

## PRODUCT SPECIFICATION

# 6233B-UUB

Wi-Fi Dual-band 1T1R 802.11a/b/g/n + Bluetooth 5.2

Combo Module

Version:v2.1

Customer: \_\_\_\_\_

Customer P/N: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

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## 6233B-UUB Module Datasheet

	Part NO.	Description
<b>Ordering Information</b>	FG6233BUUB-00	RTL8733BU-CG/802.11a/b/g/n/ WiFi+BT5.2, 1T1R, 13*15 ,USB, two-ANT, with shielding

Target Power:

2.4G: 16/15/14

5.8G: 15/14

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### Revision History

Version	Date	Contents of Revision Change	Prepared	Checked	Approved
V1.0	2022/10/27	New version	LTK	LTK	QJP
V2.0	2022/12/20	Timing change	LTK	LTK	QJP
V2.0	2022/12/20	Index Change	LTK	LTK	QJP
V2.1	2023/04/08	Update Module Picture	LXP	ZL	QJP

## 1. General Description

### 1.1 Introduction

6233B-UUB is a highly integrated module with Realtek 8733BU-CG single-chip 802.11a/b/g/n 1T1R WLAN, and an integrated Bluetooth 5.2 combo chip with USB 2.0 multi-function. 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	6233B-UUB
Product Description	Support Wi-Fi/Bluetooth functionalities
Dimension	L x W x H: 13 x 15 x2.3 (typical) mm
Wi-Fi Interface	Support USB 2.0
BT Interface	USB2.0
Operating temperature	0 °C to 70 °C
Storage temperature	-55 °C to 125 °C

## 2. Features

### General

- 802.11a/b/g/n 1T1R WLAN and Bluetooth 5.2 combo chip
- Complete 802.11n solution for both 2.4GHz and 5GHz band
- 72.2Mbps receive PHY rate and 72.2Mbps transmit PHY rate using 20MHz bandwidth
- 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth
- Maximum data rate 54Mbps in 802.11g; and 150Mbps in 802.11n

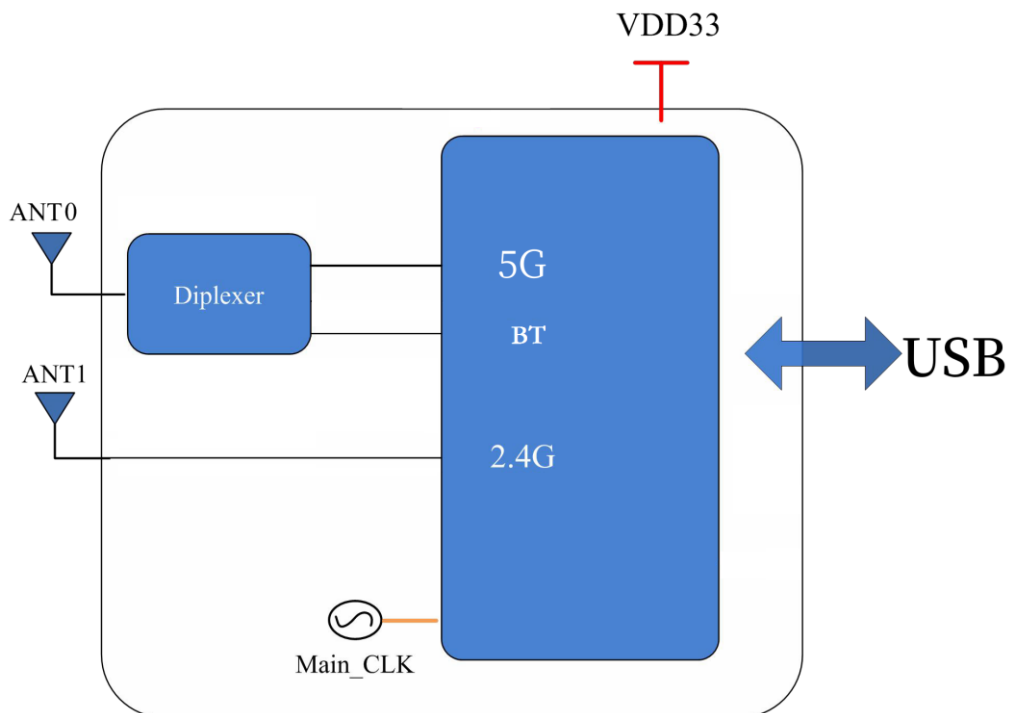
### Host Interface

- USB Multi-Function for both BT (USB function 0) and WLAN (USB function 1)

### Bluetooth Features

- Supports Bluetooth multiple Low Energy states
- Bluetooth 5.2 Dual Mode support: Simultaneous LE and BR/EDR
- Small SMT package

