FN-LINK欧智通

PRODUCT SPECIFICATION

6131E-U

Wi-Fi Dual-band 1x1 802.11a/b/g/n

Module Datasheet

Version:v5.2

6131E-U Module Datasheet

	Part NO.	Description
Ordering Information	FG6131EUXX-00	RTL8731BU/802.11a/b/g/n/1T1R, 12mm*13mm/USB (Rf is IPEX)
	FG6131EUXX-01	RTL8731BU/802.11a/b/g/n/1T1R, 12mm*13mm/USB (RF is stamp hole)

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

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Revision History

Version	Date	Contents of Revision Change	Preparde	Checked	Approved
V1.0	2020/12/24	Initial Release for DDP	-	Wxg	-
V2.0	2021/3/3	Update RF spec; Update dimensions; Update package information		Lgp	Szs
V3.0	2021/3/4	Correct typo		Lgp	Szs
V4.0	2021/6/23	update Ordering Information		Wxg	
V5.0	2021/6/24	Update the output power value		Wxg	
V5.1	2021/12/15	Update the specification format change the standaard to ±2dbm Update The Key Material List	FC	LXY	QJP
V5.2	2022/02/23	Added an encryption standard to the feature	FC		

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. The highly integrated module makes the possibilities of web browsing, VoIP, video stream applications.

With seamless roaming capabilities and advanced security, also could interact with different vendors' 802.11a/b/g/n 1x1 Access Points in the wireless LAN.

The wireless module complies with IEEE 802.11 a/b/g/n standard and it can achieve up to a speed of 150Mbps when using 40MHz bandwidth. The integrated module provides USB2.0 interface for Wi-Fi.

1.2 Description

Model Name	6131E-U
Product Description	Support Wi-Fi functionalities
Dimension	L x W x H: 12.2 x 13.0 x 2.35 mm
Wi-Fi Interface	USB 2.0
OS supported	Android /Linux/ Win CE /iOS /XP/WIN7/WIN10
Operating temperature	-20°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 2.4G(802.11b/g/n)/5G (802.11a/n) WLAN applications
- Supports 20/40MHz at 2.4GHz and 5GHz
- OFDM with BPSK, QPSK, 16QAM, 64QAM modulation, Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54Mbps in 802.11a and 802.11g, and 150Mbps in 802.11n
- Small SMT package
- 802.11i (WPA, WPA2，WPA3). Open, shared key, and pair-wise key authentication services

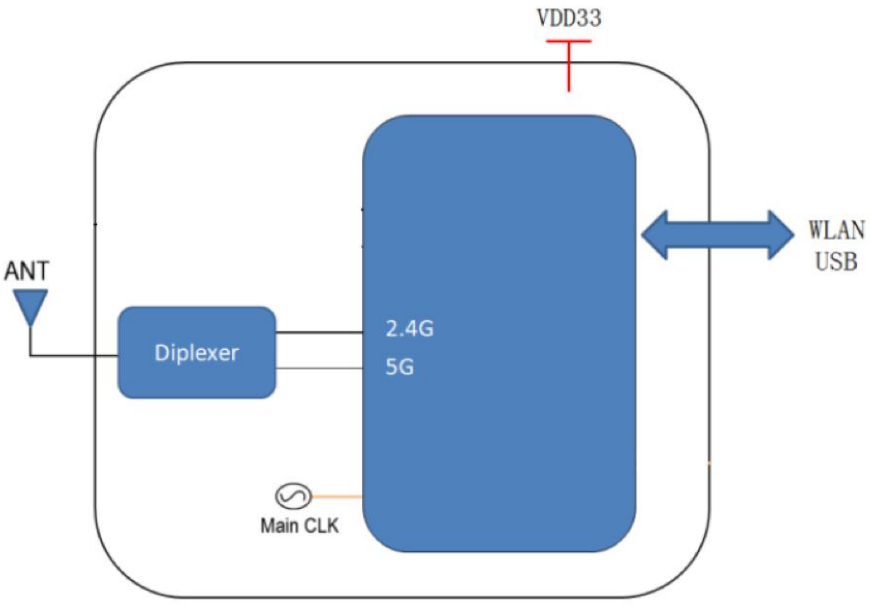
PHY Features

- Max 72.2Mbps receive PHY rate and 72.2Mbps transmit PHY rate using 20MHz bandwidth
- Max 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth

