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PRODUCT SPECIFICATION

6220HL-IF

Wi-Fi Single-band 1x1 + Bluetooth 4.2

Combo Module

Version:v1.0

Customer: _____

Customer P/N:_____

Signature:_____

Date:_____

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

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6220HL-IF Module Datasheet

	Part NO.	Description
Ordering Information	FG6220HLIF-00	RTL8720CF-VA2-CG 802.11 b/g/n/,33*18mm,UART/1T1R+BLE4.2 板载天线+ipex 头

CONTENTS

Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2023/11/21	New version	LXP	Zl	Qjp

1. General Description

1.1 Introduction

6220HL-IF is an embedded high-performance Wi-Fi+BLE module, which adopts the Realtek XMC1R-CGT chip platform solution. 6220NM-IN is an integrated PCB on-board antenna and an external false. The module is mainly applicable to smart home appliances, home automation, industrial Internet and other Internet of Things applications.

1.2 Description

Model Name	6220HL-IF
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 33 x 18 x 3.12 mm
Wi-Fi Interface	SDIO device, SPI, UART, GPIO, PWM, I2C
Operating temperature	-20 ° C to +85 ° C
Storage temperature	-40 ° C to 125 ° C

2. Features

General

- Complete 802.11n solution for 2.4GHz band
- CMOS MAC, Baseband PHY, and RF in a single chip for 802.11b/g/n compatible WLAN
- Compatible with 802.11n specification
- Backward compatible with 802.11b/g devices while operating in 802.11n mode
- Maximum data rate 26Mbps in 802.11g and 65Mbps in 802.11n
- 65Mbps receive PHY rate and 65Mbps transmit PHY rate using 20MHz bandwidth
- 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services

