PRODUCT SPECIFICATION

6220T-IF

Wi-Fi Dual-band 1x1 802.11a/b/g/n + BLE5.0

Combo Module

Version:v1.0

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

6220T-IF Module Datasheet

	Part NO.	Description
Ordering Information	FG6220TIFX-00	RTL8720DF-VA1-VG,24*16mm,内置 4MB FALASH,UART,USB,SD, SDIO ,SPI,I2C

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Preparde	Checked	Approved
V1.0	2023/9/5	New version	LXP	ZZQ	QJP

1. General Description

1.1 Introduction

The 6220T-IF is a multi-radio MCU module. With the open CPU architecture, customers can develop advanced applications running on the dual-core 32-bit MCU. The radio provides support for Wi-Fi 802.11 a/b/g/n in the 2.4GHz/5GHz band and BLE 5.0 communications. The rich set of peripherals and high performance make it an ideal choice for smart homes, industrial automation, consumer electronics, etc.

1.2 Description

Model Name	6220T-IF
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 24 x 16 x 2.3mm
Host Interface	UART,USB,SD, SDIO ,SPI,I2C…,
Operating temperature	-20°C to 85°C
Storage temperature	-55°C to 125°C

2. Features

General

- RTL8720DF-VT1-CG(named RTL8720DF there after)chipset embedded, dual-coreprocessor:KM4upto200MHz,KM0upto20MHz
- KM4 on-chip memory:up to 512KB SRAM
- KM0 on-chip memory:up to 64KB SRAM
- 4MB Flash

WIFI Features

- 802.11a/b/g/n 1x1,2.4GHz&5GHz
- Center frequency range of operating channel:2412MHz~2484MHz,5180MHz~5825MHz
- Support 20MHz/40MHz bandwidth,up to the data rate of MCS7
- Wi-Fi WEP,WPA,WPA2,WPA3,WPS;open,shared key,and pair-wise key authentication services
- Support lowpower Tx/Rx for short-range application
- Frame aggregation for increased MAC efficiency(A-MSDU,A-MPDU)

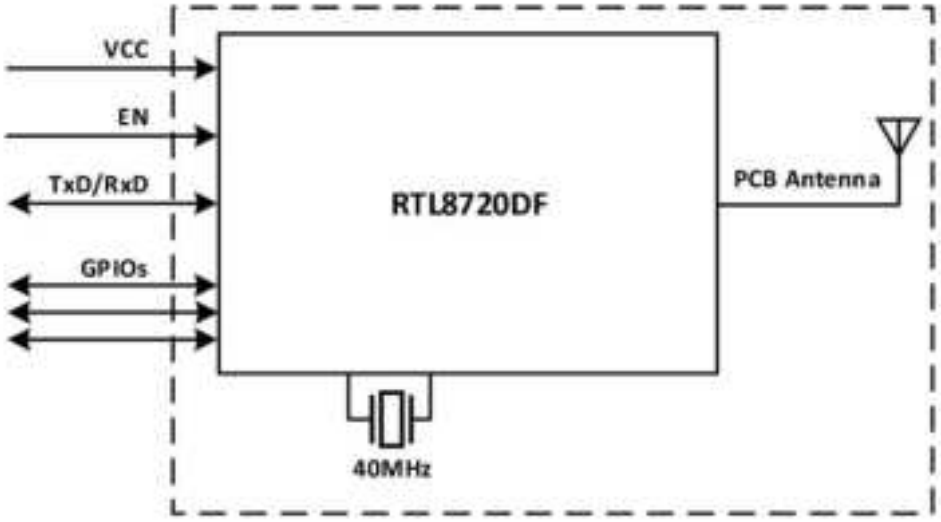
Bluetooth Features

- Bluetooth LE:Bluetooth5.0
- Speed:125Kbps,500Kbps,1Mbps,and2Mbps
- Support LE secure connections
- Support LE scatternet
- Support 3Master links/1Slavelink
- Co-existence RF design between Wi-Fi and Bluetooth

Peripherals:

- 4x UART interface,baud rate upto 6MHz
- 2x I2C,two speed modes:stand ard up to10Kbps,fast up to 400Kbps
- 2x SDIO Host/SDIO 2.0 Device,clock up to50MHz
- 3x SPI Master/Slave,baud rate up to50MHz
- 1x USB2.0 HS/FS/LS mode
- 11x PWM with configurable duration and duty cycle from 0~100%
- 19x programmable GPIOs
- KM4 and KM0 both have a GDMA controller,each with 6 channels

3. Block Diagram



4. General Specification

4.1 2.4G RF 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 : 18dBm ± 2 dB	EVM ≤ -10dB
	802.11g /54Mbps : 17dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 16dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -94 dBm	≤-83 dBm
	- 11Mbps PER @ -87 dBm	≤-76 dBm
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -89 dBm	≤-85 dBm
	- 54Mbps PER @ -75 dBm	≤-68 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-85 dBm
	- MCS=7 PER @ -72 dBm	≤-67 dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-82 dBm
	- MCS=7 PER @ -70 dBm	≤-64 dBm
Maximum Input Level	802.11b: -10 dBm	
	802.11g/n: -20 dBm	
Antenna Reference	PCB antenna with 0~2 dBi peak gain	

4.2 5GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11a/n/, Wi-Fi compliant	
Frequency Range	5.150 GHz ~ 5.850 GHz (5.0 GHz Band)	
Test Items	**Typical Value**	**EVM**
Output Power	802.11a 54Mbps: 18 ± 2 dBm	EVM ≤ -25dB
	802.11n MCS7: 17 ±2 dBm	EVM ≤ -28dB
Receive Sensitivity (11a,20MHz) @10% PER	- 6Mbps PER @ -89 dBm, typical	≤-82
	- 54Mbps PER @ -71 dBm, typical	≤-65

Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -89 dBm, typical	≤-82
	- MCS=7	PER @ -69 dBm, typical	≤-64
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	PER @ -87 dBm, typical	≤-79
	- MCS=7	PER @ -67 dBm, typical	≤-61
Maximum input level	802.11a/n: -30 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