Host Interface

- Supports USB interface for WLAN

3. Block Diagram



4. General Specification

4.1 WI-FI 2.4GHz Specification

Feature	Description	
WLAN Standard	IEEE 802.11 b/g/n 1x1 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 : 21dBm ± 2 dB	EVM ≤ -9dB
	802.11g /54Mbps : 19dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7 : 18dBm ± 2 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -92 dBm	≤-85
	- 11Mbps PER @ -82 dBm	≤-76
Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps PER @ -89 dBm	≤-82
	- 54Mbps PER @ -71 dBm	≤-65
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0 PER @ -89 dBm	≤-82
	- MCS=7 PER @ -67 dBm	≤-64
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0, PER @ -87 dBm	≤-79
	- MCS=7, PER @ -65 dBm	≤-61
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	
Antenna Reference	Small antennas with 0~2 dBi peak gain	

Note: Other data rates transmit power are controlled by Power-by-Rate function of the driver.

4.2 Wi-Fi 5GHz RF Specification

Feature	Description	
WLAN Standard	IEEE 802.11a/n 1x1, Wi-Fi compliant	
Frequency Range	5.150 GHz ~ 5.850 GHz (5.0 GHz Band)	
Number of Channels	5.0GHz：Please see the table1	
Test Items	**Typical Value**	**EVM**
Output Power	802.11a /54Mbps: 17 dBm ± 2 dB	EVM ≤ -25dB
	802.11n /MCS7: 16 dBm ± 2 dB	EVM ≤ -28dB
Test Items	**Test Value**	**Standard Value**

Receive Sensitivity (11a, 20MHz) @10% PER	- 6Mbps	≤ -89 dBm	≤ -82 dBm
	- 54Mbps	≤ -71 dBm	≤ -65 dBm
Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	≤ -89 dBm	≤ -82 dBm
	- MCS=7	≤ -67 dBm	≤ -64 dBm
Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0	≤ -87 dBm	≤ -79 dBm
	- MCS=7	≤ -65 dBm	≤ -61 dBm
Maximum Input Level	802.11a/n: -30 dBm		
Antenna Reference	Small antennas with 0~2 dBi peak gain		

Note: Other data rates transmit power are controlled by Power-by-Rate function of the driver.

[1]5GHz Channel table

Band (GHz)	Operating Channel Number	Channel Center Frequency (MHz)
5.15GHz~5.25GHz	36	5180
	40	5200
	44	5220
	48	5240
5.25GHz~5.35GHz	52	5260
	56	5280
	60	5300
	64	5320
5.5GHz~5.7GHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
	140	5700
5.725GHz~5.825GHz	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