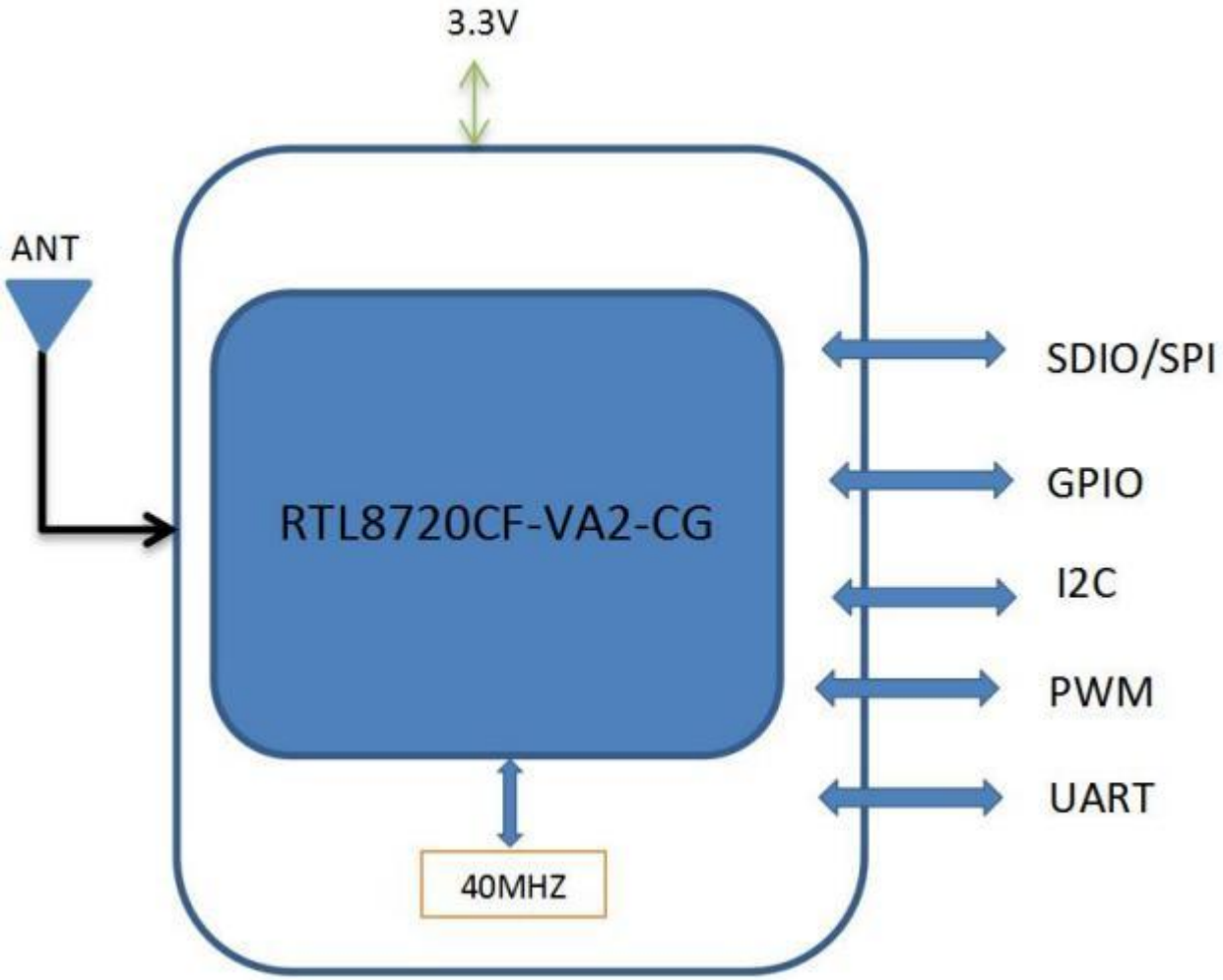
Host Interface

- Support SDIO 2.0 High Speed mode

Bluetooth Features

- Bluetooth Smart Ready (Bluetooth Low Energy) supporting BT4.2 BQB

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	
Modulation	WiFi：DSSS DBPSK/DQPSK/CCK OFDM BPSK/QPSK/16QAM/64QAM	
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	

SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps	PER @ -91 dBm	≤-83
	- 2Mbps	PER @ -89 dBm	≤-80
	- 5.5Mbps	PER @ -87 dBm	≤-79
	- 11Mbps	PER @ -85 dBm	≤-76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps	PER @ -87 dBm	≤-85
	- 9Mbps	PER @ -86 dBm	≤-84
	- 12Mbps	PER @ -84 dBm	≤-82
	- 18Mbps	PER @ -82 dBm	≤-80
	- 24Mbps	PER @ -79 dBm	≤-77
	- 36Mbps	PER @ -75 dBm	≤-73