Note: The RF specification will be updated in future version

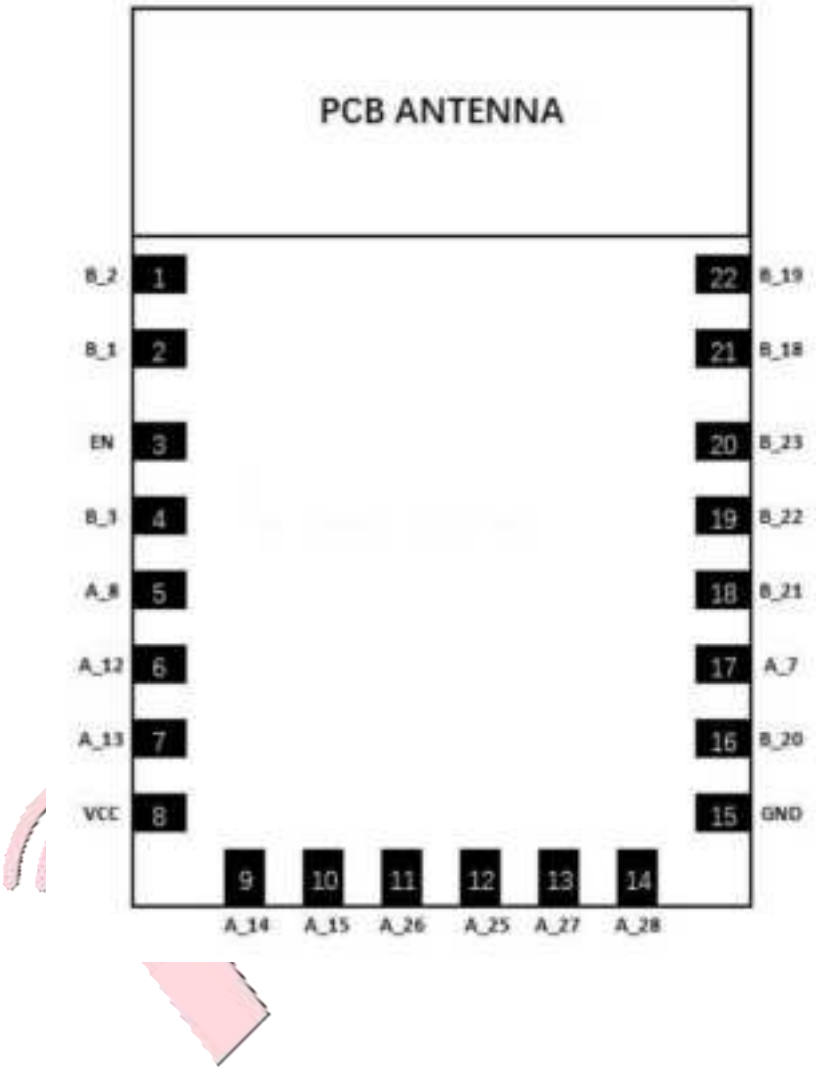
4.3 Bluetooth Specification

Feature	**Description**		
General Specification			
Bluetooth Standard	Bluetooth V5.0		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2400MHz ~ 2483.5 MHz		
Number of Channels	40 channels		
Modulation	GFSK		
RF Specification			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)
Output Power (Class 1)	3	5	7
Sensitivity @ BLE=30.8% for GFSK (1Mbps)		-90	
Maximum Input Level	GFSK (1Mbps):-20dBm		

5. Pin Definition

5.1 Pin Outline

< TOP VIEW >



5.2 Pin Definition details

Pin Name	Pin No.	Type	Description
B_2	1	I/O	GPIOB_2/UART_RXD
B_1	2	I/O	GPIOB_1/UART_TXD
EN	3	I	• High: Enable the chip. • Low: Module power off.
B_3	4	I/O	GPIOB_3/SWD_CLK
A_8	5	I/O	GPIOA_8/UART_LOG_RXD
A_12	6	I/O	GPIOA_12/SPI_MOSI
A_13	7	I/O	GPIOA_13/SPI_MISO
VCC	8	P	Power Supply
A_14	9	I/O	GPIOA_14/SPI_CLK/UART_RTS
A_15	10	I/O	GPIOA_15/SPI_CS/UART_CTS
A_26	11	I/O	GPIOA_26/HSDP
A_25	12	I/O	GPIOA_25/HSDM
A_27	13	I/O	GPIOA_27/SWD_DAT
A_28	14	I/O	GPIOA_28/RREF
GND	15	P	Ground
B_20	16	I/O	GPIOB_20/SDIO_CMD
A_7	17	I/O	GPIOA_7/UART_LOG_TXD
B_21	18	I/O	GPIOB_21/SDIO_CLK
B_22	19	I/O	GPIOB_22/SDIO_D0
B_23	20	I/O	GPIOB_23/SDIO_D1
B_18	21	I/O	GPIOB_18/SDIO_D2
B_19	22	I/O	GPIOB_19/SDIO_D3

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

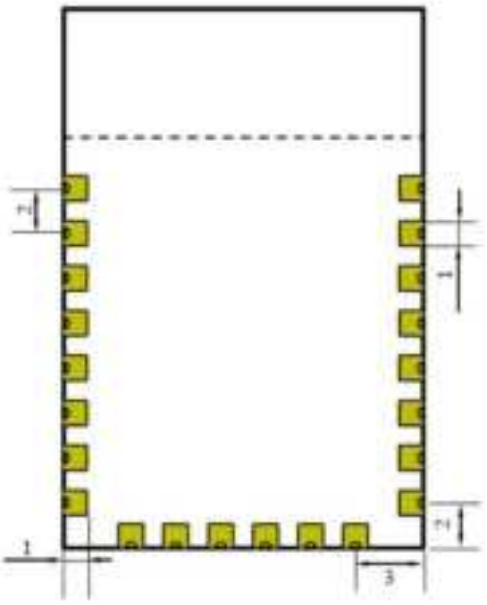
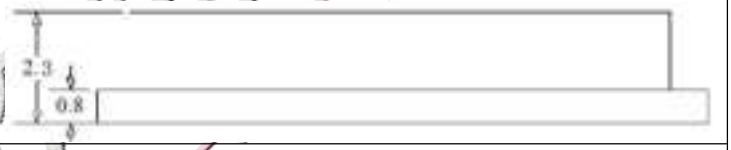
6. Electrical Specifications