## 3. Block Diagram



## 4. General Specification

### 4.1 WI-FI 2.4GHz 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 : 16dBm $\pm$ 2 dB	EVM $\leq$ -9dB
	802.11g /54Mbps : 15dBm $\pm$ 2 dB	EVM $\leq$ -25dB
	802.11n /MCS7 : 14dBm $\pm$ 2 dB	EVM $\leq$ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	$\pm$ 20ppm	
Test Items	TYP Test Value	Standard Value
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 11Mbps PER @ -85 dBm	$\leq$ -81
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 54Mbps PER @ -71 dBm	$\leq$ -67
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 PER @ -68 dBm	$\leq$ -65
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7, PER @ -65 dBm	$\leq$ -62
Maximum Input Level	802.11b : -10 dBm	
	802.11g/n : -20 dBm	

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 802.11 a/n Wi-Fi compliant	
Frequency Range	5.150 GHz ~ 5.850 GHz (5.0 GHz Band)	
Number of Channels	5.0GHz: Please see the following table1	
Test Items	Typical Value	EVM
Output Power	802.11a /54Mbps : 15dBm $\pm$ 2 dB	EVM $\leq$ -25dB
	802.11n /MCS7 : 14dBm $\pm$ 2 dB	EVM $\leq$ -28dB
Spectrum Mask	Meet with IEEE standard	

Freq. Tolerance	± 20ppm	
<b>Test Items</b>	<b>TYP Test Value</b>	<b>Standard Value</b>
SISO Receive Sensitivity (11a,20MHz) @10% PER	- 54Mbps PER @ -71 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=7 PER @ -68 dBm	≤-65
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=7, PER @ -65 dBm	≤-62
Maximum Input Level	802.11a/n : -10 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.

**<sup>1</sup>5GHz(20MHz) Channel table**

<b>Band range</b>	<b>Operating Channel Numbers</b>	<b>Channel center frequencies(MHz)</b>
5180MHz~5240MHz	36	5180
	40	5200
	44	5220
	48	5240
5260MHz~5320MHz	52	5260
	56	5280
	60	5300
	64	5320
5550MHz~5700MHz	100	5500
	104	5520
	108	5540
	112	5560
	116	5580
	120	5600
	124	5620
	128	5640
	132	5660
	136	5680
5745MHz~5825MHz	140	5700
	149	5745
	153	5765
	157	5785



	161	5805
	165	5825

### 4.3 Bluetooth Specification

Feature	Description		
<b>General Specification</b>			
Bluetooth Standard	Bluetooth V5.2		
Host Interface	USB		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	GFSK, $\pi/4$ -DQPSK, 8-DPSK		
<b>RF Specification</b>			
	<b>Min(dBm)</b>	<b>Typical(dBm)</b>	<b>Max(dBm)</b>
Output Power (Class 1)	2	8	10
Sensitivity @ BER=0.1% for GFSK (1Mbps)			-70
Sensitivity @ BER=0.01% for $\pi/4$ -DQPSK (2Mbps)			-70
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)			-70
Maximum Input Level	GFSK (1Mbps):-20dBm		
	$\pi/4$ -DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