	- 48Mbps	PER @ -71 dBm	≤-69
	- 54Mbps	PER @ -70 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -87 dBm	≤-85
	- MCS=1	PER @ -84 dBm	≤-82
	- MCS=2	PER @ -82 dBm	≤-80
	- MCS=3	PER @ -79 dBm	≤-77
	- MCS=4	PER @ -75 dBm	≤-73
	- MCS=5	PER @ -71 dBm	≤-69
	- MCS=6	PER @ -70 dBm	≤-68
	- MCS=7	PER @ -69 dBm	≤-67
Maximum Input Level	802.11b : -8 dBm		
	802.11g/n : -20 dBm		

4.2 Bluetooth Specification

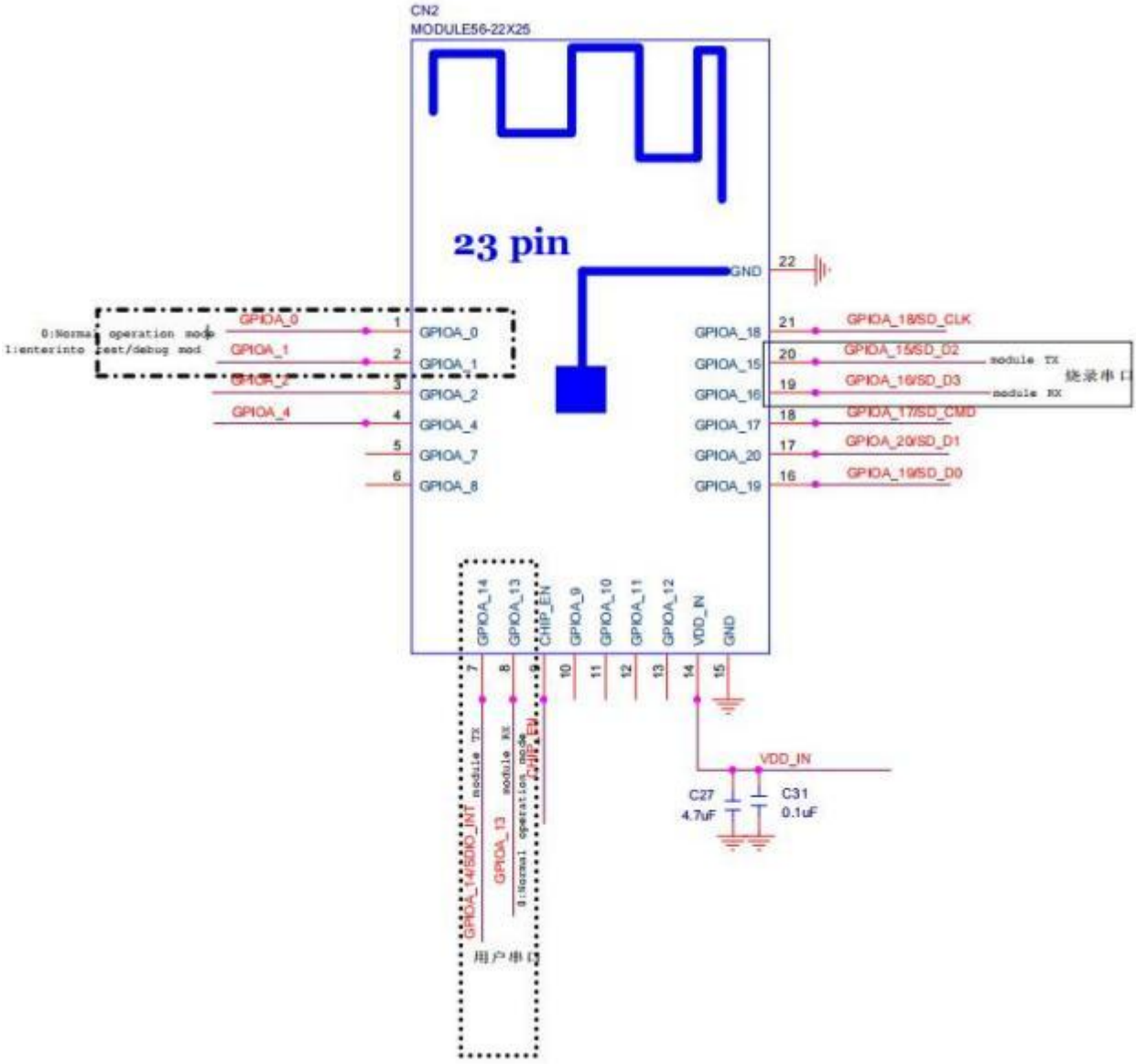
Feature	**Description**		
General Specification			
Bluetooth Standard	Bluetooth V4.2		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2400 MHz ~ 2483.5 MHz		
Number of Channels	40 channels		
Modulation	GFSK		
RF Specification			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)