6.1 Power Supply DC Characteristics

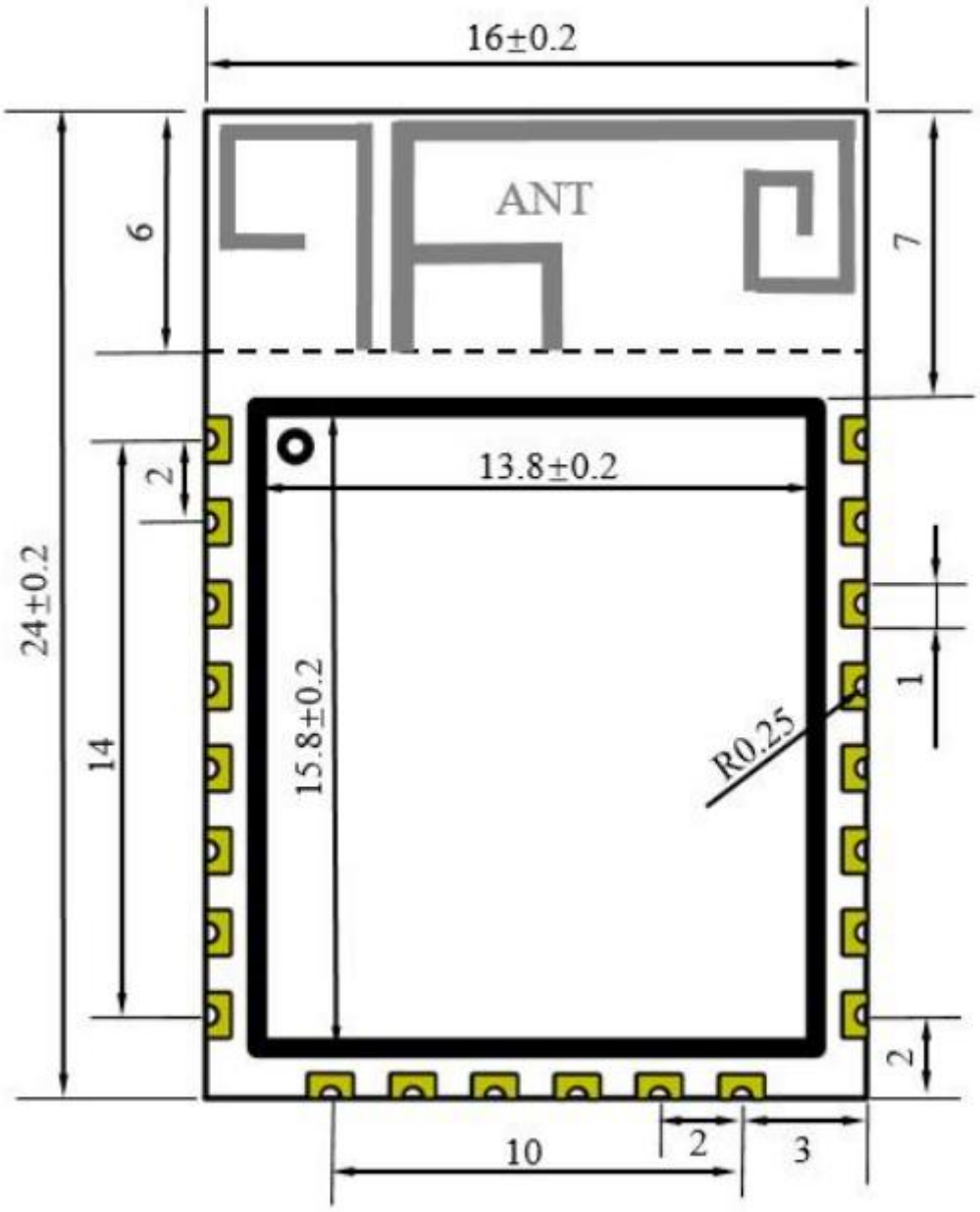
	Min.	Typ.	Max.	Unit
Operating Temperature	-20	25	85	deg.C
VCC33	3.0	3.3	3.6	V