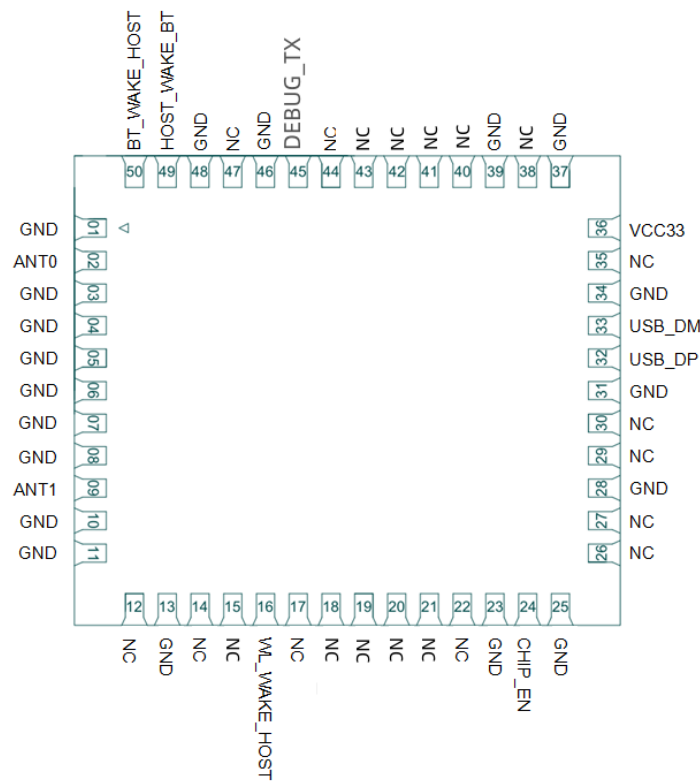
## 5. ID setting information

WI-FI

Vendor ID	-
Product ID	-

## 6. Pin Definition

### 6.1 Pin Outline



### 6.2 Pin Definition details

PIN	Name	Type	Description	Voltage
1	GND	—	Ground connections	
2	ANT0	I/O	RF I/O BT&5G WIFI	
3~8	GND	—	Ground connections	
9	ANT1	I/O	RF I/O 2.4G WIFI	
10~11	GND	—	Ground connections	
12	NC	—	Not connected	

13	GND	—	Ground connections	
14	NC	—	Not connected	
15	NC	—	Not connected	
16	WL_WAKE_HOST	O	WLAN to wake-up HOST	
17~22	NC	—	Not connected	
23	GND	—	Ground connections	
24	CHIP_EN	I	Enable pin for chipset. Pull low to enable	3.3V
25	GND	—	Ground connections	
26~27	NC	—	Not connected	
28	GND	—	Ground connections	
29~30	NC	—	Not connected	
31	GND	—	Ground connections	
32	USB_DP	I/O	USB2.0 differential pair D+ for WLAN and Bluetooth	
33	USB_DM	I/O	USB2.0 differential pair D- for WLAN and Bluetooth	
34	GND	—	Ground connections	
35	NC	—	Not connected	
36	VCC33	P	Main power input 3.3V	3.3V
37	GND	—	Ground connections	
38	NC	—	Not connected	
39	GND	—	Ground connections	
40~44	NC	—	Not connected	
45	DEBUG_TX	O	Debug UART TXD	
46	GND	—	Ground connections	
47	NC	I	Not connected	
48	GND	—	Ground connections	
49	HOST_WAKE_BT	I	HOST to wake-up Bluetooth device	
50	BT_WAKE_HOST	O	Bluetooth device to wake-up HOST	

P:POWER I:INPUT O:OUTPUT

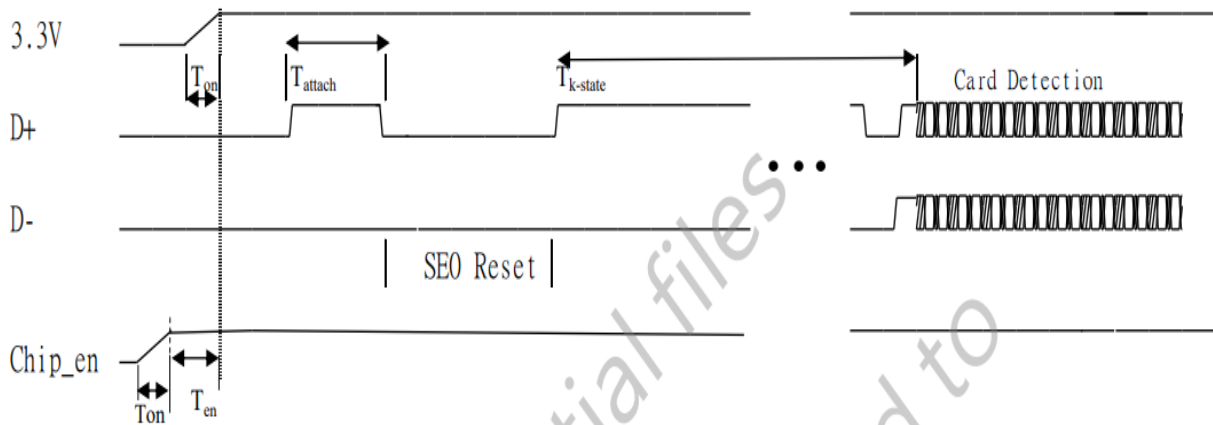
## 7. Electrical Specifications

### 7.1 Power Supply DC Characteristics

	Min.	Typ.	Max.	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.15	3.3	3.45	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 resistors to indicate the insertion of the USB device.