Output Power (Class 1)	2.5	4.5	6.5
Sensitivity @ BLE=1% for GFSK (1Mbps)		-89	
Maximum Input Level	GFSK (1Mbps):-20dBm		

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GPIOA_0	I/O	JTAG_ CLK/ UART1_ IN/PWM0, power on requires low level: normal start mode	
2	GPIOA_ 1	I/O	JTAG_TMS/UART1_ OUT/PWM1, power on requires low level: EFUSE normal import mode	GPIOA_ 1
3	GPIOA_2	I/O	JTAG_TDO/UART1_IN/SPI_CS/I2C_SCL/PWM2	
4	GPIOA_4	I/O	JTAG_TRST/ UART1_CTS/ SPI_MOSI/ PWM4	
5	GPIOA_7	I/O	UART0_IN/ PWM7 Communication RX	
6	GPIOA_8	I/O	UART0_IN/ PWM8 Communication RX	
7	GPIOA_ 14/SDIO_INT	I/O	SDIO_INT/ UART0_OUT/ PWM2 Communication TX	
8	GPIOA_ 13	I/O	UART0_IN/ PWM7 Communication RX	
9	CHIP_EN		Module enable	
10	GPIOA_9	I/O		
11	GPIOA_ 10	I/O		
12	GPIOA_ 11	I/O		
13	GPIOA_ 12	I/O		
14	VDD_IN		Power, The maximum output current of the external power supply is recommended to be 500 mA and above.	
15	GND		Ground connections	
16	GPIOA_ 19/SD_D0	I/O	SD_D0/SPI_M_D0/UART2_CTS/SPI_MOSI/I2C_SCL/PWM7	
17	GPIOA_20/SD_D 1	I/O	SD_D 1/SPI_M_D 1/UART2_RTS/SPI_MISO/I2C_SDA/PWM0	
18	GPIOA_ 17/SD_CMD	I/O	SD_CMD/SPI_M_D2/PWM5	
19	GPIOA_ 16/SD_D3	I/O	SD_D3/SPI_M_CLK/UART2_OUT/SPI_SCL/ I2C_SDA/ PWM4 Commissioning TX	
20	GPIOA_ 15/SD_D2	I/O	SD_D2/SPI_M_CS/UART2_IN/SPI_CS/I2C_SCL/ PWM3 Commissioning RX	
21	GPIOA_ 18/SD_CLK	I	SD_CLK/SPI_M_D3/PWM6	
22	GND	-	Ground connections	

P:POWER I:INPUT O:OUTPUT

explain:

GPIO0 power-on instant, do not pull high, or enter the down load mode.

■ Module startup configuration table:

	CHIP_EN	GPIOA_0	GPIOA_13
Normal operation mode	1	0	0 OR 1
URAT downlaod mode	0->1	1	1

■ GPIO1 power-on instant, do not pull high, otherwise the efuse configuration will fail to import and affect the normal operation of the module.