7. Size reference

7.1 Module Picture

L x W : 24 x16 (±0.2) mm	
H: 2.3(±0.1)mm	
Weight	TBD

7.3 Layout Recommendation

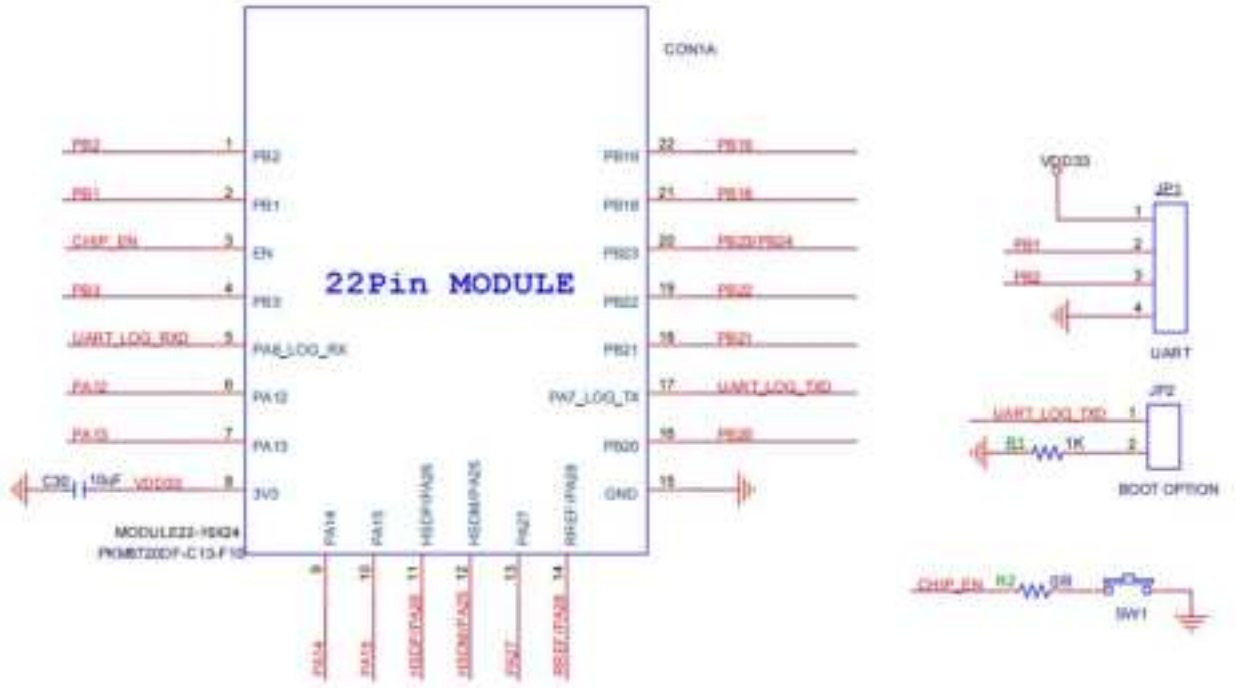


Top view

8. The Key Material List

TBD

9. Reference Design

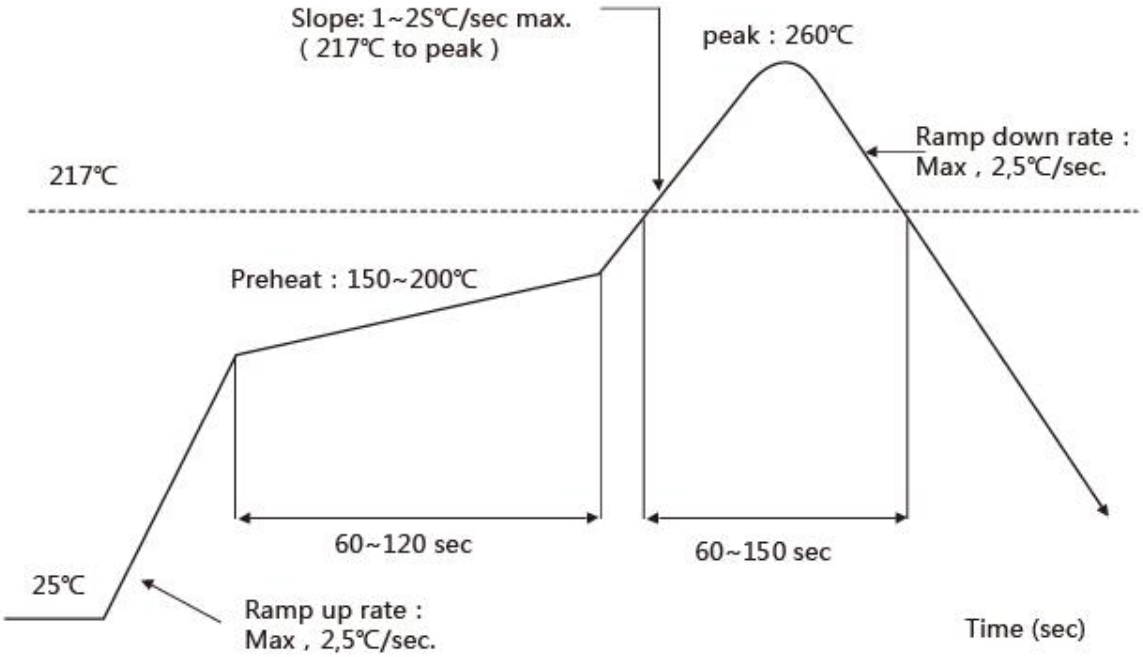


10. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

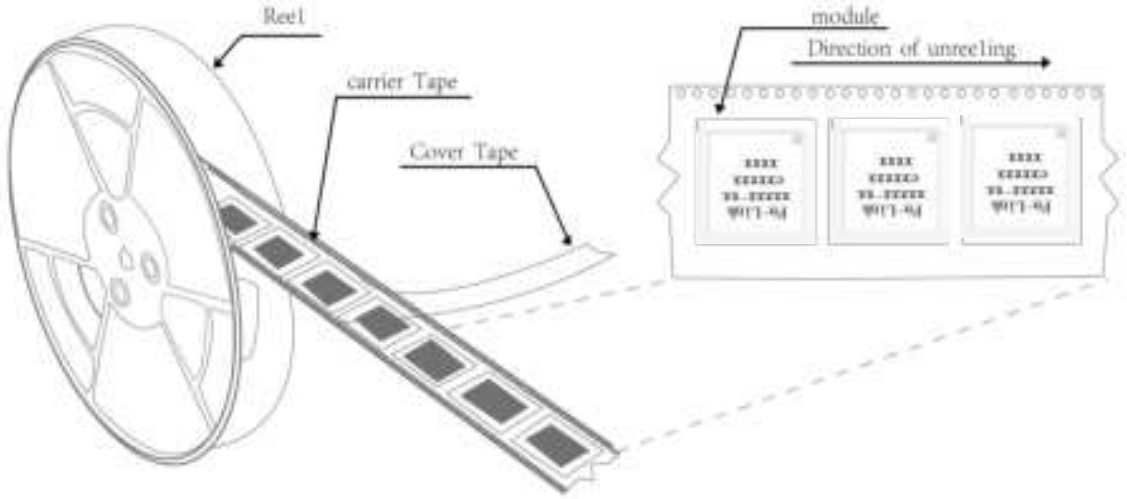
Number of Times : ≤2 times