	Unit	Min	Typical	Max
<b>Ton</b>	ms	0.2	1.5	5

<b>Tpor</b>	ms	--	2	10
<b>Txtal</b>	ms	--	1.5	8
<b>Tattach</b>	ms	100	250	-
<b>T1v25</b>	ms	0	0	5

### 7.2.2 Power off by 3.3V power sequence

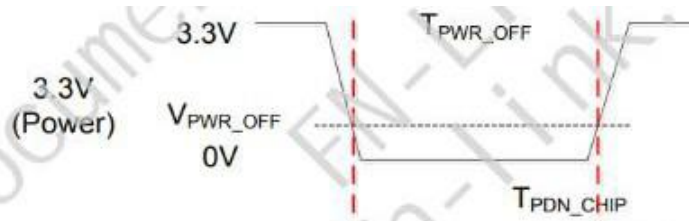


Figure 6. RTL8731BU-CG Power Off by 3.3V power Sequence

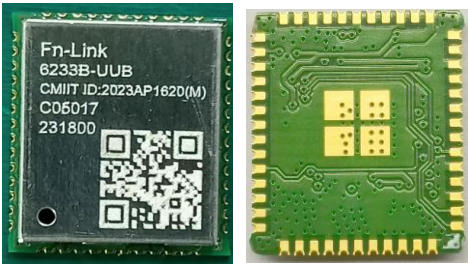
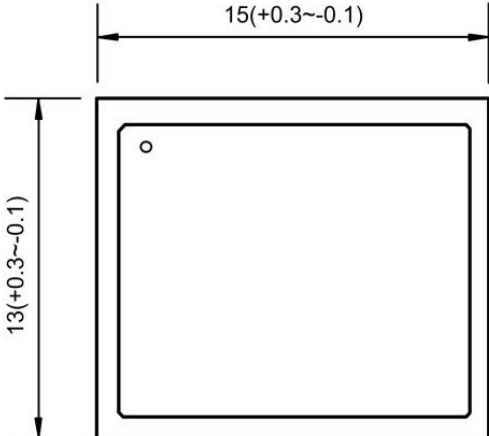

Table 14. RTL8731BU-CG Power Off by 3.3V power Timing Parameters

	Min	Typical	Max	Unit	Description
TPWR_OFF	100	200	--	ms	3.3V power off time
VPWR_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

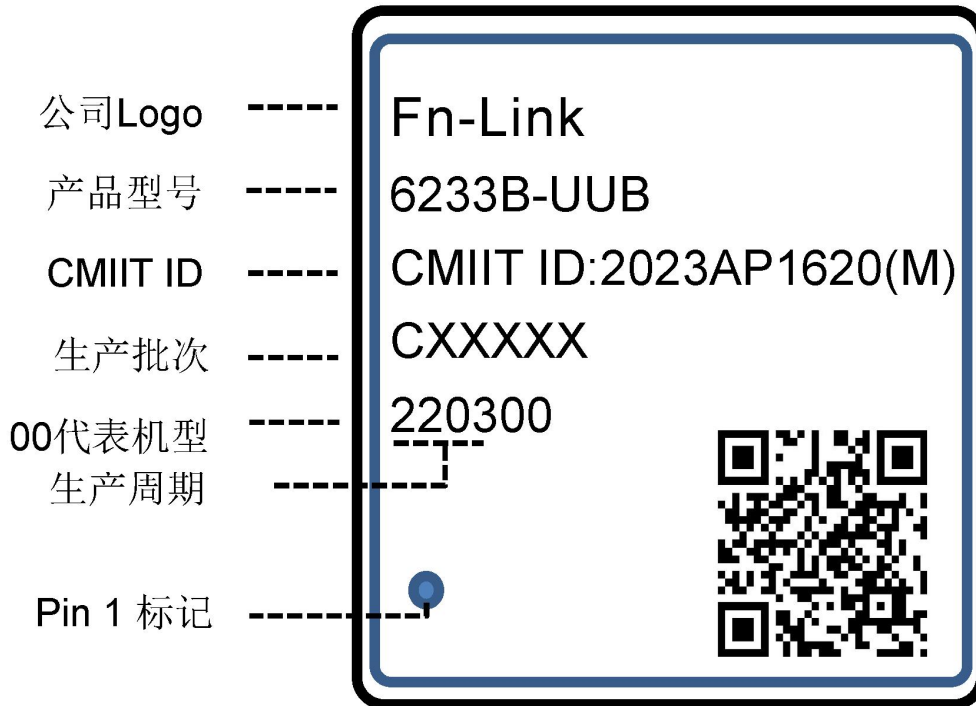
## 8. Size reference

### 8.1 Module Picture

<p><b>L x W : 13 x 15 (+0.3/-0.1) mm</b></p> 	
<p><b>H: 2.3 (±0.2) mm</b></p>	
<p><b>Weight</b></p>	<p>0.85g</p>