5. ID setting information

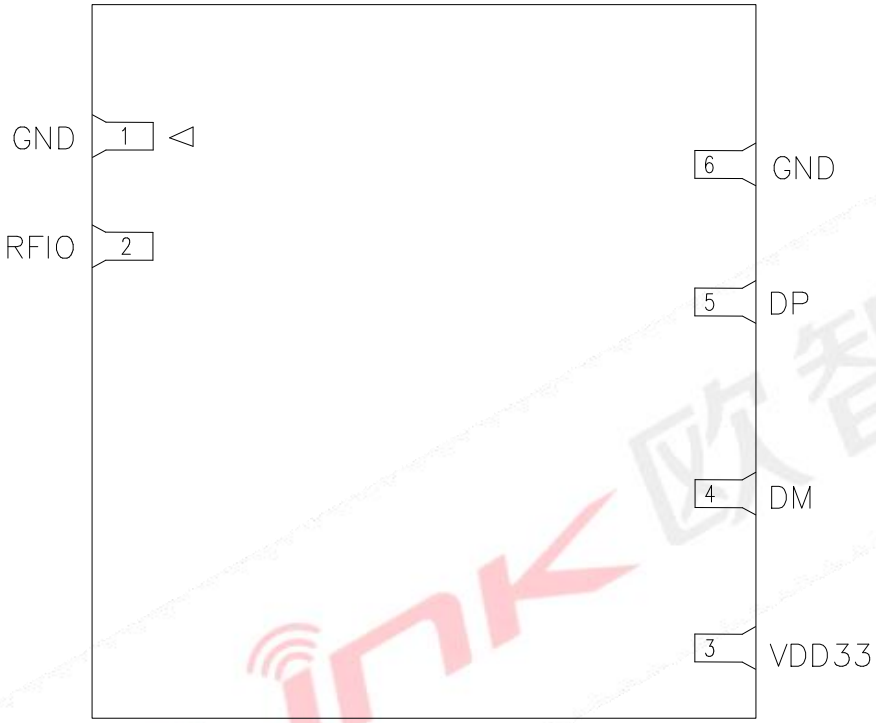
WI-FI

Vendor ID	TBD
Product ID	TBD

6. Pin Definition

6.1 Pin Outline

< TOP VIEW >



6.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	RFIO	I/O	RF I/O, dual band Wi-Fi	
3	VDD33	P	Main power input 3.3V	3.3V
4	USB_DM	I/O	USB2.0 differential pair D-	
5	USB_DP	I/O	USB2.0 differential pair D+	
6	GND	—	Ground connections	

P:POWER I:INPUT O:OUTPUT

7. Electrical Specifications

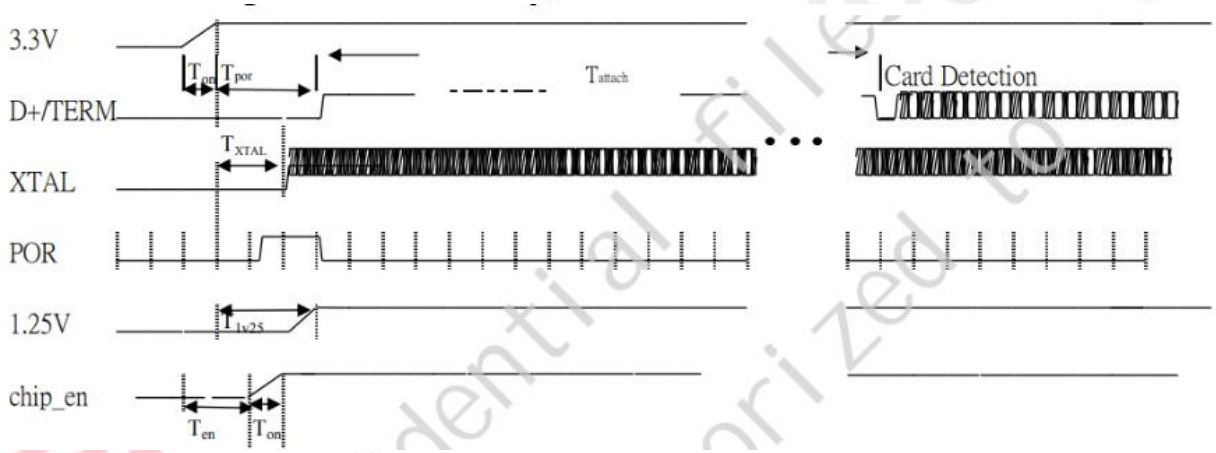
7.1 Power Supply DC Characteristics

The digital IO supports VDD33 or VDD18 application.

	MIN	TYP	MAX	Unit
Operating Temperature	-20	25	70	deg.C
VCC33	3.0	3.3	3.6	V

7.2 Interface Circuit time series

7.2.1 USB Bus Timing 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

The power on flow Description:

The power on flow description : After main 3.3V ramp up, the internal power on reset is released by power ready detection circuit and the power management unit will be 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.

The typical timing range:

	Unit	Min	Typical	Max
T_{on}	ms	0.2	1.5	5
Tpor	ms	--	2	10
Txtal	ms	--	1.5	8
T_{attach}	ms	100	250	-
T_{1v25}	ms	0	0	5