■ GPIO23 power-on instant, do not pull high, otherwise it will affect the normal operation of the module

7. Electrical Specifications

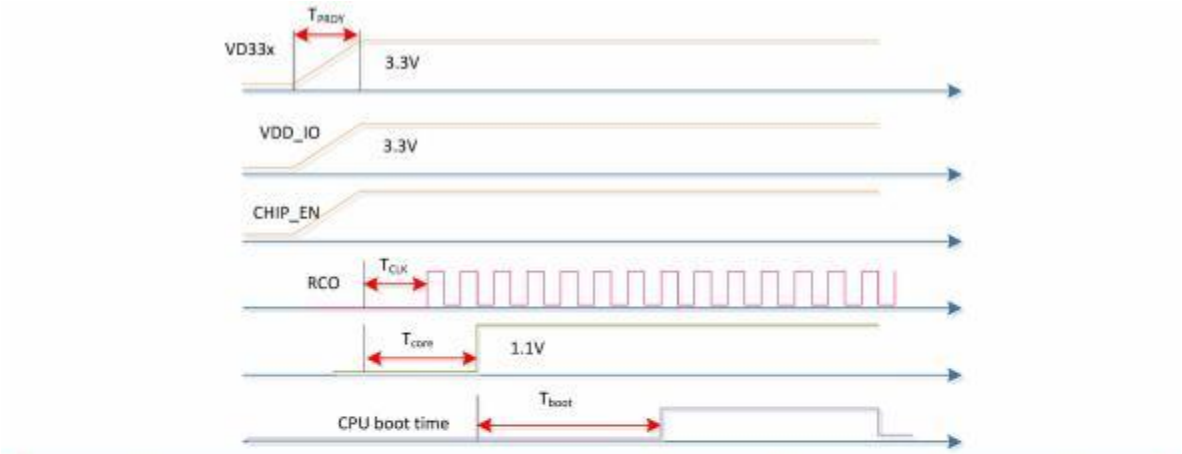
7.1 Power Supply DC Characteristics

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

7.2 Power Consumption

model	Mcu status	describe	TYP	Unit
shutdown			10	uA
Deep sleep			30	uA
Standby	Power-gated		200	uA
Sleep	Clock-gated	WLAN off	450	uA
MCU Active			9	mA
WLAN on(beacon only)	MCU sleep		58	mA
WLAN asoc idle(2.4G),RF ON	MCU sleep	DTIM=1	3	mA
WLAN asoc idle(2.4G),RF ON	MCU sleep	DTIM=3	2	mA
BT active+WLAN active	MCU sleep		60	mA

