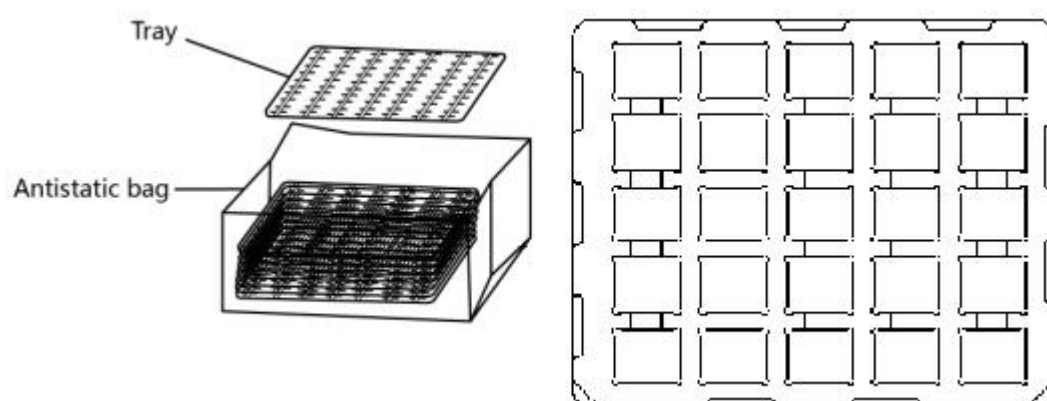
Internal size: 350*350*35mm



Carton size: 350*210*370mm

9.4 Tray

Use pallet packaging for less than 300 pieces



9.5 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, please take care of 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

10 Certification Information

10.1 EU Regulatory RED Declaration of Conformance

Hereby, we (Fn-Link) declared that this device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU



BE	BG	CZ
DK	DE	EE
IE	EL	ES
FR	HR	IT
CY	LV	LT
LU	HU	MT
NL	AT	PL
PT	RO	SI
SK	FI	SE
UK		