7.2.2 Power off by 3.3V power sequence

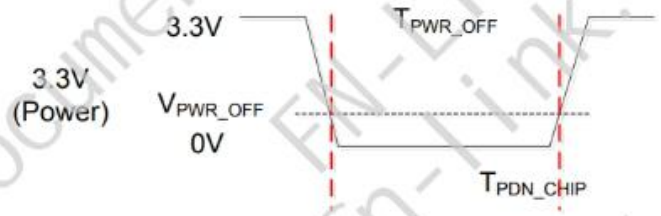


Figure 6. RTL8731BU-CG Power Off by 3.3V power Sequence

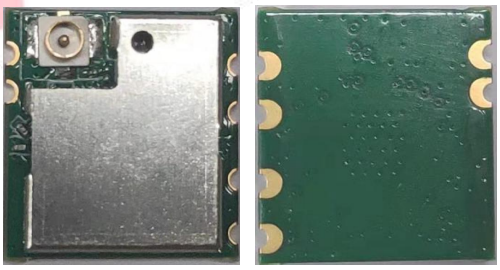
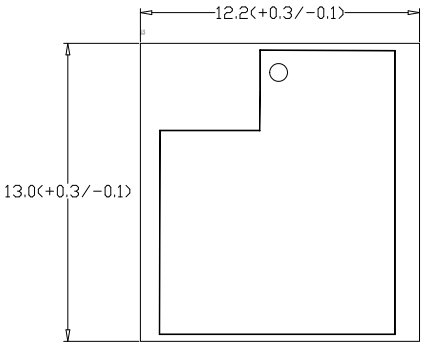
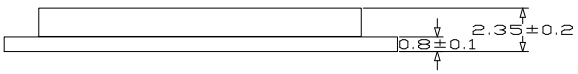
Table 14. RTL8731BU-CG Power Off by 3.3V power Timing Parameters

	Min	Typical	Max	Unit	Description
T_{PWR_OFF}	100	200	--	ms	3.3V power off time
V_{PWR_OFF}	--	--	0.7	V	3.3V power off voltage

When 3.3V power off and on afterward, the voltage of 3.3V power must keep lower than VPWR_OFF , and the 3.3V power keeping off duration must be more than TPWR_OFF