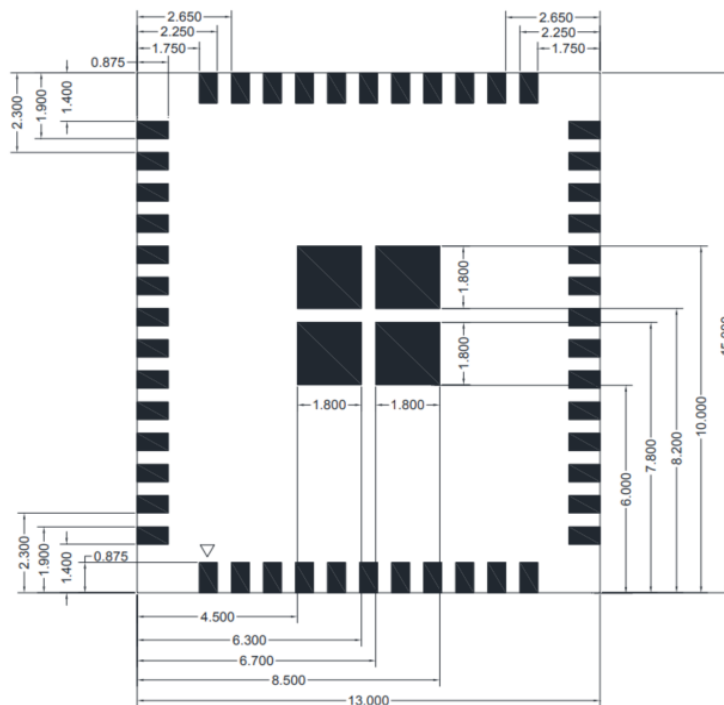
### 8.2 Marking Description

< TOP VIEW >

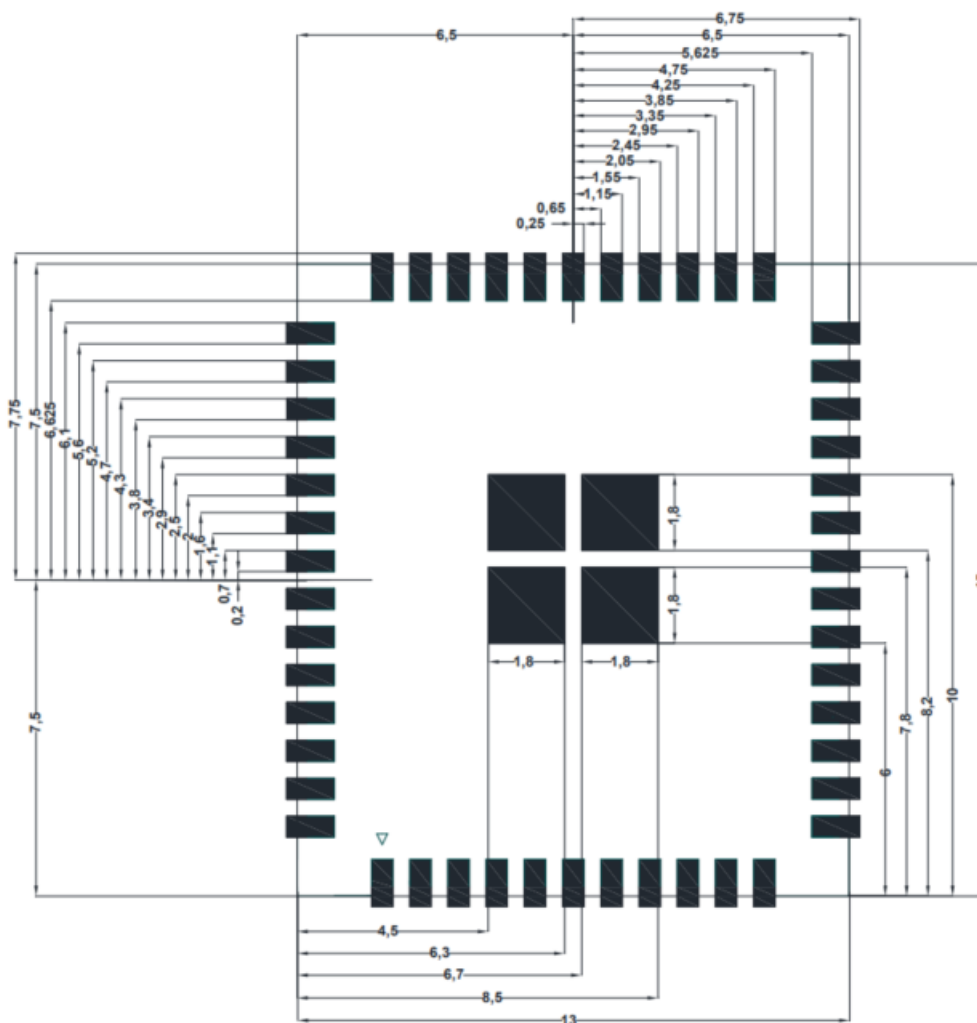


### 8.3 Physical Dimensions

<TOP View>



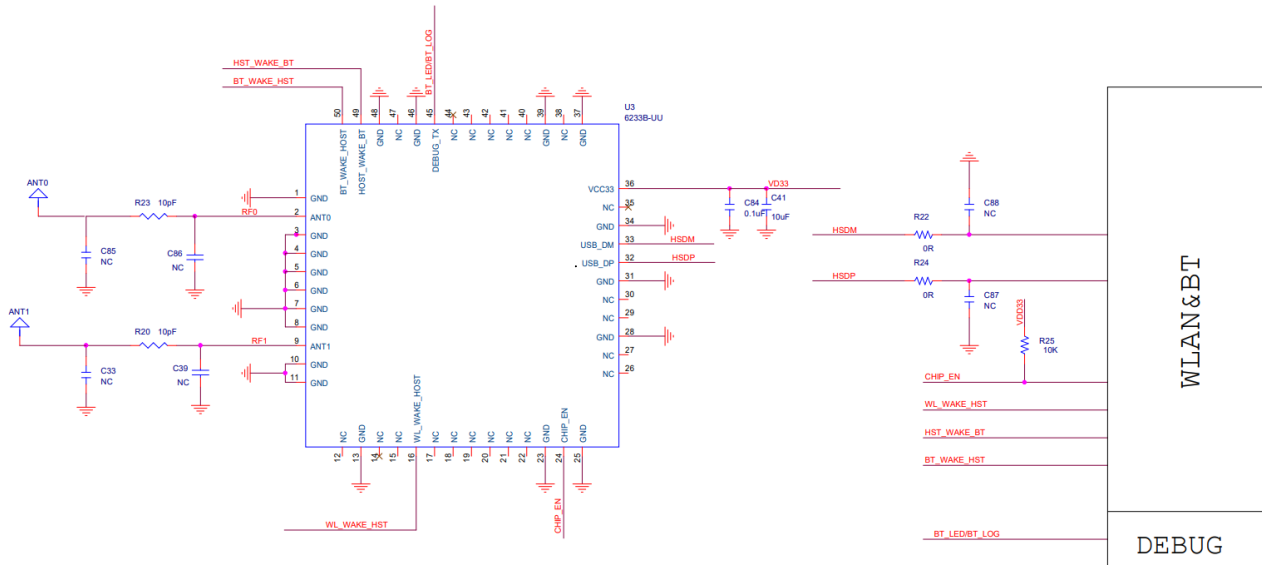
### 8.4 Layout Recommendation



### 9. The Key Material List

Item	Part Name	Description	Manufacturer
1	Inductor	2016,2.2uH, ±20%,DCR 0.264Ω,耐流 1.1A	Sunlord,Ceaiya,cenker,TAIYO,Chilisin,INPAQ
2	Diplexer	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	Glead, Walsin, ACX, Murata, MAGLAYERS,TDK,FTR
3	Crystal	2016 40MHz 10ppm 12PF -20-85° C	ECEC, TKD, Hosonic, JWT, TXC
4	Chipset	RTL8733BU-CG,QFN40	Realtek
5	PCB	6233B-UUB-V2.0PCB green,4layer,FR4,13X15X0.8mm	XY-PCB,GDKX,Sunlord,SL-PCB,TRULY
6	Shielding	6221B-UUC-V1.0,shielding,13.65x11.65x1.55mm,T=0.15mm	信太, 精力通, 卓益