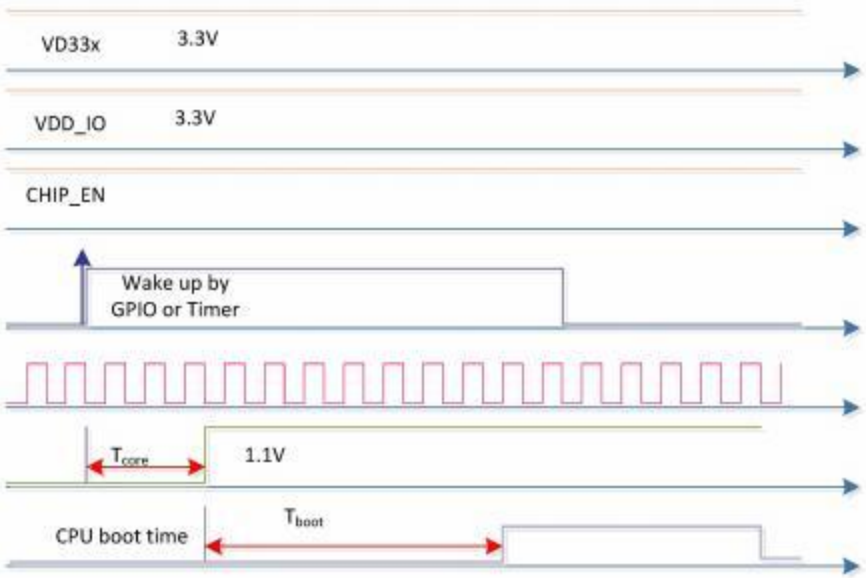
7.3 Power On Sequence



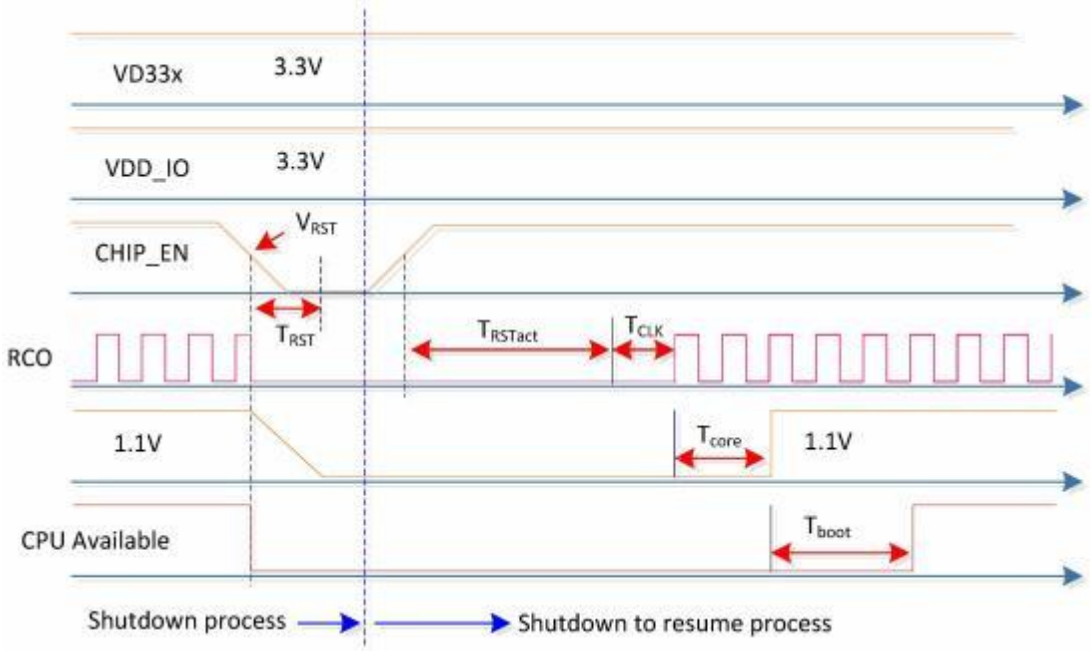
Symbol	Parameter	Minimum	Typical	Maximum	Unit
TPRDY	3.3V ready time	0.6	0.6	1	ms
T_{CLK}	Internal ring clock stable time after 3.3V ready	1			ms
T_{core}	Core power ready time	1.5	1.5		ms
T_{boot}	Application ready time				ms
V_{RST}	Shutdown occurs after CHIP_EN lower than this voltage	0	0	1.65	V
T_{RST}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

7.4 Interface Circuit time series

7.4.1 Resume from Standby

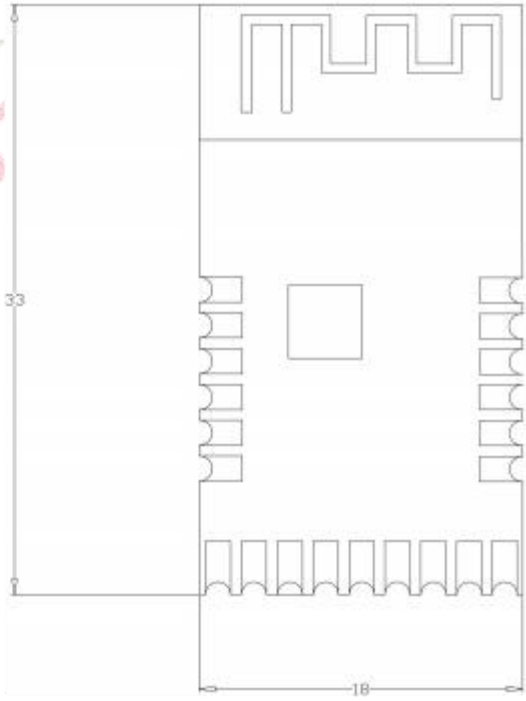


7.4.2 Shutdown Sequence



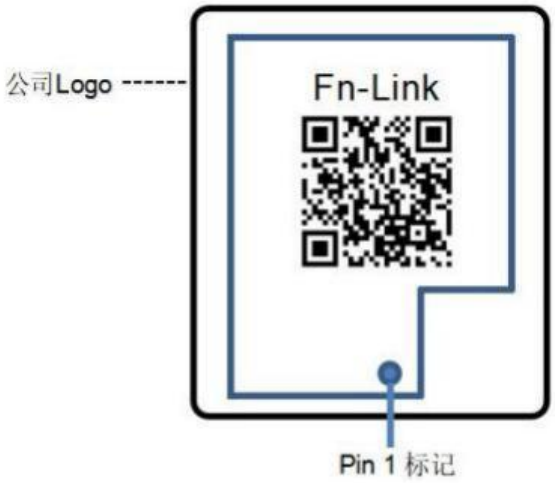
8. Size reference

8.1 Module Picture

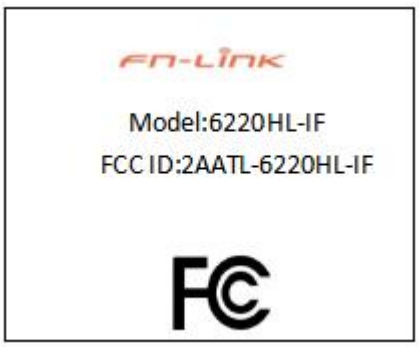
L x W : 33 x 18 (±0.2) mm 	
H:3.12(±0.2) mm	
Weight	2.37g