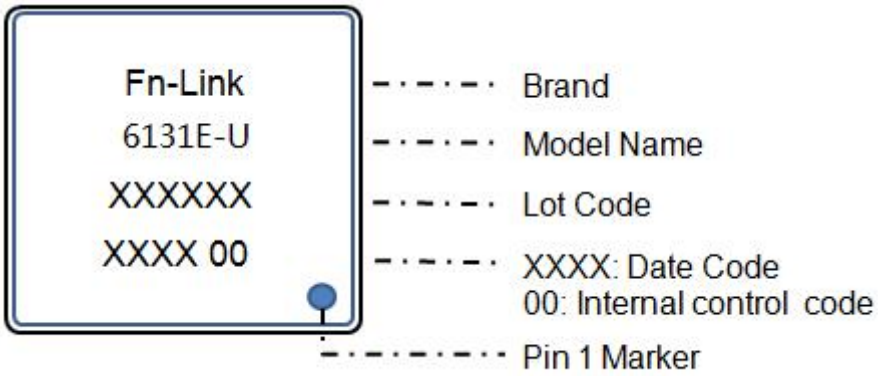
8. Size reference

8.1 Module Picture

L x W : 12.2 x 13.0 (+0.3/-0.1) mm 	
H: 2.35 (±0.2) mm	
Weight	0.65g

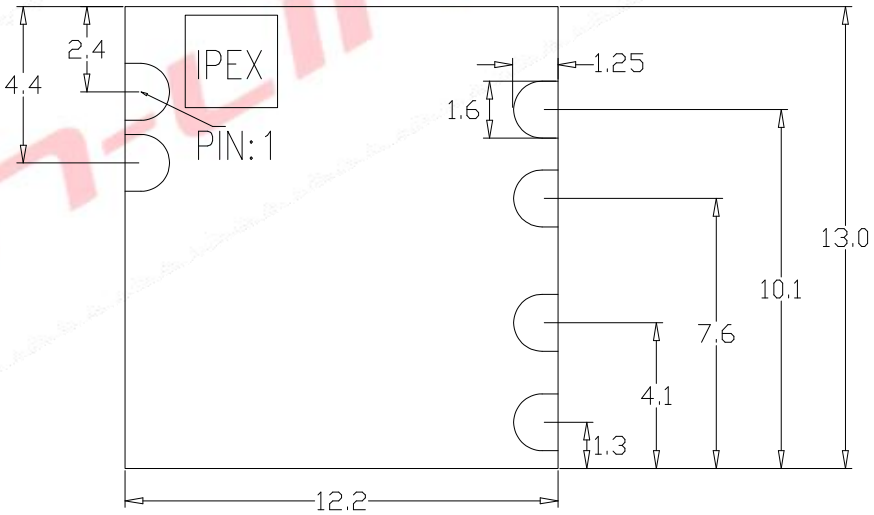
8.2 Marking Description

< TOP VIEW >

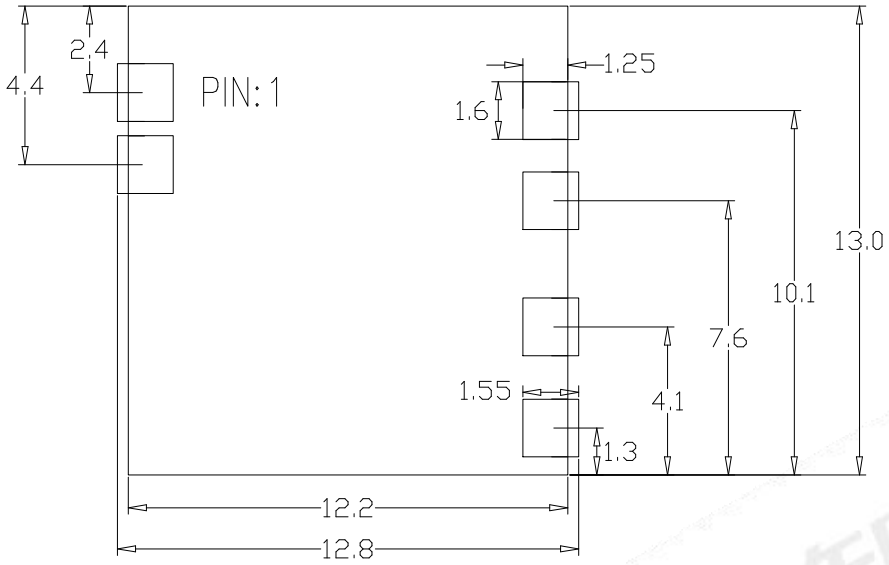


8.3 Physical Dimensions

<TOP View>



8.4 Layout Recommendation



9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2016,2.2uH,2x1.6x1mm	Cenker, Sunlord, Ceaiya
2	Crystal	2016, 40MHz,12pF	Murata, ECEC,TKD, Hosonic, JWT, TXC
3	Chipset	RTL8731BU	Realtek
4	PCB	FR4, 4 LAYER, GREEN	XY-PCB, GDKX, Sunlord, SLPCB

10. Reference Design

10.1 Reference Design

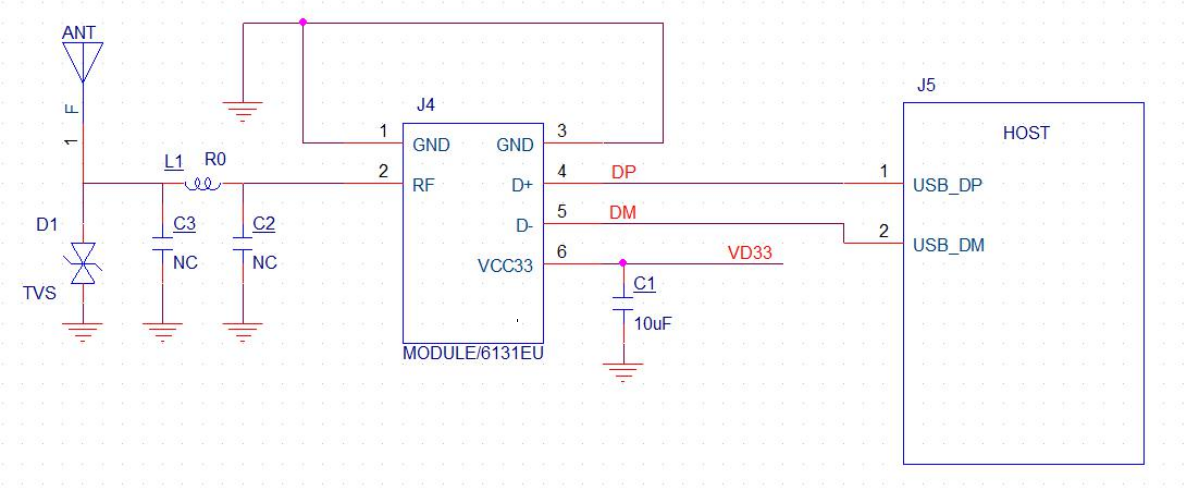
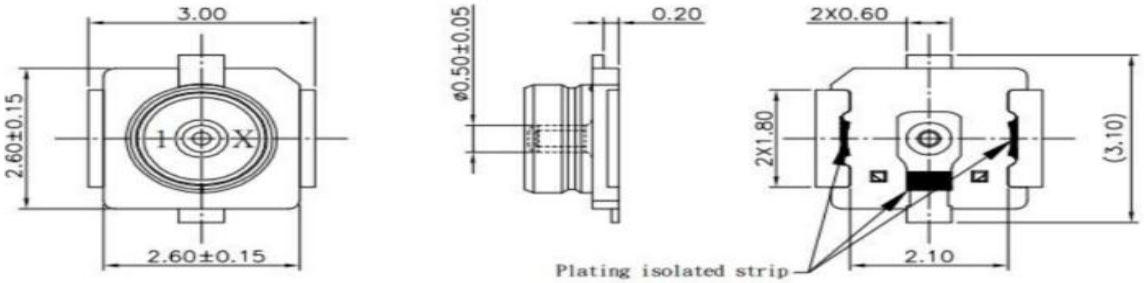