## 10. Reference Design

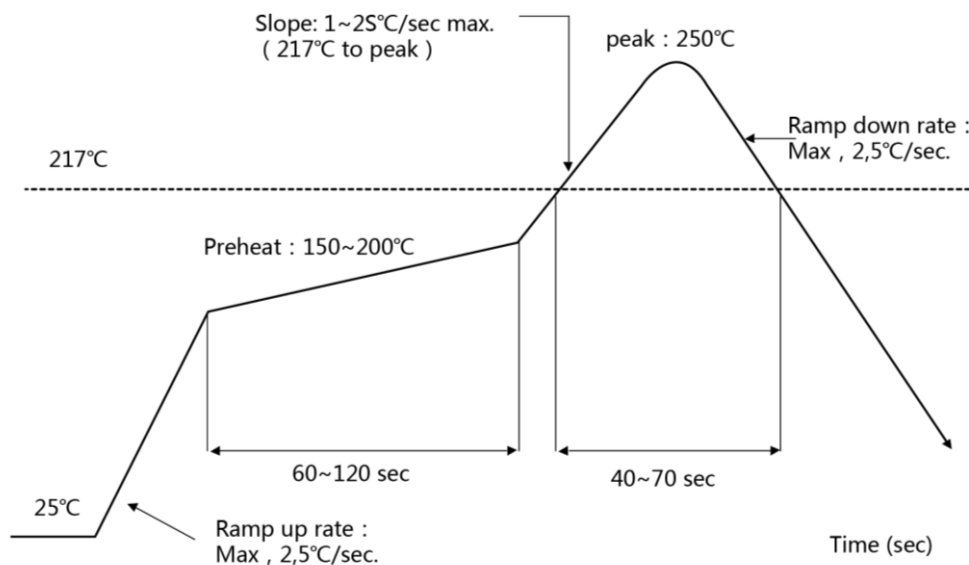


## 11. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : ≤2 times



## 12. RoHS compliance

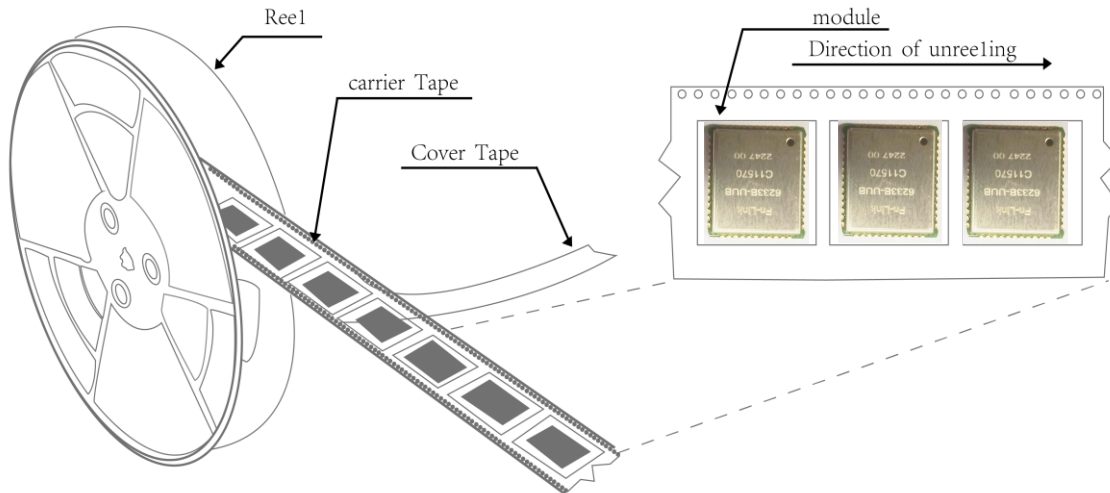
All hardware components are fully compliant with EU RoHS directive