Note：Module Picture the actual shipment shall prevail

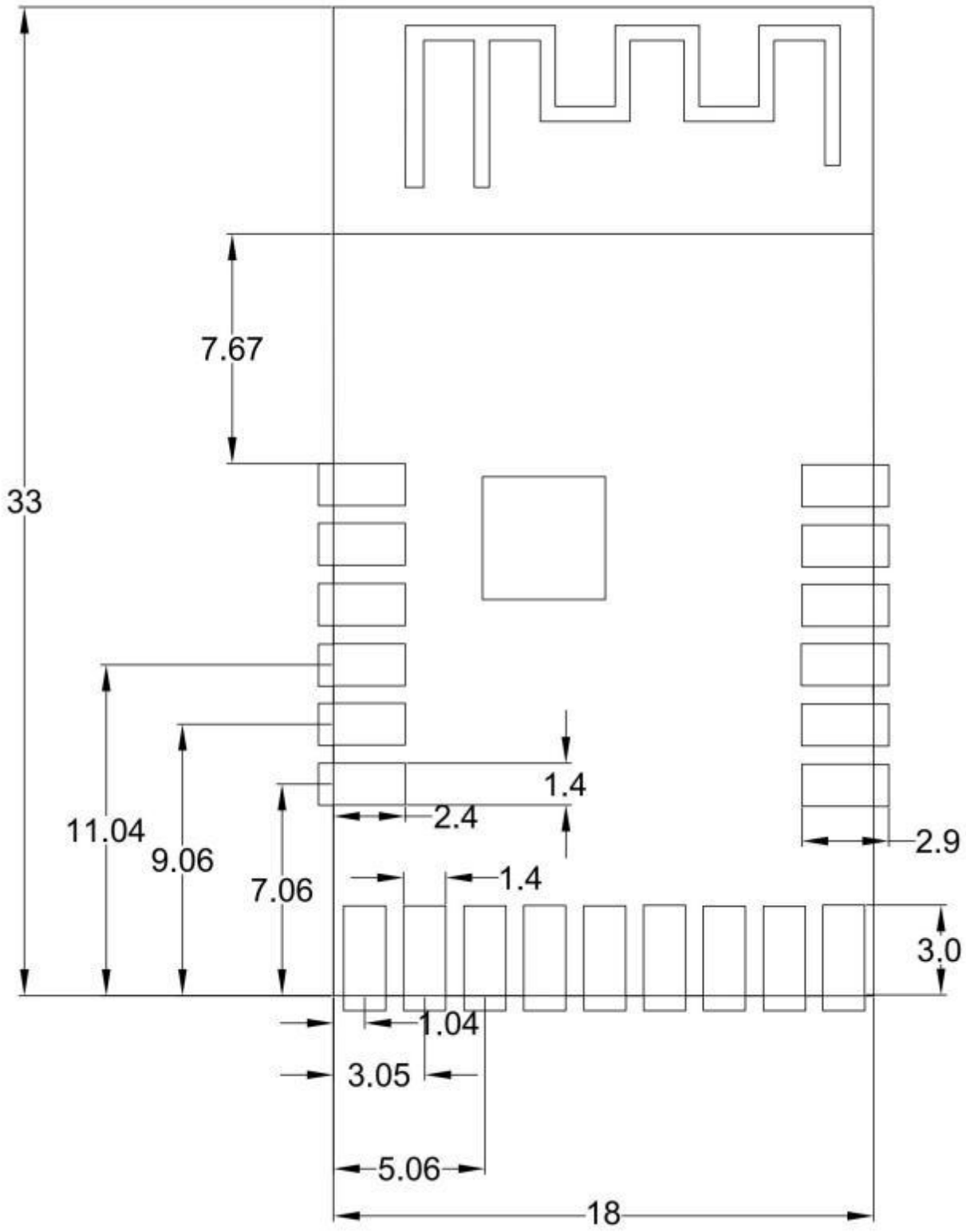
8.2 Marking Description



模组尺寸：33x18mm
屏蔽盖尺寸：22.3x15.44mm



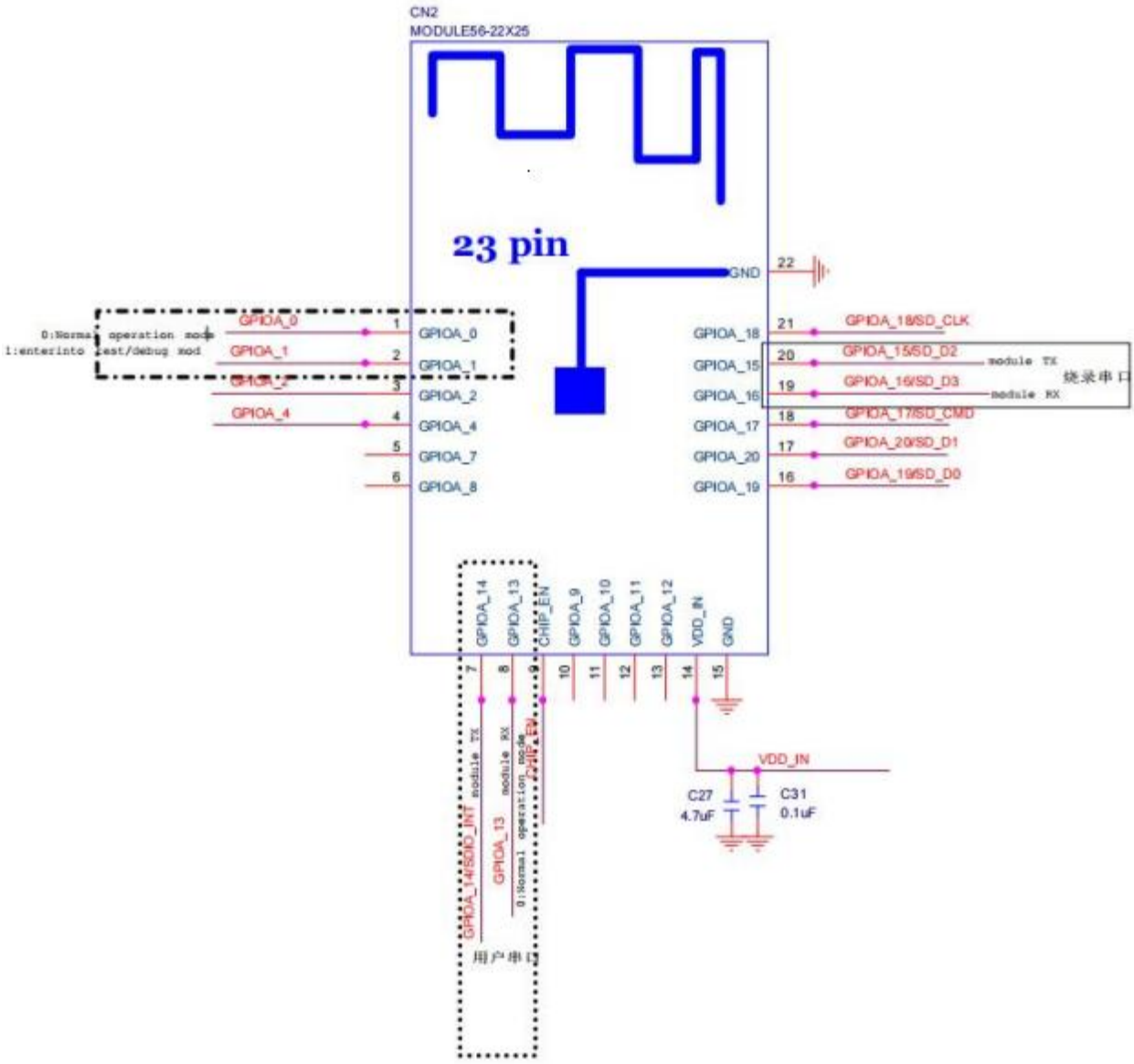
8.3 Layout Recommendation



9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Chipset	RTL8720CF-VA2-CG QFN40,5x5mm	Realtek
2	PCB	6220HL-IF-V2.0 蓝油 白字,FR4,4 层通孔,无 卤 TG150,化 金 2 μ ”, 16 连片,18x33x1.0mm	XY-PCB,KX-PCB,SL-PCB,Sunlord
3	Crystal	2016 40MHZ,12PF,±10PPM	TST,HOSONIC,TKD,ECEC,JWT
4	Shielding	6220HL-IF Shielding	信太,精力通