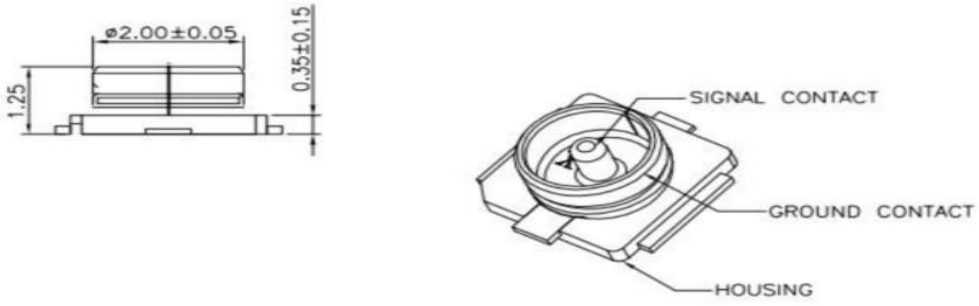
Figure 6-1 Reference Schematic

Note: Module requires independent power supply , supply capacity ≥ 1200mA and ripple less than 100mV; Do not share power with amplifier, infrared device, camera, etc.

USB differential trace, please keep 90 ohm.

10.2 RF Connector





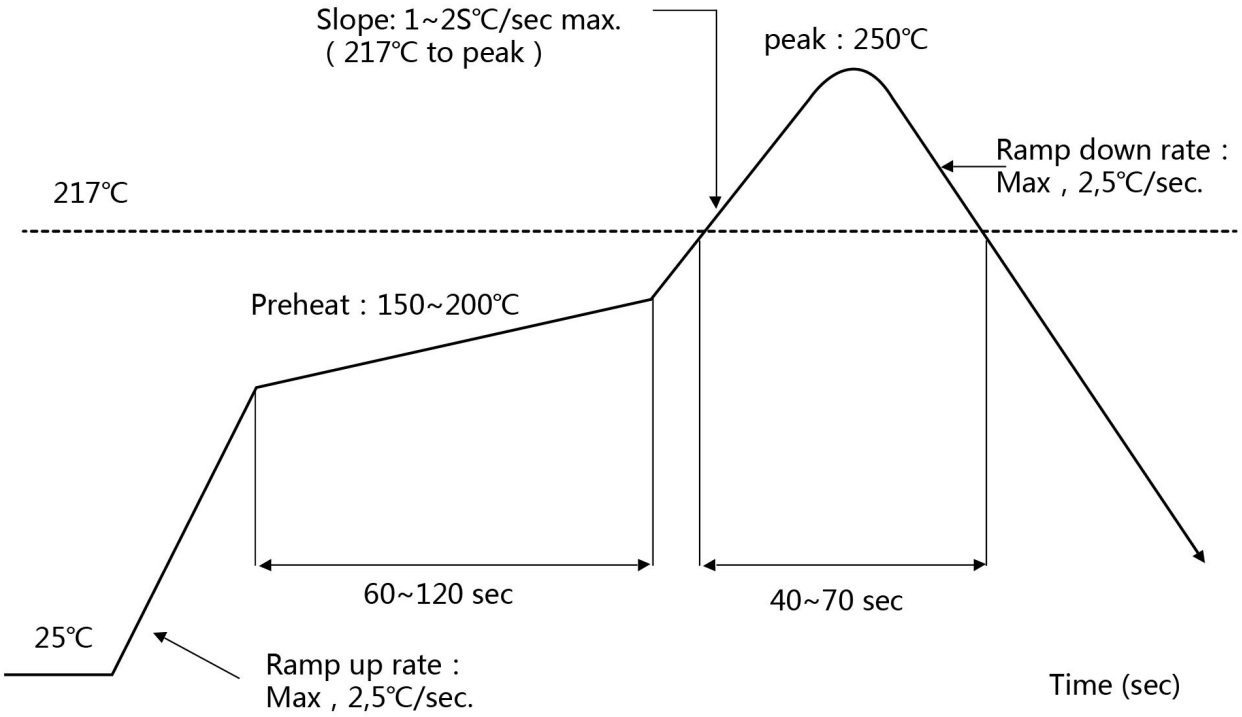
Note: The RF connector is an IPEX I connector.