11. Package

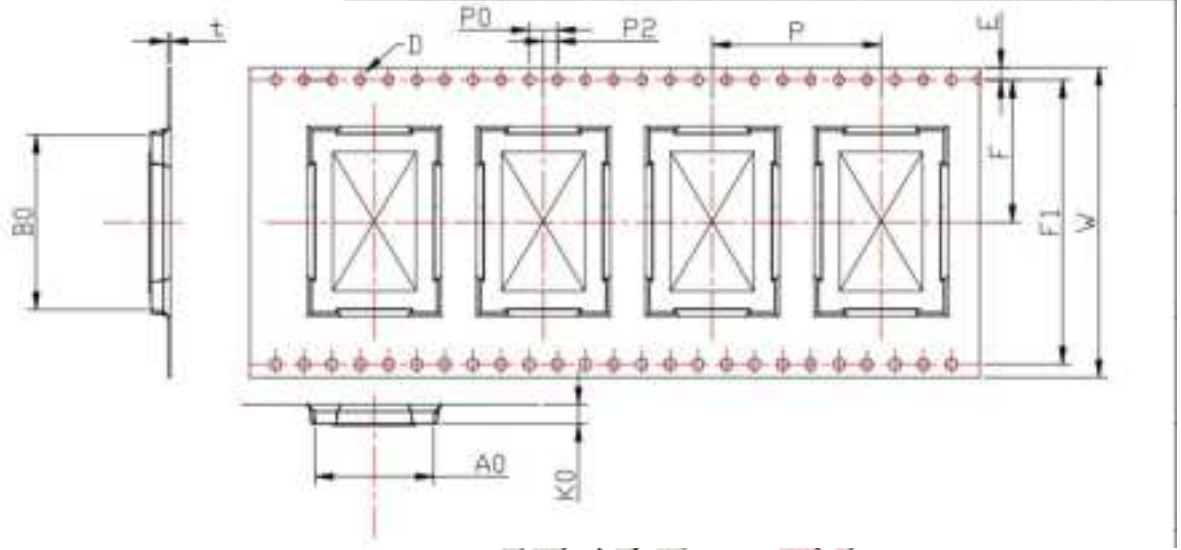
11.1 Reel

A roll of 840pcs



11.2 Carrier Tape Detail

ITEM	W	A0	B0	D	E	F	F1	K0	P0	P2	P	T
DIM	44	16.40	24.40	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



11.3 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

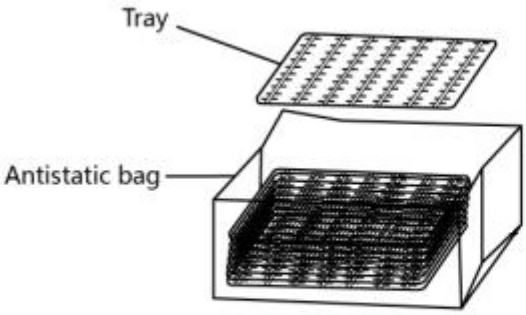
NY bag size:450mm*415mm

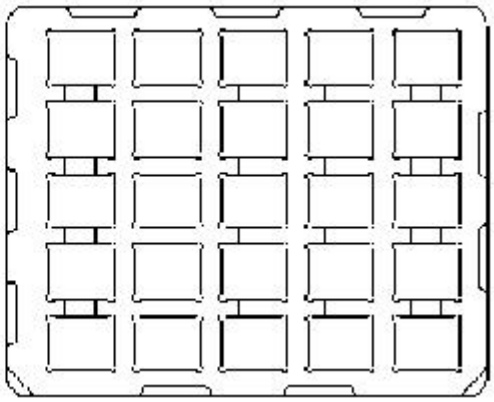
size ： 350*350*35mm

The packing case size:360*210*370mm

11.4 Tray

Use pallet packaging for less than 300 pieces





FCC WARNING

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and

2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

The device has been evaluated to meet general RF exposure requirement. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