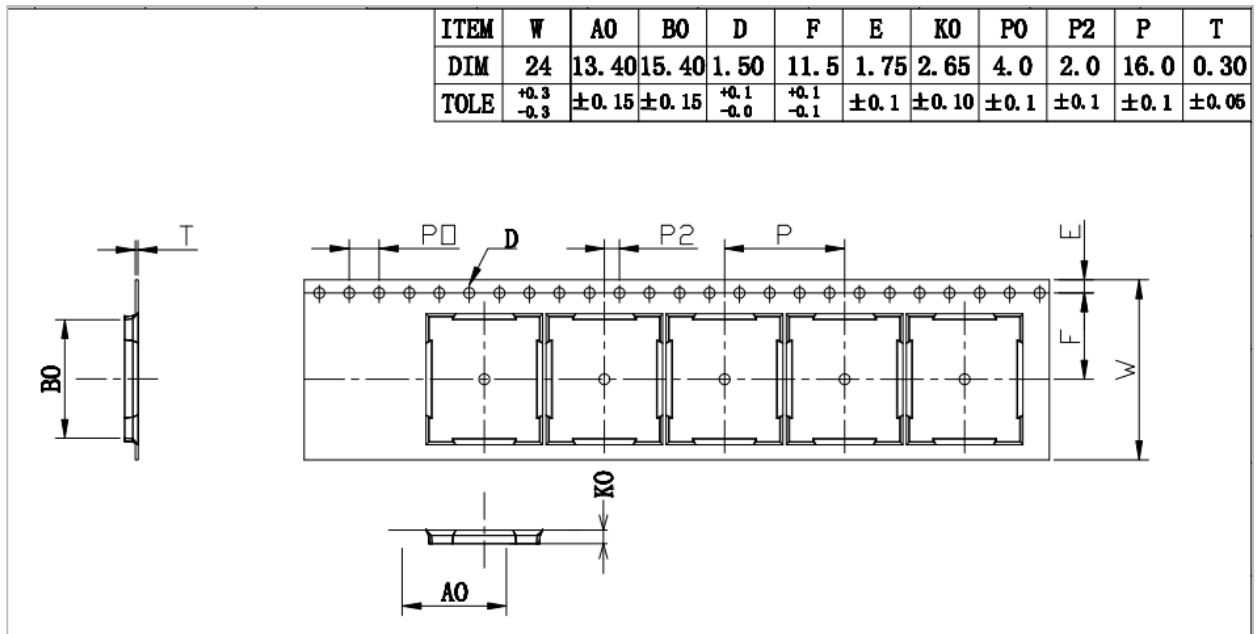
### 13. Package

#### 13.1 Reel

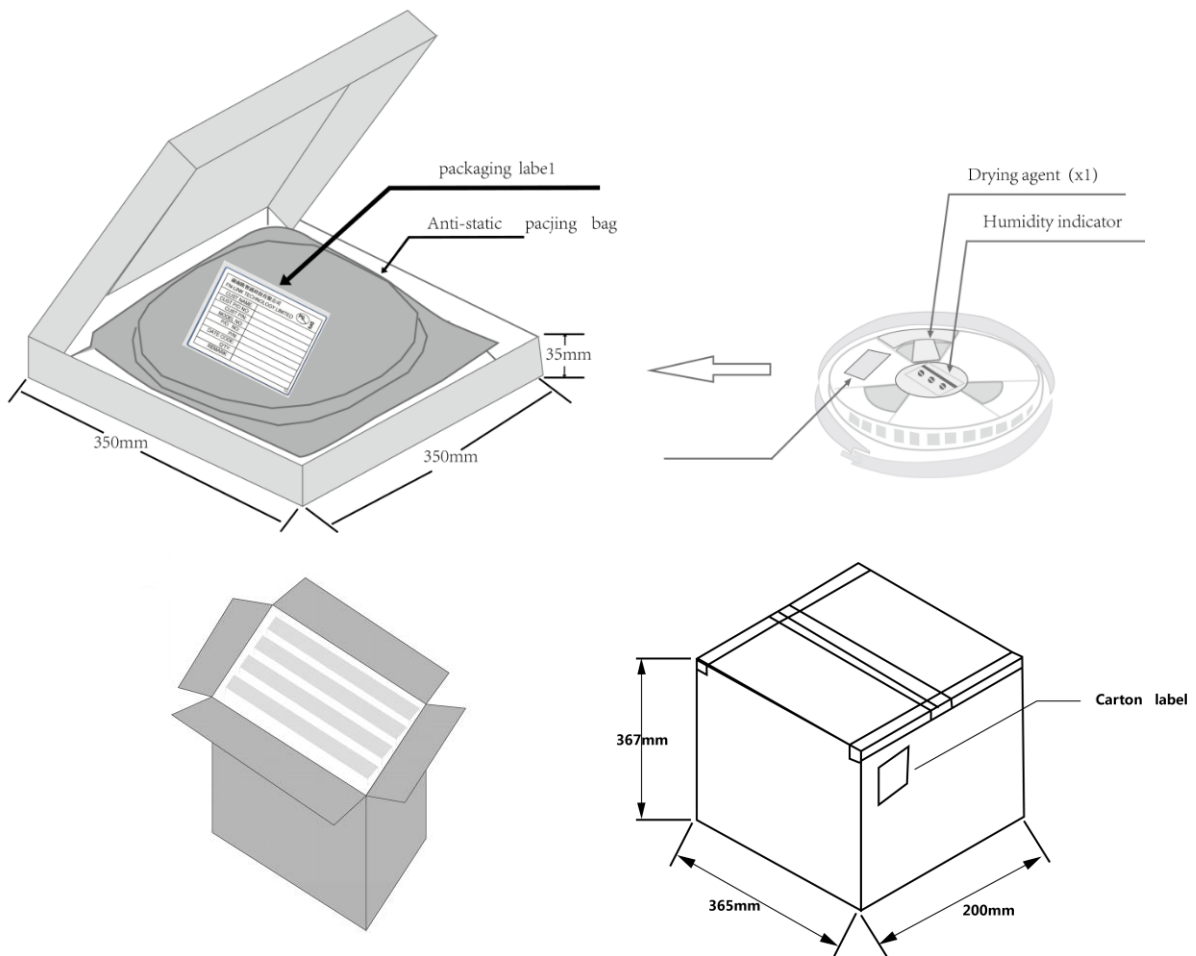
A roll of 1500pcs



#### 13.2 Carrier Tape Detail



### 13.3 Packaging Detail



### 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