11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



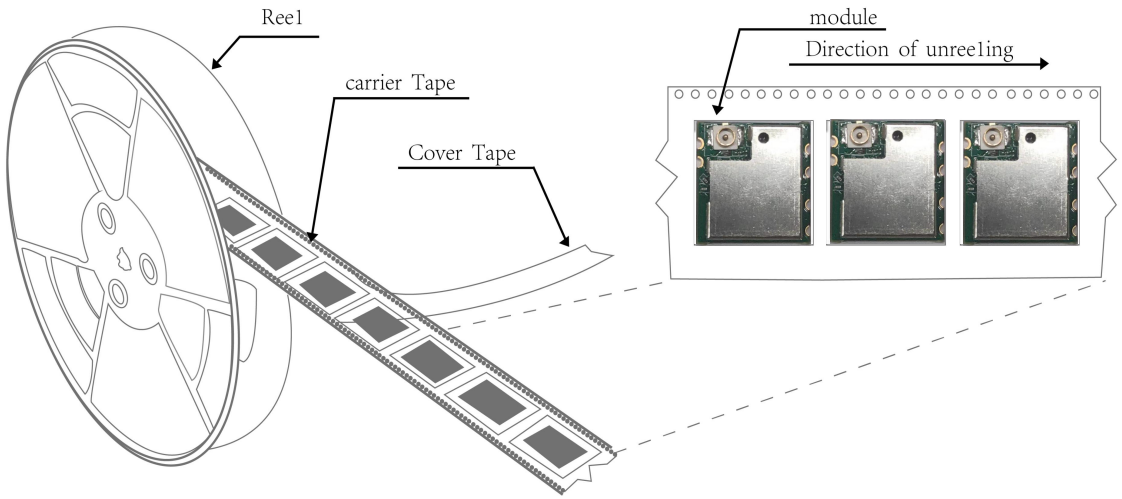
12. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

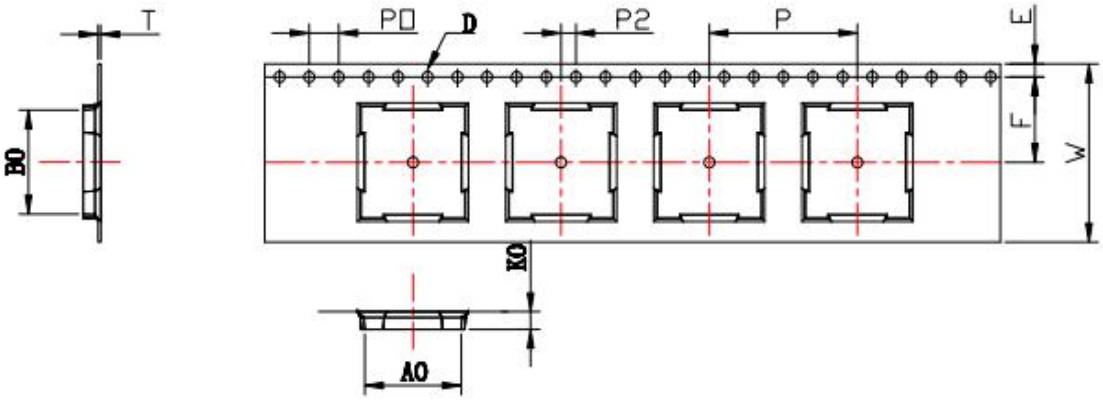
13. Package

13.1 Reel

A roll of 1500pcs



ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.50	13.50	1.50	11.5	1.75	2.40	4.0	2.0	20.0	0.30
TOLE	+0.3 -0.3	±0.15	±0.15	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05



13.2 Packaging Detail

the take-up package

Using self-adhesive tape

Color of plastic disc: blue

NY bag size:TBD

size ： 350*350*35mm

The packing case size:360*370*210

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

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