12. 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

Integration instructions for host product manufacturers according to KDB 996369 D03 OEMManual v01

Conditions on using FN-LINK TECHNOLOGY LIMITED regulatory approvals:
A. Customer must ensure that its product (The ”CUSTOMER Product”) is electrically identical to FN-LINK TECHNOLOGY LIMITED reference designs. Customer acknowledges that any modifications to FN-LINK TECHNOLOGY LIMITED reference designs may invalidate regulatory approvals in relation to the CUSTOMER Product, or may necessitate notifications to the relevant regulatory authorities.
B. Customer is responsible for ensuring that antennas used with the product are of the same type, with same or lower gains as approved and providing antenna reports to FN-LINK TECHNOLOGY LIMITED.
C. Customer is responsible for regression testing to accommodate changes to FN-LINK TECHNOLOGY LIMITED reference designs, new antennas, and RF exposure safety testing/approvals.
D. Appropriate labels must be affixed to the CUSTOMER Product that comply with applicable regulations in all respects.
E. A user’s manual or instruction manual must be included with the customer product that contains the text as required by applicable law. Without limitation of the foregoing, an example (for illustration purposes only) of possible text to include is set forth below:

2.2 List of applicable FCC rules
FCC Part 15 Subpart C 15.247, FCC Part 15 Subpart E

2.3 Specific operational use conditions
Radio Technology: Bluetooth BLE
Operation frequency: 2402-2480MHz
Channel No.: 40 channels
Data rate: 1Mbps/2Mbps
Channel Separation: 2MHz
Modulation: GFSK
Antenna Type: PCB antenna, max gain 0.64dBi.

Radio Technology: 2.4G WIFI
Operation frequency: 2412MHz-2462MHz for IEEE 802.11 b, g. n/HT20
2422MHz~2452MHz for IEEE802.11n/HT40
Channel No.: 802.11b/802.11g /802.11n (HT20): 11, 802.11(HT40): 9
Modulation type: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type: PCB antenna, max gain 0.64dBi.

Radio Technology: 5G WIFI
Operation Frequency: 802.11a/n (HT20): 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz
802.11n (HT40): 5190~5230MHz; 5270-5310MHz; 5510-5670MHz; 5755~5795MHz
Channel separation: 20MHz for 802.11a/ 802.11n (HT20)
40MHz for 802.11n (HT40)
Modulation technology: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type: PCB antenna, max gain 2.63dBi.
The module can be used for mobile applications with a maximum 2.63dBi antenna. The host manufacturer installing this module into their product must ensure that the final composit product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide informationto the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

2.4 Limited module procedures
Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs
The antenna used is the PCB antenna on the module.

2.6 RF exposure considerations
If RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or newapplication. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

2.7 Antennas
Antenna Specification are as follows:
Antenna Type: PCB antenna
Antenna Gain(Peak):2.63 dBi (Provided by customer)
This device is intended only for host manufacturers under the following conditions:
The transmitter module may not be co-located with any other transmitter or antenna;

As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheralrequirements, etc.).

2.8 Label and compliance information
Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2AATL-6220T-IF" With their finished product.

2.9 Information on test modes and additional testing requirements
Radio Technology: Bluetooth BLE
Operation frequency: 2402-2480MHz
Channel No.: 40 channels
Data rate: 1Mbps/2Mbps
Channel Separation: 2MHz
Modulation: GFSK
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Radio Technology: 5G WIFI
Operation Frequency: 802.11a/n (HT20): 5180~5240MHz; 5260-5320MHz; 5500-5700MHz; 5745~5825MHz
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Channel separation: 20MHz for 802.11a/ 802.11n (HT20)
40MHz for 802.11n (HT40)

Modulation technology: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type: PCB antenna, max gain 2.63dBi.
Host manufacturer must perfom test of radiated & conducted emission and spurious emission, etcaccording to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.
Only when all the test results of test modes comply with FCC requirements, then the end product canbe sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.
The end user manual shall include all required regulatory information/warning as shown in this manual, include:
This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.