10. Reference Design

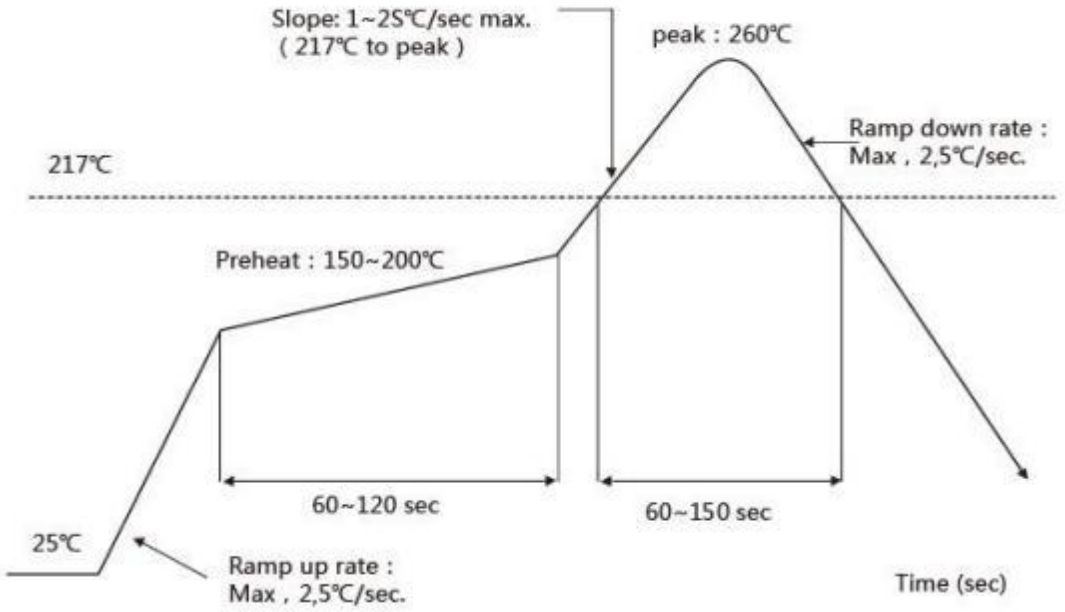


11. Recommended Reflow Profile

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

TBD

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

The Module is designed to comply with the FCC statement. FCC ID is 2AATL-6220HL-IF. The host system using Module, should have label indicated it contain modular's FCC ID: 2AATL-6220HL-IF. This radio module must not installed to collocate and operating simultaneously with other radios in host system additional testing and equipment authorization may be required to operating simultaneously with other radio.
The Module and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device.

The modular must be installed in the host that assign by Company name: FN-LINK TECHNOLOGY LIMITED, Model no.: 6220HL-IF if other host types used would need further evaluation and possible C2PC if they are not significantly similar to the one tested The WIFI Module is designed for a compact PCB design. It should be installed and operated with host or other minimum distance of 20 centimeters between the radiator and your body." To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed 1.58 dBi in 2.4G. The module uses PCB antenna, the antenna is sold with the module.

Notice to OEM integrator

The end user manual shall include all required regulatory information/warning as show in this manual. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed The intended use is generally not for the general public. It is generally for industry/commercial use. The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required, the user has no access to the connector. Installation must be controlled. Installation requires special training.
This device complies with Part 15 of the FCC Rules.
This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

2.2
This module has been assessed against the following FCC rule parts: CFR 47 FCC Part 15 C (15.247. DTS). It is applicable to the modular transmitter

2.3
This radio transmitter Module has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

The concrete contents to check are the following three points.
1) Maximum antenna gains are shown in item 2.7 below.
2) Should be installed so that the end user cannot modify the antenna
3) Feed line should be designed in 50ohm
Fine-tuning of return loss etc. can be performed using a matching network.
The antenna shall not be accessible for modification or change by the end user.

2.4
The module complies with FCC Part 15.247 and apply for Single module approval.

2.5
Trace antenna designs: applicable.
Any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. in this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.
The device must be professionally installed.
The intended use is generally not for the general public.
It is generally for industry/commercial use.
The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required.
The user has no access to the connector.
Installation must be controlled.
Installation requires special training.

2.6
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

2.7
The following antennas have been certified for use with this module.
Only antennas of the same type with equal or lower gain may also be used with this module.
Other types of antennas and/or higher gain antennas may require the additional authorization for operation.
The installer should use unique antenna connector and Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. The

manufacturer of module will inform installer to meet with the FCC part 15.203 in the warning part.
Antenna Specification list below:

BLE/2.4G WIFI:
Antenna type: PCB Antenna
The max antenna gain (in dBi):1.58 dBi

2.8
Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as "Contains FCC ID: 2AL6K-BLM8852BP2 "; any similar wording that expresses the same meaning may be used.

2.9
Testing of the host product with all the transmitters installed - referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules. The radio spectrum is to be investigated with all the transmitters in the final host product functioning to determine that no emissions exceed the highest limit permitted for any one individual transmitter as required by Section 2.947(f). The host manufacturer is responsible to ensure that when their product operates as intended it does not have any emissions present that are out of compliance that were not present when the transmitters were tested individually.
If the modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).
The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration.

2.10
Any company of the host device which install this modular should perform the test of radiated & conducted emission and spurious emission etc. according to FCC Part 15C: 15.247 and15.209 & 15.207, part 15B: class B requirement, only if the test result comply with FCC part 15C: 15.247, 15B class B requirement. Then the host can be sold legally.
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.

FCC Statement

1. 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.
(2)This device must accept any interference received, including interference that may cause undesired operation.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.
Note: This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.